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Where manufacturing begins

The European machine tool industry's Manifesto on skills

IMPROVE THE IMAGE OF MANUFACTURING

ENSURE THE SECURITY OF SKILLS SUPPLY

BRIDGE THE GAP BETWEEN EDUCATION AND PRODUCTION

BUILD MANUFACTURING SKILLS OF THE 21ST CENTURY

USE THE FULL POTENTIAL OF THE EU

EUROPE TO RAISE TO THE SKILLS CHALLENGE

The European machine tool industry is a strategic enabling industry which provides production equipment and solutions to other manufacturing sectors. It is a global heavyweight generating one third of the world's machine tool output and two fifth of global exports. The strength of the machine tool (MT) industry lies in the density and richness of the resources available in the European industrial eco-system. A strong skills base is a major factor underlying the competitiveness of the sector worldwide.

Nevertheless, the ageing European society and shrinking of its active population put the supply of talent at risk. Moreover, skills requirements in manufacturing industries have considerably changed over the last decade, owing to globalization, industrial restructuring, technological change, the increasing role of ICT in everyday life and new patterns of work organization. As a result many manufacturing sectors, including machine tools, have an increasing need for higher levels of competences when it comes to technical specialization, practical and transversal skills.

Unfortunately, education and training systems in Europe have proven to be unprepared to respond to the skills-related needs and challenges in the manufacturing industry. The growing gap between skills demanded by industry and those provided in formal education hampers the competitiveness of European manufacturing vis-à-vis new competitors from emerging markets. Human resources are abundant in these markets that benefited from the globalization of education and training and the instant transfer of knowledge across continents via ICT. Europe must take this challenge seriously; it must allocate the necessary efforts and resources to draw up a strategy to meet the 21st century's skills-related challenges to its manufacturing base.

As the technological gap between world regions close, human capital is becoming the most important factor underpinning competitiveness. In times of economic hardship, there is a tendency to see spending in education as a cost. However, efforts put in the development of human capital should be considered as an investment with high returns for value-added industries. This manifesto highlights the major needs of the European machine tool industry as regards education and training, and it puts forward five headline recommendations for the consideration of policy-makers.

Filip Geerts
Director General

HEADLINES

I. Help improve the image of manufacturing

II. Ensure the security of skills supply

III. Help bridge the gap between education and production

IV. Build manufacturing skills of the 21st century

V. Use the full potential of the EU

IMPROVE THE IMAGE OF MANUFACTURING

Manufacturing does not have a very attractive image in the eyes of young people. It is perceived as an old-fashion sector and is associated with demanding tasks and a largely static and hierarchical organizational structure. In line with this general impression, according to a CECIMO inquiry carried out amongst European machine tool builders represented at the CECIMO General Assembly and member national associations (hereafter "the CECIMO inquiry on skills"), the weak image of the sector is the most important obstacle encountered by companies when trying to attract new people to work with them (Table 1*).

Most machine tool builders comment that the major challenge they are facing to fill the skills gap in their companies is to attract new people to replace the outgoing workforce. Indeed, along with the declining role of manufacturing in the European economy, the industry has seen the interest of young people in manufacturing fading out. Moreover, high-profit and fast-growing jobs in the services industry, which often offer generous financial benefits and career opportunities, have emerged as strong competitors to the manufacturing industry.

48%
of MT builders say the unattractive image of their industry is the biggest challenge to attracting the best talents *

Nevertheless, recent events have come to reverse the decline of manufacturing's image, the industry's importance has become salient in the aftermath of the global economic recession. Countries and regions with a strong manufacturing base have turned out to be more resilient to the negative effects of the financial crisis, in particular on employment. Moreover, the manufacturing industry has reaffirmed its unique role as the provider of solutions to most of the complex problems facing our society today such as climate change, the depletion of natural resources and environmental pollution. This proves that manufacturing is not a thing of the past but an industry of the future which will build tomorrow's economy.

