

# Structural changes, gender and research and innovation potential

## Case study in the ICT domain

Valentina Janev, Dejan Paunović, Sanja Vraneš

**Abstract**—This research paper aims at presenting the preliminary results of two EU funded projects related to the structural changes in R&D organizations and their impact to performance. Although at first sight, the projects are quite complementary (the GenderTime project analyses gender aspects and monitors implementation of the gender-related actions; the PACINNO project analyses innovation potential at the local level and facilitates transfer of innovations to industry), herein we shall explain the interrelation and how the PUPIN Institute (as a case study organization) can benefit from the results of both projects. The GenderTime and PACINNO activities extend the standard practice and existing monitoring approaches in the PUPIN Human Resources Department. First preliminary analysis, perceptions and conclusions are also reported.

**Keywords**—structural change, R&D organizations, qualifications, innovation, career development

### I. Introduction

This research paper aims at presenting the preliminary results of two EU funded projects related to

- promoting gender equality in EU education institutions and scientific organizations (GenderTime) and
- creating new bridges between education, research and innovation activities and measuring the innovation potential at the local level (PACINNO).

The goal of the GenderTime (*Transferring Implementing Monitoring Equality*) [1] project is implementation of “gender action plans” (GAP) in various scientific institutions across the Europe that differ in terms of size, disciplines, etc. from small research institutes to huge pluridisciplinary universities. The “Mihajlo Pupin” Institute (PUPIN), Belgrade, Serbia has been selected as a representative R&D organization for facilitating the best practices transfer.

The PACINNO (Platform for trans-Academic Cooperation in Innovation) project aims at establishing a platform for cooperation in research and innovation covering the whole Adriatic region.

The “Mihajlo Pupin” Institute is a partner that has established and will continue to maintain a virtual platform as a *virtual regional ecosystem connecting relevant actors in the region* [2] including PACINNO research partners, interested government organizations and policy makers, start-up companies and potential investors. The paper is organized as follows. Section II introduces the “Mihajlo Pupin” Institute case study, while Section III and Section IV summarize the key findings in the first half of the projects.

### II. The Mihajlo Pupin Institute – Case Study

The Institute is the biggest and the oldest R&D Institute in ICT area in the whole SE Europe. It is affiliated to the University of Belgrade, with more than 60% of employees with engineering background, most of them recruited directly from the University through internships/diploma work.

PUPIN is the leading Serbian R&D institution in information and communication technologies providing a wide range of products and services applicable in different industry sectors. Since 1997 the Institute “Mihajlo Pupin” has been organized as a holding company, with several daughter companies, formed according to their programs and existing tradition. Currently, the female share is 37.5 % at the company level, however the gender structure differs from one business unit to another (see Figure 1 below). Members of the scientific staff are mainly employed by the business unit “Institute” (the biggest business entity in the holding company). The female share among all employees in this business unit ranges from 36 % (2013) to 39 % (2008). However, there are business units (“Automation & Control Systems” and “Telecommunications”) where female share is below 30%.

In January 2013, in the GenderTime project framework, the Institute started an initiative for implementation of the best systemic approaches to increase the participation and career advancement of women researchers. The initiative involves activities as recruitment, retention and promotion policies, supporting research staff career opportunities and work-life balance measures, updated management and research standards, supporting policies for dual careers-couple, etc. Additionally in November 2013, PACINNO activities started [2], where one of them directly influences organizational structure i.e. establishment of technology transfer office (TTO) with the objective to facilitate the transfer of research outputs into innovation.

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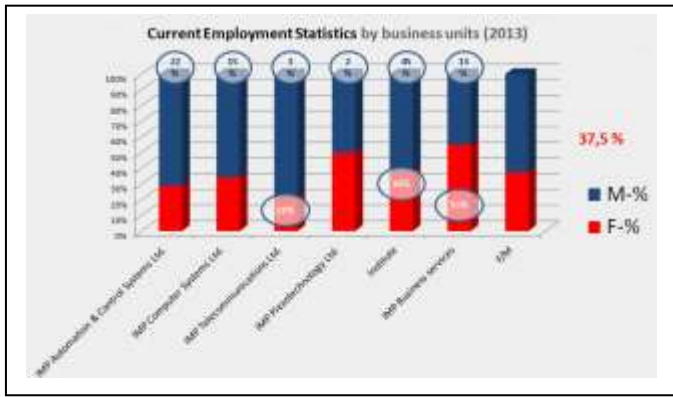


Figure 1. Gender statistics across different PUPIN R&D groups

Both projects relate to monitoring researchers qualifications and results, especially in the form of prototypes and products that can be promoted via the virtual platform of the PUPIN Technology Transfer Office. At first sight the

projects are quite complementary, because the Gender Time studies gender aspects and monitors the implementation of gender-related actions, while PACINNO analyses the innovation potential on local level and facilitates transfer of innovations to industry. However, the PACINO activities (especially the case study of innovation at micro level) can contribute to understanding the creativity and innovation processes inside research groups and study the role of gender as a particular factor. In order to understand the impact of contextual (country level) factors, both projects assume collecting country statistics about research and innovation policies, science and engineering capacity, etc.

