

Role of the YWPs in the implementation of the R&D strategy of urban water management in Hungary

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Abstract

The Hungarian National Water Technology Platform initiated by the Hungarian National Office for Research and Technology was established with the lead of the Department of Sanitary and Environmental Engineering, BME with the primary aim to develop a long-term strategic research plan for the urban water management sector. The Platform's main goal is to provide a strategic basis for the R&D demand and strengthens towards the realisation of the sustainable and integrated urban water management. As the result of the Platform's activity in 2009, a Strategic Research Agenda was prepared which has analyzed and assessed the development and present state of the Hungarian innovation policy and the present state of urban water management sector and made projections on the time horizon beyond 2035. This paper presents the findings of the Strategic Research Agenda concerning Young Water Professionals and their future role of the strategy implementations. According to the long-term vision of the Platform, there is an increasing need for the young generation to join to its activities mostly in the implementation phase of the Platform's Strategic Research Agenda. The primary objective of this publication is to present the activity of the Platform and the identified challenges and problems of the R&D of urban water management in Hungary to the Young Water Professionals and to involve them in the implementation phase of the strategy-forming

Keywords

National water technology platform, integrated urban water management, YWP, Hungary

INTRODUCTION

Since Hungary's EU accession, there has been a growing number of the financially supported research and development (R&D) project in the field of urban water management. Due to the diversified characteristic of the water technologies, its R&D was ad hoc by nature, which has led to the lack of concept in the field of urban water management. Which more, the increased possibilities of the R&D did not provide breakthrough results in the Hungarian urban water management R&D (e.g. home innovative solutions, new R&D centres). One of the reasons for that was the quasi absence of the priorities of Hungarian politics of water science which were only represented with a few words in the tender calls. At the same time the drivers (increasing water stress and water cost, urbanization, extreme events, the deterioration of existing infrastructure), the future's need and challenges, adaptation to the international trends have led to the establishment of strategy forming corporation, a national technology platform in order to develop the R&D priorities based on widespread professional consensus (Szabó et al., 2009a).

With the coordination of the Department of the Sanitary and Environmental Engineering, Budapest University of Technology and Economics (BME), the Hungarian National Water Technology Platform (HU NWTP) was founded at the end of 2008 in the course of the tender calls of the National Office for Research and Technology for establishing national technology platforms. The main goal of the Platform is to provide a strategic basis for the R&D demand and strengthens towards the realisation of the sustainable and integrated urban water management. The Platform prepares and investigates different scenarios and offers an R&D strategy that was introduced in the

Strategic Research Agenda (SRA) at end of 2009. Through our SRA the HU NWTP provides strategic answers for the future challenges in water research. The target field covers some coherent technology issues: safe and secure drinking water supply, cost-efficient and sustainable wastewater and sludge treatment and public networks, their state in the present and in the future, and the innovative solutions for the challenges. The characteristics of water management of small settlements and the effects of global climate change on the water stock have an emphasized priority (Szabó et al., 2009b).

The goal of the HU NWTP’s strategy is to realise completely the conditions of the sustainable urban water management in Hungary and to offer solutions for the present and future problems of the whole water technology spectrum via R&D policy. An Implementation Plan (IP) is prepared for the identified problems in the urban water management sector, in which the possibilities for reaching the strategic aims, the inhibitory issues and the needed actions will be developed in details.

The vision of the sector-specific agenda is basically led by industries in collaboration with academics, research organisations and water users to improve efficiency and financial opportunities in the sector. Therefore the members of the Platform’s *Business Council* are coming from the private sector to confront the everyday experiences with the identified R&D priorities in the SRA which was created based on the workshops of the eight Working Teams: (1) Drinking water treatment technologies and water safety and security, (2) Advanced municipal wastewater and sludge treatment technologies, (3) Innovative wastewater and sludge treatment strategies, (4) Water management of the small settlements, (5) Public works in the water sector, (6) Preparation for the unexpected effects of the climate change and climatic scenarios, (7) Sustainable water management for the industry, (8) Legal, economical and social environment affecting the national R&D situation in urban water management.



Figure 1. Working teams of the HU NWTP (www.nvp.hu)

Strategic documents are supervised by the *Scientific Council* and the *Coordination Council* of the HU NWTP. The *Coordination Council* is responsible also for the communication of the Platform’s *Scientific Council* and the *Business Council*, for contacting with policy making and governmental

agencies and for networking with the EU Water Supply and Sanitation Technology Platform (WSSTP) and other national technology platforms. The structure of the HU NWTP can be seen in the Fig.1.