The machine tool industry, as a key enabling sector, offers young people opportunities to develop solutions for high-performance and sustainable production of future products in a wide array of sectors from automotive to energy generation, from aerospace to medical devices. It is a world-competitive and export-oriented industry which provides stable and long-term jobs and an international career. This current context offers an unprecedented opportunity for Europe to put a spotlight on the role of advanced manufacturing industries for the economy and to revive interest for manufacturing among young people who are keen on contributing to economic and environmental progress.

'Young people will find in the machine tool industry long-term stable jobs as well as vast opportunities for continuous learning. Internships and student programmes are key to introduce young people to opportunities in our sector. '
Mr Selcuk Baydar, Chairman, EAE Makina A.S.

RECOMMENDATIONS

- *Provide support for strengthening the image of manufacturing in the society through promotion and communication campaigns.*
- *Individual companies and trade associations have vast experience in organizing activities with school children, teachers and families to introduce them to the world of manufacturing. Engage national and regional authorities to partner with these actors, provide resources and support for optimizing these efforts.*
- *Work out strategies and long-term plans at government level, in cooperation with industry and education institutions, to make STEM (science, technology, engineering, matematics) studies more attractive to young people.*
- *Recognize, at political level, the importance of manufacturing technology for the economy. The participation of students in STEM-related studies and vocational education and training (VET) programmes are closely linked to employment prospects.*

* See annex

ENSURE THE SECURITY OF SKILLS SUPPLY

The skills pipeline is too narrow in Europe because there are not enough young people studying science, technology, engineering and mathematics (STEM) subjects and participating in VET programmes. The existing workforce has the experience and competences to keep the European machine tool industry innovative and competitive, but European machine tool builders are concerned about the declining number of young people with the right skills who plan a career in manufacturing.

According to the EU Vacancy and Recruitment Report 2012, engineering appears amongst the top bottleneck occupations (talent shortages) in Europe. Based on CEDEFOP 2012 forecasts, there will be approximately 3,6 million job openings in key STEM-related occupations between 2010 and 2020, largely driven by job replacement demand and, to a lesser extent, by expansion demand. According to this, the number employed as physics, mathematic and engineering professionals is expected to grow by 14.3%, which is four times above the 3.4% average growth expected across all occupations. Government policy should mobilize all resources to meet this demand, which is the only way for Europe to tap the economic growth potential and other societal benefits offered by these jobs.

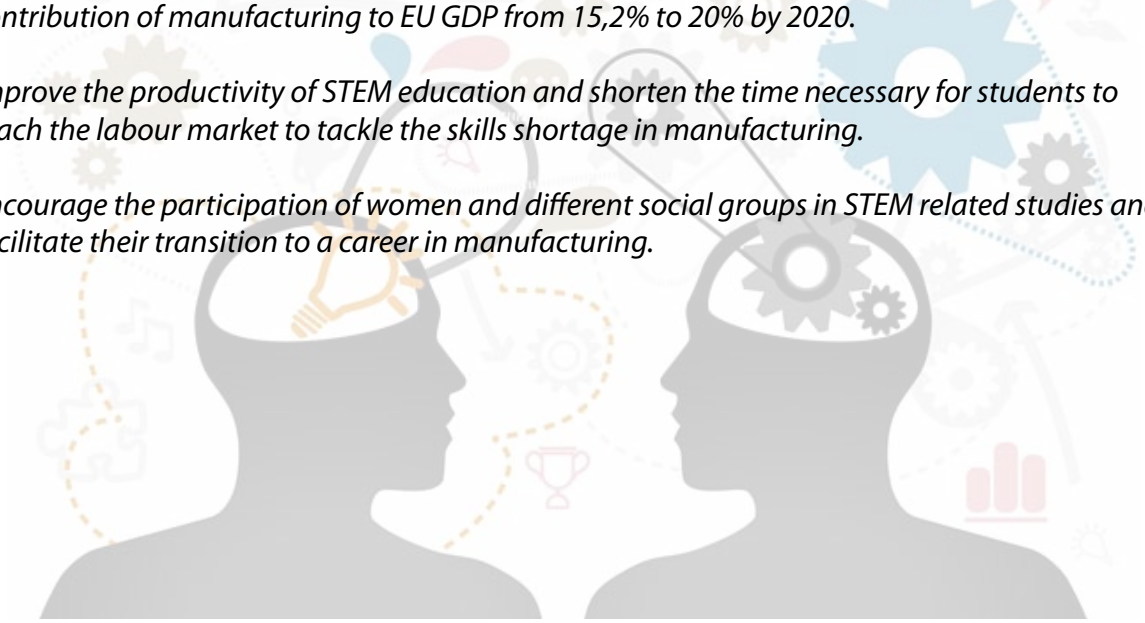
42%
of MT builders struggle the most with recruiting engineering technologists*