Comparing the project timeframes, PACINNO results will be used to improve the GenderTime action plan, especially the activities linked to improvement of researchers career development, as well as career opportunities. During their work on highly challenging research projects, researchers develop prototypes that can be offered lately to investors via the PACINNO virtual platform (see Figure below).

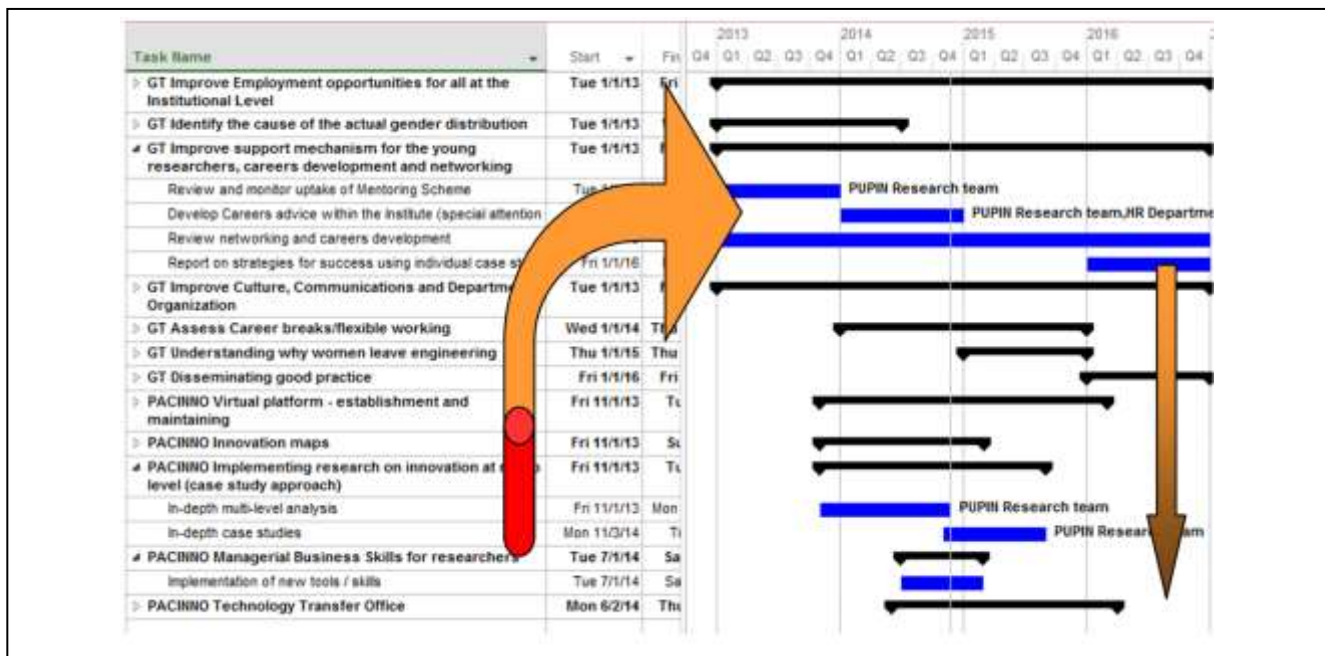


Figure 2. Interlinking of GenderTime and PACINNO activities

### iii. GenderTime approach and first results

The goal of the GenderTime project is implementation of “gender action plans” (GAP) in seven scientific institutions from the UK, Spain, France, Germany, Italy, Austria and Serbia. Besides the implementation of GAP, the PUPIN team is involved in implementation of common tools that support the GenderTime methodology. The methodology is based on a set of qualitative analysis (focus group discussions, conducting survey research), as well as quantitative approaches: cross-comparison of survey results, quantitative analysis of

participation of women in research and engineering activities, etc.

Herein, we would like to present some initial results from the implementation of the PUPIN action plan.

#### A. Monitoring the implementation of Action plan

Monitoring activity includes collecting, analysis and reporting about the performance of the work in the project, comparison of this with the project plans, and undertaking corrective actions. Regarding the GenderTime project, this is performed through regular meetings of the PUPIN research

team with the members of the Human resources department and the Head of the Institute. , For instance, the Figure bellow gives highlights about the implementation of the actions by the project impact.