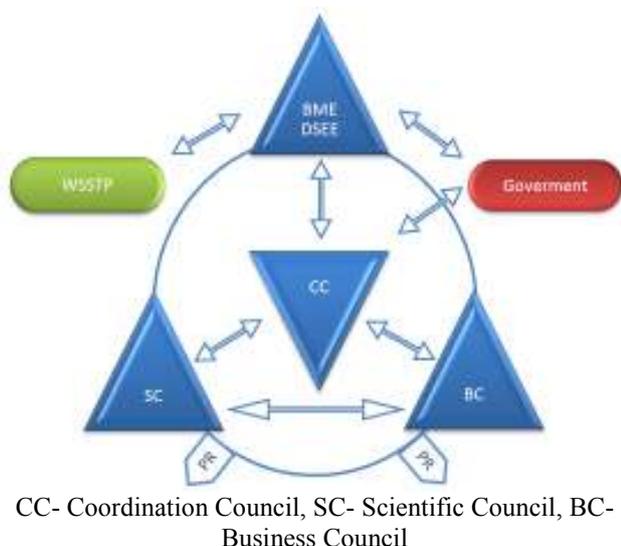


Figure 2. Structure of the HU NWTP

Distribution of the contributor organizations in the activity of the platform

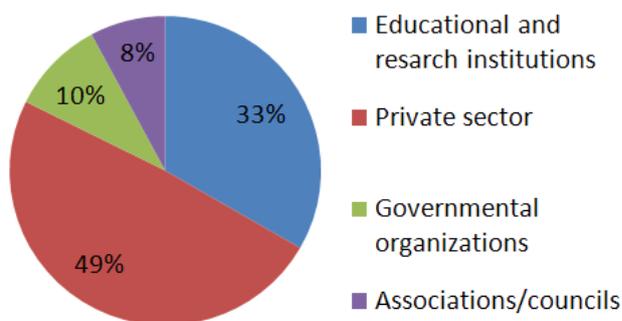


Figure 3. Distribution of the contributor organizations in the activity of the HU NWTP

In the course of the preparation of the IP, the HU NWTP is about to widen towards the organisations which have got an essential role in the effective operation of the national innovation chain and offers solutions for the challenges and problems identified in the SRA.

METHODS

The working methodology for the identification applied in the preparation phase of the SRA was widespread: questionnaire surveys among the stakeholders, interview with Hungarian experts of the urban water management sector, activities of the HU NWTP's working teams (expert panels) and their brainstorming discussions, SWOT analyses, examination of major problems, identification of future task and the exterior, global and local driving forces, development and usage of scenarios. Working groups of the HU NWTP conducted SWOT analyses to achieve diagnoses on the following areas: water treatment technologies and water safety/security, advanced/innovative wastewater and sludge treatment technologies, water distribution networks and sewerage systems, special problems of small settlements on rural areas, hydro-climatic changes and water management, treatment and recycling of industrial wastewater, financial/institutional/legislative framework of urban water management. Based on the results of SWOT analyses, prognosis was given according to three different scenarios. Based on the different scenarios various patterns of R&D tasks are elaborated having different time horizons. Analysis was also made on the development and present state of the Hungarian innovation policy (National Water Technology Platform, 2010a).

RESULTS AND DISCUSSION

Evaluation of Hungarian R&D&I activity in urban water management

Although the recognition and understanding of environmental and water quality problems had delayed in Hungary as well, research, development and innovation (R&D&I) activity in the field of water and wastewater treatment started from the 70's.

Current structure of ownership and operations management developed during the privatisation in the past two decades. Intentions of international integration and the opening of the market resulted in the appearance of an enormous amount of internationally supported R&D achievements as products (turn-key technologies and systems, etc.) on the domestic market. Despite their appearance and quick spread in practice, these achievements did not receive any substantive professional critics or supervision because of the absence of such professional forums (for example platform).

The statistical survey performed by the HU NWTP unambiguously indicated a strong need for the improvement of domestic R&D activities, also meaning a need for the increase of domestically developed methods and technologies. Overweighing Western European interest in domestic investments resulted in the dominance of international companies employing domestic professionals only for the application or adaptation of foreign machinery and automatics, blurring the value of these professionals. Among other reasons, this situation was caused by the disappearance of domestic manufacturing industry. For those few small companies left in the Hungarian market, it is impossible to compete with superior western funds.