The CECIMO inquiry on skills has also confirmed this trend. Industrialists affirm that the workforce categories in which they face the biggest challenge finding the right people are engineering technologists (mechanical, automation, mechatronics, production, quality control), followed by skilled producers (machine operators and technicians) and sales people with technical knowledge. (Table 2*)

'Students do not receive enough STEM courses during their secondary and tertiary studies. Industry and governments should work hand in hand to introduce kids to mathematics, physics, chemistry, etc. as early as possible. That way, students would be better prepared and feel more enthusiastic about working in manufacturing, an industry that offers exciting opportunities to young people to find technical solutions to problems facing our world.'
Dipl.-Ing. Carl Martin Welcker, Managing Partner, Alfred H. Schütte GmbH&Co.

RECOMMENDATIONS

- *Set targets accompanied by concrete strategies at national and EU levels to increase the number of STEM graduates, with growing labour needs of strategic industrial sectors in mind. Raising human capital with the right mix of skills is key to achieve the EU's goal of increasing the contribution of manufacturing to EU GDP from 15,2% to 20% by 2020.*
- *Improve the productivity of STEM education and shorten the time necessary for students to reach the labour market to tackle the skills shortage in manufacturing.*
- *Encourage the participation of women and different social groups in STEM related studies and facilitate their transition to a career in manufacturing.*



II BRIDGE THE GAP BETWEEN EDUCATION AND PRODUCTION

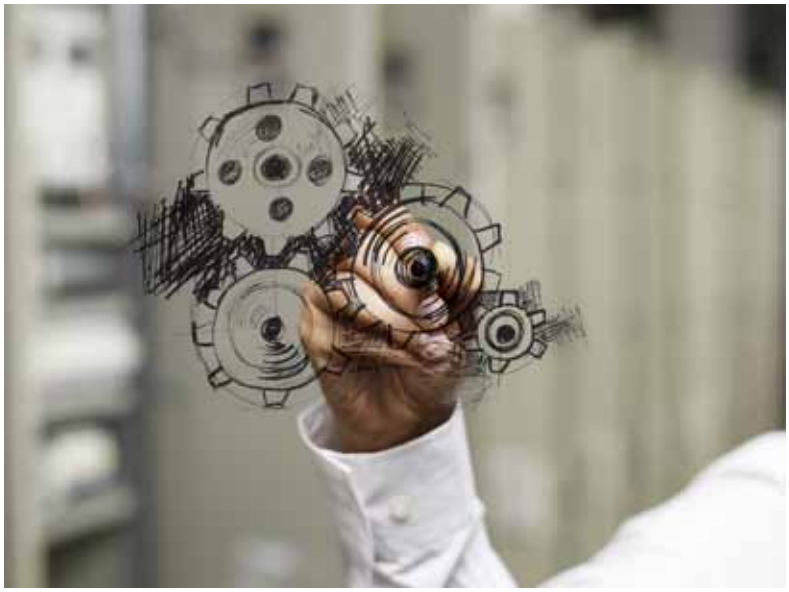
While the structure of companies has drastically changed over the last two decades, the education and training systems including their curricula have not evolved at the same pace. This has created a gap between the world of education and the workplace. European machine tool builders argue that university graduates are not immediately employable, they need to go through long, time- and money-consuming training processes in companies before they can start executing tasks independently.

