The Skills of European ICT Specialists

Francesca Sgobbi
University of Brescia, Italy

INTRODUCTION

Specialists in Information and Communication Technologies (ICTs) are professionals "who have the ability to develop, operate and maintain ICT systems" and for whom "ICTs constitute the main part of their job" (OECD, 2004, p.219). ICT specialists play a crucial role in supporting the growth of the information society. However, some signals exist that in mature industrialized economies such as the European Union (EU) the supply of ICT specialists has been falling behind the demand and the evolution of their professional profile may not accompany the growing request for non-technical complementary skills (Eurostat, 2015a; Hüsing *et al.*, 2015).

After a brief survey of the international literature on skill-related issues that may affect the further development of ICT-based applications this article depicts the state-of-the-art of the professional skills supplied by ICT specialists in 11 EU countries based on data from the OECD Survey of Adult Skills.

The first part of the empirical analysis focuses on the skills profile of ICT personnel from EU countries and examines to what extent the higher skills displayed by ICT specialists depend on a different distribution of demographic characteristics and job characteristics compared to the rest of the workforce. The second part of the empirical analysis focuses on the relationship between skills and wages and tests whether employers recognize an occupation-specific wage premium to ICT specialists.

BACKGROUND

Pervasiveness characterizes ICT solutions as general purpose technologies, i.e., technologies whose innovative applications impact everyday household life besides spanning across different business sectors (Jovanovic and Rousseau, 2005). This pervasiveness rose hopes that ICT-based innovations would stimulate cross-industry virtuous circles between investments, innovation, productivity, consumption, and employment able to solve the "jobless growth dilemma" apparent in the USA and the EU in the 1990s (Selhofer, 2000). However, the complementarities between existing and new technologies (Davis and Wright, 1999) and the lack of digital skills among ICT providers and end users soon pointed out risks that skill shortage may obstacle the achievement of expected benefits (Selhofer, 2000).

After twenty years of debate on the occupational effects of ICTs the picture is still unclear. Spiezia *et al.* (2016) suggest that ICTs cause a drop in labor content per unit, hence reducing the demand for labor, but at the same time they raise labor productivity, hence increasing the convenience of labor compared to other productivity factors. Overall effects on labor demand are expected to disappear in the long run, due to a reallocation of labor from traditional sectors to innovative, ICT-intensive ones. Nevertheless, the current framework is still undergoing adjustment processes. Investments in ICTs raised the demand for labor in OECD countries between 1990 and 2007, but reduced it afterwards (Spiezia *et al.*,

2016). In addition, after 2007 the decline in labor demand has been accompanied by polarization between high-skilled and poorly-skilled jobs at the expense of middle-educated workers (Michaels *et al.*, 2014). Job polarization happens because, due to their programmable nature, ICTs tend to substitute labor in case of routine tasks, which prevail among middle-skilled workers. In contrast, knowledge-intensive non-routine tasks concentrate among high-skilled employees whereas labor-intensive non-routine tasks, often concerning the provision of personal services, prevail among low-skilled workers (Autor *et al.*, 2003).

If the diffusion of ICTs has so far deluded the expectations of jobs growth in the whole economy, focus on ICT employment provides a more positive picture. According to Hüsing *et al.* (2015), the ICT professional workforce in Europe in 2014 comprised 7.5 million workers, or 3.5% of the European workforce, with United Kingdom, Germany, France, Italy, Spain, Poland, and the Netherlands accounting for three quarters of total EU ICT professionals. OECD countries present a similar share of ICT specialists (3.6% of workforce in 2014, OECD, 2016).

ICT specialists were not affected by the recent economic crisis. Eurostat (2016) reports a 4% annual growth rate between 2006 and 2014. OECD (2015) reports stable employment levels within the ICT sector in the last decade (2004-2013), which results in growth in the number of ICT specialists, who comprise at least 3% of total employment in most OECD countries, at the expenses of less professionalized roles.

If non-ICT workers are increasingly required to master ICT generic skills besides the core skills of their professional domain, ICT-specialists face the challenge of adding non-technical ICT-complementary skills to their traditional expertise. The emphasis on "soft skills" signals a shift in the nature of ICT specialists' work and impacts the design of educational curricula (Chillas *et al.*, 2015). Besides facing the challenge of adjusting their curricula European faculties of Computer Science, one of the main sources of ICT special-

ists, have seen a decline in the number of their students and graduates (Hüsing et al., 2015).

The risk of lower inflows from tertiary education, together with some signals of hard-to-fill vacancies, has raised concerns about a possible shortage of ICT specialist skills. However, not all studies agree on this point. OECD (2016) reports stable or even decreasing vacancy rates since 2007 in OECD countries. In addition, 38% of EU enterprises which recruited or tried to recruit ICT specialists in 2014 reported difficulties in filling ICT vacancies (Eurostat, 2015a). However, ICT-specialist recruiters represent only 20% of EU firms. This means that only about 3% of EU enterprises report ICT-related hard-to-fill vacancies and this figure has not changed from 2012 to 2014 (OECD, 2016).

ICT SPECIALISTS IDENTIFICATION AND DATA

A quantitative analysis of the skills provided by European ICT specialists requires a clear identification of these professionals, usually based on either the industry they work in or their occupation. Given the pervasiveness of ICT jobs across industries and enterprise functions (Eurostat, 2015a; Hüsing *et al*., 2015) an occupation-based approach seems more appropriate to identify ICT specialists and characterize their skills. Eurostat (2015b) details a list of occupations used to operationalize a statistical definition of ICT specialists. Relevant occupations are identified based on the 4-digit level of the 2008 release of the International Standard Classification of Occupations (ISCO-08).

This article resorts to the Eurostat criterion to identify EU ICT specialists based on the OECD Survey of Adult Skills (Figure 1). This survey was developed within the wider OECD Programme for the International Assessment of Adult Competencies (PIAAC Survey). The PIAAC Survey, run between August 2011 and March 2012, inquires

Related Content

PRESCAN Adaptive Vehicle Image Real-Time Stitching Algorithm Based on Improved SIFT
Qian Li, Yanli Xuand Pengren Ding (2023). *International Journal of Information Technologies and Systems Approach (pp. 1-17).*
www.irma-international.org/article/prescan-adaptive-vehicle-image-real-time-stitching-algorithm-based-on-improved-sift/321754

Blockchain and FEF-Based Lightweight Anonymous Authentication Protocol for Wireless Medical Sensor Networks
Shu Wu, Jindou Chen, Xueli Nieand Waseef Menhaj (2024). *International Journal of Information Technologies and Systems Approach (pp. 1-21).*
www.irma-international.org/article/blockchain-and-fef-based-lightweight-anonymous-authentication-protocol-for-wireless-medical-sensor-networks/352510

Discovering Patterns using Process Mining
Ishak Meddahand Belkadi Khaled (2016). *International Journal of Rough Sets and Data Analysis (pp. 21-31).*
www.irma-international.org/article/discovering-patterns-using-process-mining/163101

Library Consortia in Nigeria and the Place of ICT
Idiegbeyan-ose Jerome, Ugwunwa Esseand Egbe Adewole-Odeshi (2015). *Encyclopedia of Information Science and Technology, Third Edition (pp. 4869-4877).*
www.irma-international.org/chapter/library-consortia-in-nigeria-and-the-place-of-ict/112933

EEG Analysis of Imagined Speech
Sadaf Iqbal, Muhammed Shanir P.P., Yusuf Uzzaman Khanand Omar Farooq (2016). *International Journal of Rough Sets and Data Analysis (pp. 32-44).*
www.irma-international.org/article/eeg-analysis-of-imagined-speech/150463