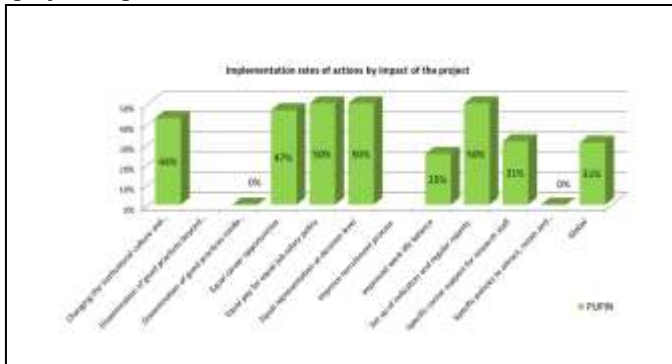


Figure 3. GenderTime actions - Implementation rates

Some initial conclusions about the objectives of the action plan given in the Table below are as follows:

- Equal opportunities are guaranteed with national and internal acts. The structural changes achieved through the GenderTime actions should not reflect negatively on the performance of the PUPIN Institute as a whole. Performance can be evaluated through indicators related to scientific publications, patents, tools, collaboration with scientific community abroad and knowledge transfer (commercial projects) with industry. PUPIN employees are students with high (excellent) grades.
- The gender distribution differs across PUPIN departments. We keep track of the scientific career of holders of PhD degree (25 employees), and MSc degree (35). We have noticed that there is a potential for structural changes with promotion of MSc female researchers into PhD holders. However, some of our female researchers with MSc degree (old program, before Bologna) have abundant their scientific career. The current distribution is: 38% of PhD holders (with title Researcher) are females but that percentage will drop (to 32%) with the promotion of 4 additional candidates (holders of PhD, but without title issued by the Ministry); 52 % female researchers with MSc degree (old program, before Bologna); 40% of female students actively involved in PhD studies.
- Support mechanisms for the young researchers, careers development and networking are very dependent on the financial possibilities of the individual PUPIN organizational units and the Institute as a whole. The PUPIN management and the PUPIN Scientific Council contribute to the Careers advice activities. Members of the PUPIN Scientific Council are responsible for acquiring new financial support and in that way they support the career development of young researchers. Analysis of the uptake of Mentoring Scheme is under responsibility of the PUPIN Scientific Council

- Free discussions about GT topics at events have high impact on female researchers and their perception of the organization. According to their reactions, they (female researchers) have feeling that somebody cares about them and their work. Their conclusion is that PUPIN is much better place for their employment then other companies or institutes in Serbia.
- Career breaks influence negatively the GT structural change activities. Career breaks are recorded in the SAP HRM system. The HR department keeps a list of employees which break their careers and it monitors their progress after their return. *Career break due to specialization:* The analysis has shown that most of the career breaks (paid or unpaid related to specialization abroad) ended in the past with termination of employment. It seems that the researchers have decided to stay abroad for a longer period. *Career break due to parental leave:* Female researchers need a longer period to end their PhD studies.
- Some of the researchers left the Institute in the last 2 years. However, the analysis has shown that it is not a case that PUPIN researchers leave engineering. They leave for the following reasons: better salary and working conditions abroad, leaving country due to some private reasons (marriages); better salary on the new position in the country, etc. The GT team can hardly influence these negative structural changes especially when female researchers continue their careers abroad.
- Activities such as Dissemination of good practices / success stories can motivate young researchers to advance in the career and thus indirectly influence structural changes in the PUPIN Institute.

TABLE I. GENDERTIME OBJECTIVES

Objective	Importance
Improve Employment opportunities for all at the Institutional Level	High
Identify the cause of the actual gender distribution	Medium
Improve support mechanism for the young researchers, careers development and networking	Very High
Improve Culture, Communications and Departmental Organization	Medium
Assess Career breaks	Medium
Understanding why women leave engineering	High
Disseminating good practice	Medium

**B. Survey tool**

The aim of this survey is to help universities and R&D organizations to understand how male and female staff experience their working environment and what, if any, improvements may be needed to ensure equality of opportunity. Responses from Serbia to the statement ‘I am actively encouraged to take up career development opportunities’, show that 65% employees are satisfied with the career development opportunities (in comparison to 35% for the overall responses).