Machine tool builders cannot find skilled people to make the sophisticated products that they manufacture every day. Universities are incapable of delivering high quality practical skills that industry is in need of. The education curricula are largely theoretical and disconnected from the industrial reality. There is often a gap between the mindset of universities and enterprises: universities are often research-oriented whereas industry needs people with practical and production-oriented skills. The separation of research and production locations in a global marketplace also contributes to further increasing the distance between the academic world and industry. Furthermore, technical school and university school professors lack up-to-date knowledge about latest trends in industry.

98%
of MT builders state that the skills requirements changed in their company over the last 5 years *

Policies in education and training can play a key role to ensure that young people, when finishing their secondary or tertiary studies, possess the skills and competences needed to make a rapid and successful transition to employment. The business and education worlds have to work together to understand the skills needs to adjust study programmes accordingly. It is of utmost importance to make learning at work a part of the education system, alongside classroom-based education. Apprenticeship systems applied in some European countries largely provide students with the required skills by allowing them to test their knowledge at the factory floor.

'To ensure a continuous flow of skills into my company, we have close relationships with universities. We receive two-to-three PhDs and around ten master thesis per year. This is a good source of recruitment in a number of subjects including electronics, mechanical engineering, IT and marketing. Industrial PhDs deserve stronger public support. '
Eng. Antonio Cardoso Pinto, President, Adira S.A.



RECOMMENDATIONS

- *Reform education and VET programmes to increase their quality, efficiency and labour market relevance. Pay higher attention to work-based learning.*
- *Promote apprenticeships / dual education system across the EU, building on the existing successful models. Review and update apprenticeship programmes systematically with industry's close involvement.*
- *Increase the number of industrial PhDs and masters to help create early links between university graduates and industry.*
- *Facilitate the establishment of a genuine partnership between universities and industry enabling them to identify the skills needs and to better design the education curricula in technical and engineering schools.*
- *Promote the exchange of supervisors and professors between manufacturing companies and education institutes to foster a better understanding of labour market needs.*
- *Encourage companies to join forces with each other and with governmental authorities to increase financial resources dedicated to VET and the promotion of apprenticeships and traineeships.*

'Practical and vocational training on the shop floor are key to furnish the workforce with the right and broad skills required by our industry. Therefore, we need strong apprenticeship programmes in Europe. This can be achieved through the duplication of the dual system applied successfully in countries like Switzerland, Germany and Austria.'
Hans-Martin Schneeberger, CEO, Schneeberger Holding AG

IV BUILD MANUFACTURING SKILLS OF THE 21ST CENTURY

Skills requirements in the machine tool industry have evolved fast over the past decade, in line with changes in technology, customer needs and business environment. As products get increasingly sophisticated, employees in machine tool companies need to master a multitude of technology areas and their integration, including mechanical design, pneumatic, hydraulics, electrical design, software and NC programming, among others. Education and training systems in Europe need to go through a sound reform so that it starts supplying the skills required to invent processes and products of the future. Continuous training during professional career is equally important to allow the workforce to keep current with new technologies and update their competences accordingly.

Nowadays, transversal or soft skills are becoming as important as technical skills (Table 4*). This is largely due to the machine tool market shift from Europe towards Asia, which implies that companies do not operate any more in a local value chain, but in an international environment. The workforce needs to cope with new business, cultural and legal challenges in international markets. In order to respond to needs of customers located in various geographical locations across the globe, employees rely on transversal skills which include inter alia entrepreneurship, communication, negotiation, problem solving, inter-cultural and language skills. In an export-driven and customer-oriented sector like machine tools, it is essential for the staff to understand their customers' needs and use all available knowledge to satisfy them. Information processing skills, which refer to the capacity to asses, understand, select and use, and communicate information, are becoming important.