Domestic technological R&D investments often follow international trends. There is no Hungarian development trend in the field of urban water management which could compete with the international frontline. There is a significant international pressure to purchase complete results and developments (for example drinking water or wastewater treatment technologies). The distrust in innovative solutions and the absence of adequate knowledge and vocational training is also typical.

There are no research institutes in Hungary committed to the development of drinking water and wastewater technologies or to the system of public water works. There is a lack of experienced professionals, chemical implements and model devices. The last extensive water technology related research institute closed about two decades ago.

Nowadays only the institutes of higher education and a few large operational organizations and manufacturers contain groups, or people, that represent domestic R&D dealing with water technology.

Low efficiency of domestic research institutes committed to urban water management is noticeable from the small amount of articles composed by Hungarian authors being published in two of the most important periodicals of water research. For example, Water Science and Technology publishes 4-5 Hungarian articles a year, which is 0.5-0.6% of all publications. Water Research publishes even less, 0.02-0.03%, which means an average of 1 article a year. Incidentally, most authors of the articles about urban water management are members of HU NWTP. By the topic of these articles most of them are concerned with water quality and modeling issues, while the number of publications related to water and wastewater technology is scarce. Furthermore, these publications are related intensification, instead of the application of innovative methods (National Water Technology Platform, 2010b)

By the facts mentioned above, the deficiency of domestic urban water management R&D is definitely noticeable, but hardly quantifiable. There are several methods available for the measurement of the R&D efficiency. Some of these indexes are highly informative in the field of urban water management R&D&I as well (for example the ratio of professionals with university or PhD degrees, R&D expenses compared to total income, number of patents registered to employees of a company, number of international publications, ratio of professionals participating in lifelong learning, or complex indicators like innovation demand/supply/diffusion/absorption and SII etc.).

Unfortunately no such surveys were performed in Hungary so far in the sector of urban water management.

Present situation of the education and training of YWPs in numbers

International studies (European Commission, 2007; European Commission, 2009) emphasize the effect of educational standards on the country's R&D&I activity. All studies analyzing the Hungarian situation (e.g. OECD, 2009; Havas, 2009) report negative results concerning the standards of higher education. According to these the development of Hungarian R&D&I will shortly be limited by the absence of qualified labor. Adaptation and spread of high end international technologies may also be limited by the absence of qualified labor. However, foreign companies only put their innovation investments in countries, where beside other circumstances (allowance, support system, economic stability, etc.) qualified labor for performing research activity is available.

Indices representing absorption capability show a significant lag compared to the European/international frontline. The ratio of new graduates, PhD graduates, and postgraduates is low in Hungary. The ratio of students on the field of engineering and natural or social sciences compared to the total population (3.0%) is 75% of the EU-27 average (4.0%), whereas the same ratio for PhD students is 38% of the EU average (OECD, 2009).

The Hungarian leeway is indicated by the fact that Hungarian institutes of higher education do not have an upscale position in international rankings (for example websites containing university charts display BME as the 88th in Europe, but usually there are no Hungarian universities in the top 200-300 worldwide; <http://www.webometrics.info/index.html>). Currently BME is the 235th worldwide. Considering the relation between R&D activity and university standards, the improvement of Hungarian higher education must earn great attention.

For the improvement of domestic R&D activities, all fields mentioned above contain several unsolved matters, solution of which could enhance the performance of Hungarian innovation. In the field of urban water management, effect of those mentioned above is unequivocally noticeable.

Problems and challenges concerning the education and training of YWPs its influence on a country's R&D&I activity

Serious absence of professionals and the situation of higher education and vocational training in the field of urban water management is a current concern (e. g. HAS Committee of Water Management Science, 2010). Prevision is needed to determine the number and quality of future professionals, to be capable of solving problems that will develop in the next 5-10 years. To develop a prescient educational system, the development of a long term educational strategy would be essential, although each initiation has been swept away by recent reforms (such as the adaptation of the Bologna System without any critics).

It is obvious, that for projects generated by the close-up oriented EU support (New Hungary Development Plan and subsystems) concerning urban water management do not have (or do not have enough) Hungarian professionals available. This situation is about to deteriorate in the future.