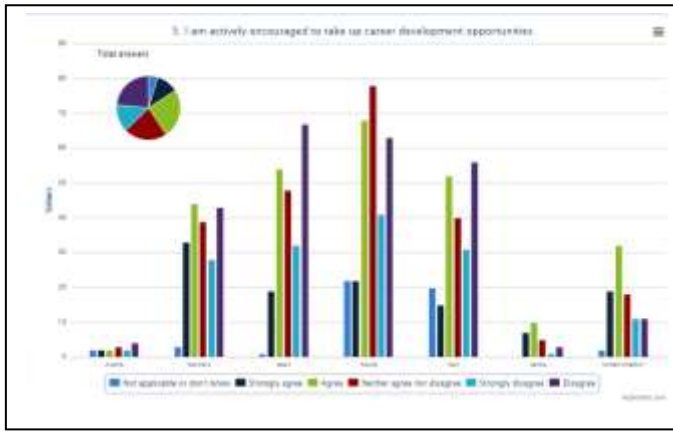


Figure 4. Employment opinion about career development opportunities – GenderTime partner institutions

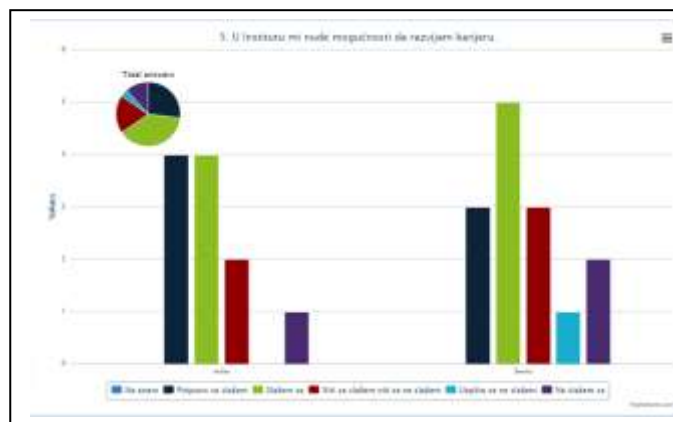


Figure 5. Employment opinion about career development opportunities – PUPIN Institute

#### IV. PACINNO approach and first results

The goal of PACINNO is to establish a platform for cooperation in research and innovation covering the whole Adriatic region. The goal of the PACINNO TTOs will be “to boost research and innovation capacities as well as fostering innovation in SMEs”. The work of the TTO will be supported by the PACINNO virtual platform for connecting all partners (mainly universities), associate partners (mainly education policy makers and government bodies) and potential innovative start-ups.

##### A. PACINNO education support

PACINNO activities foresee mentoring activities by:

- Organization of an educational program for promoting innovative entrepreneurship (involving SMEs and innovative start-ups), <http://www.pacinnno.eu/coinvest-startup-investment-readiness-training-call-for-projects-first-generation-2014/>

- Organization of Managerial-Entrepreneurial Skills Development for Researchers (MBSDr) targeted at R&D professionals from all fields, <http://www.pacinnno.eu/mbsdr-call-for-candidates/>
- E-learning training material available via the PACINNO platform.

##### B. The PUPIN approach for analysing / tracking research/innovation performance

In 2008 the PUPIN Institute introduced the SAP® HCM system and established the HR knowledge pool [3] in order to keep an extensive record of the employee professional and scientific life including scientific and professional skills and expertise, obtained certificates, information about engagements in concrete projects with details about their roles and competencies, scientific achievements (patents, technical solutions, scientific papers / books), other achievements / awards, etc. At the country level, indicators for measuring staff research/innovation performance are divided into several groups [4]. The existing system is used for monitoring the implementation of the GenderTime Action plan, as well as for analyzing the overall innovation activities of the PUPIN daughter companies as it is specified in the PACINNO methodology.

#### v. Concluding Remarks

The GenderTime and PACINNO activities extend the standard practice and existing monitoring approaches in the PUPIN Human Resources Department. Furthermore, they specify frameworks for gathering data and analysis of indicators related to recruitment, careers development and networking, staff development and support, management and policy making, institutional culture, scientific output (innovations), business skills, etc. Besides quantitative approaches, both projects use qualitative analysis such as focus groups with female researchers, interviews with employees from different R&D teams and management levels, innovative products and services document analysis, etc.

The preliminary results of the gender analysis show that PUPIN has quite diverse research and development teams with up to 37% of female staff at the Institute level. In 2013, the gender equality activities were strengthened with different actions defined in the GenderTime Action plan. As significant results achieved in the last two years, we can point out to the number of women at the management positions; number of awards won by female staff; number of promotions in scientific titles approved by the Ministry of education, science and technological development.

The PUPIN GenderTime transfer agents will spread GenderTime best practices to similar institutions in the country and region. The PUPIN daughter companies will serve as case studies for analyzing and measuring the PUPIN research/innovation performance, as well as the best practices transfer. Additionally, it is expected that the newly opened

PACINNO technology transfer office will further strengthen the regional cooperation (in Adriatic region and broader) and the visibility of PUPIN innovative products and services. The preliminary results of the PUPIN Institute scientific output have shown that it is among the five most active research institutions from Serbia in the EU research programs with partner network in almost all EU countries.

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