39%
of MT builders state they face the largest skills gap in technical skills. An equal share state that they face the most important shortage in soft skills*

The continuous development of the workforce's competences is key to differentiation and business competitiveness in a global business environment characterized by fierce competition. Training is, however, a difficult and costly activity, especially for European small and medium sized machine tool companies, employing on average less than 100 employees, which have limited resources. The CECIMO inquiry on skills revealed that the biggest obstacle that machine tool builders face in training their workforce is a lack of organizational capacity within their enterprise. This closely relates to costs, financial or in time required, which was identified as the second biggest obstacle to skills development by companies (Table 5*) Nevertheless, all companies agree on the importance of lifelong learning and the majority of them plan to continue to conduct their training activity in-house relying on their own resources.

Europe needs to develop a common long-term vision on education and skills policies. It is vital to ensure that the right skills are supplied to industry across the EU through the skills pipeline. Moreover, governments should support companies in their efforts to improve the competences of their human capital. Because of the negative economic climate and increasing pressure on profit margins amidst global competition, industry cannot handle alone the challenging task of training Europe's manufacturing workforce. Policies should be developed to help improve the efficiency and quality of training programmes whilst bringing down training costs for companies, for example, by pooling expertise and cost-sharing between government, training providers and industry.

'Our yearly budget for training represents 20% of our annual investments. Our teams are trained in mathematics, simulation, mechanical design, electrical design, NC programming and software among other subjects. Our return on investment is real. The professional development of our staff is our main strength.'
René Panczuk, President, Dufieux Industrie

RECOMMENDATIONS

- *Ensure that transversal competences (entrepreneurship, communication, negotiation, problem solving, inter-cultural and language skills, information processing skills) are acquired by young people by the end of compulsory education to a large extent, equipping them for professional life.*

- *Provide broad support for companies to implement "life-long learning programmes" to help adult workers update their key transversal competences, digital skills but also basic skills in mathematics and science.*

- *Encourage public authorities, companies and training suppliers to build training centers in industrial zones to pool expertise and enable cost-sharing.*

- *Help companies finance the life-long training of their workforce through tax rebates, education vouchers and innovative financing schemes, amongst other tools.*

- *Support the continued professional development of training providers, including university professors, through professional profiles, standards and competence frameworks. Develop quality assurance systems to measure the capacity of training providers.*

Machine tools are highly technological and complex products. Therefore, our sector requires detailed training programmes in a broad range of technology areas. Moreover, most machine tool companies have daughters in other countries. Our workforce needs to be prepared for professional and cultural challenges in a global marketplace.
Geoffrey Lloyd, Managing Director, Heller Machine Tools Ltd.

V USE THE FULL POTENTIAL OF THE EU

Skills-related challenges in Europe, due to their size and complexity, can be better addressed through joint efforts of Member States and the EU. For instance, as far as the machine tool industry is concerned, the skills-related problems differ from one region to another, due to the divergence of economic performance in Northern and Southern European countries. Some countries face a shortage of engineers and technicians whereas skilled people remain outside the job market due to economic problems in other Member States. Moreover, differences in VET systems across the EU make it difficult to compare qualifications, thus hindering mobility.

Encouraging greater mobility of students and labour across the EU provide employers with access to a wider choice of skills base. Moreover, mobility enables the exchange of knowledge and best business practices between employers and employees, generating a positive impact on creativity, productivity and innovation. Keys to a smooth mobility are the validation and recognition of skills and competences acquired both in and outside formal education, across Member States. Supplying transparent and comparable information to employers on skills profiles can help increase the employability of the workforce both on the local and European labor market, thus facilitating to fill vacant positions. This also allows job-seekers to search for work outside their home country and exploit the full potential of their competences for the benefit of the EU economy. Two EU level instruments, the European Classifications Framework and the Classification of European Skills/Competences, qualifications and Occupations (ESCO), are important steps to create a European Area of Skills and Qualifications.

The EU also provides a common space for Member States to exchange best practices and establish cross-border partnerships to improve the quality and supply of skills. Some EU Member States, such as Germany, Austria and Denmark, have well-established VET programs. These dual systems have a strong emphasis on work-place learning. They are demand-driven, delivering sound learning outcomes. The machine tool industry is keen on seeing the most successful schemes being replicated in their Member States and supports the recently launched European Alliance for Apprenticeships.