Despite the enormous present and future need for qualified and talented professionals on the field, most university and college students arrive from high school with mediocre scholastic records (Kovács, 2009). The Bologna Process united the former practical (college) and theoretical (university) education and made them identical. Because of the process students acquire only basic

knowledge by the end of their BSc studies. Further education can take place in the university (MSc education), at the work place. Vocational training of new graduates and explanation of practical matters and possible solutions are the challenge of the profession itself. Publication of basic articles in student's forum and studies would be assistance to young professionals during their education. Beside the development of the students' knowledge, the relation between professional associations, universities, and young intellectuals would also improve as a result.

Competitiveness of the urban water management sector is determined by the multilevel educational system, related to which several critics were drawn from questionnaires and interviews. The main problem is that most institutes of elementary and middle education on water have ceased. There are only a few high schools (e.g. Barcs, Baja, Szolnok) involved in water management, and mostly their curriculums are divided between water management and environmental protection, which is becoming very popular nowadays. Absence of skilled workers and technicians may even endanger the operation of public water services in the future which is rather disturbing.

Another problem with Hungarian professional training in urban water management is the disharmony between the different levels of education. In most institutes of middle and higher technical education concerning public water services the ratio of economic and legal studies compared to technical knowledge is rather low and the intention of interdisciplinary and practical approach is often disregarded. Master students should acquire knowledge sufficient for the profession of design and operation. Currently this is not possible. Moreover, latest trends and results of international research are not integrated well enough into higher and postgraduate education either.

Further hidden issue is the pressure made by the indexes measuring the performance in universities. Unprepared acceptance of the Bologna System multiplied the burden of professors involved in R&D. The three pillars (teaching, researching, giving technical expertise) cannot be harmonized, and most of the time of R&D is the one considered as a burden instead of a voluntary activity. There is a system in Western European and North American universities called "sabbatical" which was introduced in order to unburden professionals, and improve R&D activity. It is a cliché that the difference in the salary is in order of magnitude between Hungarian and Western European professors (for the benefit of Western European colleagues of course). It is disturbing, that brain-drain is not typical of this age group but more likely of young professionals, who leave the country for a much better salary. This phenomenon is not urban water management specific however.

Without proper measurement of the effectiveness of Hungarian professional conferences, it is hard to tell if these programs improve the qualification of participants or not. While professionals of the audience often change thoughts about the emerging topics, spread of the results of these conferences would also be very important. However, most of the time presentations of Hungarian conferences are not published in hard copy of Conference Proceedings or not published at all.

Written professional arguments are also missing. The periodical of the Hungarian Association of Wastewater Technologies had published several keynote articles in the attempt of calling in professionals to discuss collective matters, but after an initial success the attempt failed.

International reputation of Hungarian professionals in the R&D of urban water management is mediocre. Hungarian professionals in international associations are rare and most of them belong to the older age. Except for a few experienced researchers and engineers emblematic figures of water technology (drinking water and wastewater treatment) are missing by now.

R&D in urban water management is also set back because of the limits of co-operation between contractors and research institutes. Requirements of companies, universities and research institutes are different, and the exchange of professionals or knowledge is limited. Traditions and economical inspiring mechanisms that “automatically” guarantee the profitable co-operation of contractors and research institutes in many countries are also missing or only incidental in Hungary.

There is no scholarship program announced by either companies or national professional associations in Hungary that would guarantee talented students to get into the company which is the most appropriate for their superior expertise for example by the means of a scholarships during their studies. Unfortunately the most significant group of professionals (working at public utilities for example), the middle-aged cannot be inspired to differ from their daily routine and perform R&D activities that would be profitable for the country either.

CONCLUSION

The lag of domestic water research significantly handicapped younger generations, assuming that only a limited number of young Hungarian professionals will be able to join the international academic society in the near future. Unfortunately most of them will likely get into higher positions as representatives of a foreign company. A possible solution could be the promising initiative of establishing so called research universities in the course of tender calls of the Hungarian Ministry of Education and Culture, which could ensure the financial background for the universities’ R&D activity.

A possible solution would be the improvement of international scientific relationships and the increase of the mobility of young professionals in order to allow them to work at high standard research institutes. However, farfetched bureaucracy and circumstantial mobility tenders should be avoided. Instead, a flexible and success-oriented support system should be established, which would finance research activity not only for the time of foreign residence, but for much longer. The critical conditions of this solution are that researchers travelling to other countries should target their research and they should be supported after their return in order to continue with it.

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