'We need to work closer with universities and high schools. We need to come closer and to work our programmes together with a view to adjusting skills and competences of graduates to the needs of our industry. Aligning the objectives of the academia and industry is a key action point for building manufacturing skills of the 21st century. '
Martin Kapp, CECIMO president and Managing Director and Partner, Kapp GmbH.

RECOMMENDATIONS

- *Step up cooperation between Member States, the EU and industry stakeholders on the promotion of apprenticeships as agreed during the Berlin meeting of EU Ministers of Education (2012), especially through the European Alliance for Apprenticeships.*

- *Develop standards and assessment tools for the EU-wide definition, validation and recognition of skills and competences acquired during formal education and non-formal training. This will increase the transparency and comparability of qualifications, and facilitate mobility.*

- *Increase the coherence of EU instruments (e.g. EQF, ESCO, European Skills Panorama) and the synergy between them. Promote these instruments to industry stakeholders and encourage their participation in their implementation.*

- *Encourage European partnerships between education, research and business to address the development of skills through the "Knowledge and Innovation Community (KIC) in value added manufacturing" (foreseen to be launched in 2016) as well as through Sector Skills Alliances.*

- *Continue supporting the mobility of labour and VET students through the "Erasmus +" programme whilst improving the language skills of the manufacturing workforce.*

- *Promote towards Member States the use of Structural Funds for education and training priorities.*

'Certification of competences provides machine tool companies with a reliable system to evaluate skills profiles and recruit the right people. Moreover, it helps measure skills gaps and determine training needs. An EU-wide certification scheme would help create a large pool of qualified and mobile workforce for our industry.' Luigi Galdabini, Managing Director, Cesare Galdabini S.p.A.

ANNEX – CECIMO inquiry on skills

On 3 June 2013, CECIMO conducted an inquiry on skills to identify the challenges and requirements related to skills in the European machine tool sector. Fifty respondents, CECIMO General Managers and CEOs of leading machine tool companies, participated in the inquiry.

Table 1

What is the biggest challenge that you face in your company in attracting the best talents available on the market?

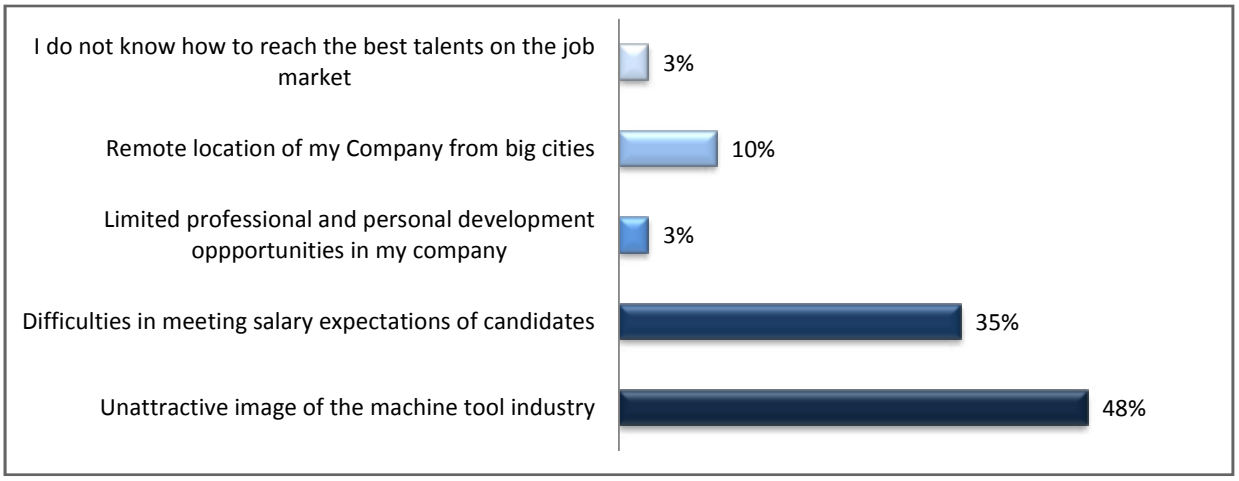


Table 2

In which of the following workforce segment does your company faces challenges most in fiding the right people?

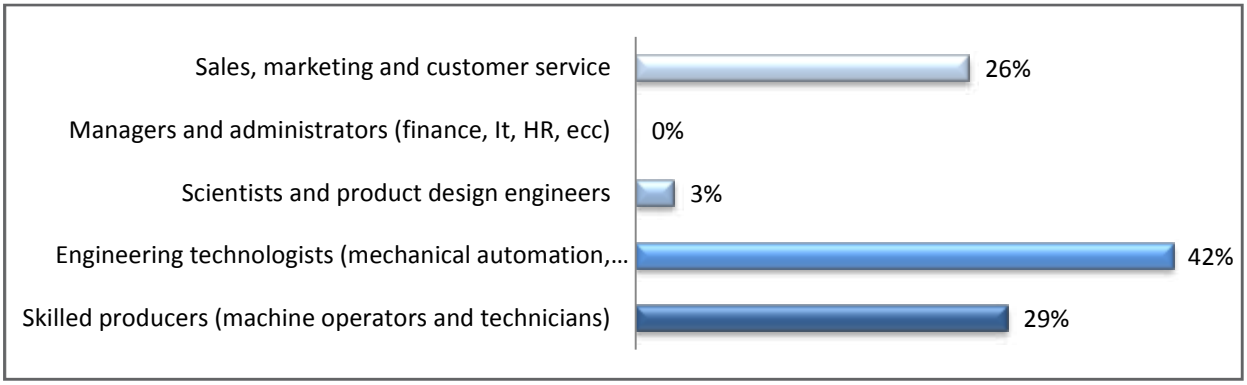


Table 3

Have the skill requirements in your company changed over the past 5 years (both technical and soft skills)?

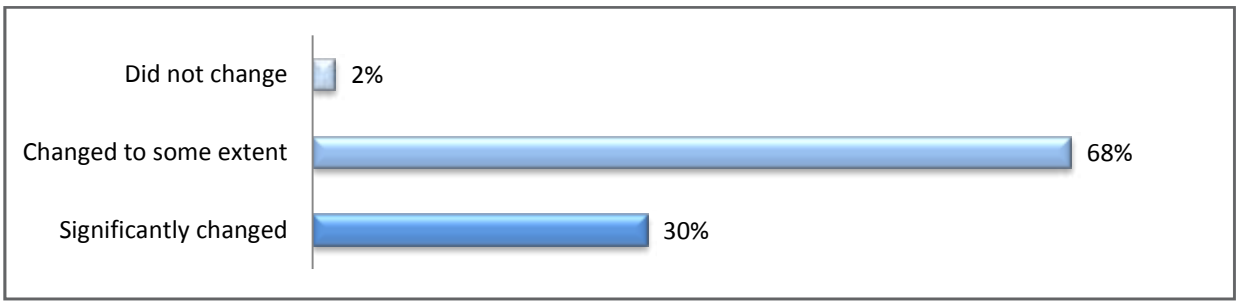


Table 4

In which of the following areas are skills requirments the highest and need to be addressed in priority?

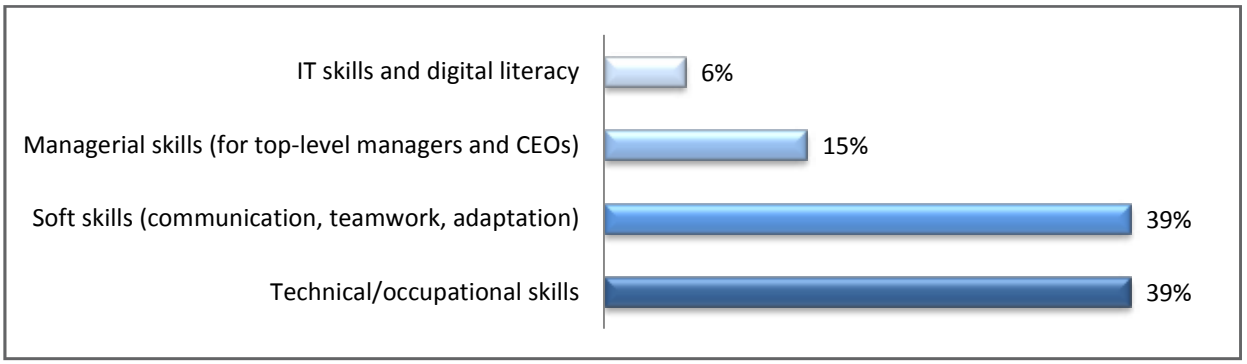
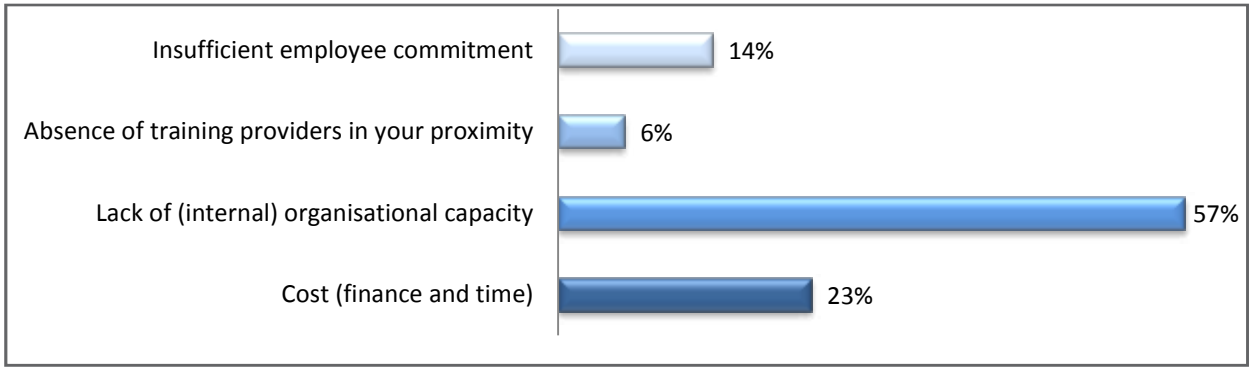


Table 5

Which of the following represents the biggest impediment to the skills development in your company?



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Member Associations:

Austria: FMMI
Fachverband Maschinen & Metallwaren Industrie
www.fmmi.at

Belgium: AGORIA
Federation for the technology industrie
www.agoria.be

Czech Republic: SST
Svazu Strojírenské Technologie
www.sst.cz

Denmark: DAAM
Danish Association for Advanced Manufacturing
www.daam.dk

Finland: Federation of Finnish Technology Industries
www.teknologiateollisuus.fi

France: SYMOP
French Association for ManufacturingTechnologies
www.symop.com/fr

Germany: VDW
Verein Deutscher Werkzeugmaschinenfabriken e.V.
www.vdw.de

Italy: UCIMU - SISTEMI PER PRODURRE
Associazione dei costruttori Italiani di macchine utensili robot e automazione
www.ucimu.it

Netherlands: VIMAG
Federatie Productie Technologie / Sectie VIMAG
www.vimag.nl

Portugal: AIMMAP
Associacâo dos Industriais Metalúrgicos, Metalomecãnicos e Afins de Portugal
www.aimmap.pt

Spain: AFM - Advanced Manufacturing Technologies
Advanced Manufacturing Technologies
www.afm.es

Sweden: MTAS
Machine and Tool Association of Sweden
www.mtas.se

Switzerland: SWISSMEM
Die Schweizer Maschinen-, Elektro- und Metall-Industrie
www.swissmem.ch

Turkey: MIB
Makina İmalatçıları Birliği
www.mib.org.tr

United Kingdom: MTA
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