

Professional Registration of Electrical and Information Engineers in Cyprus, Turkey and Various Countries around the World

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Introduction

Professional licensure is the act of professional registration and authorisation by law of engineers who have the right competencies in their designated professional areas. Licensing (licensure) enforces standards that restrict practise to qualified individuals with the aim to protect and improve public health, safety and welfare. Hence, it is an important issue and there are laws to this end in many countries [1–3].

Engineering is a global profession and mobility of engineers is desirable. Licensing laws of many countries have some similarities but also exhibit some differences. Hence, for easier mobility of professional workforce, conditions for allowing comity of licensure between different countries need to be agreed upon [4–6]. In the European Union a series of Community Directives have been adopted in order to overcome the obstacles in the free access and pursuit of professions which are regulated by specific laws in member states.

This paper studies the status of professional registration and licensure in a number of different countries around the world. In particular, the cases of Cyprus, Turkey, UK and USA are studied. The situation in the EU with regards to the Directives covering Professional Registration and mobility is also investigated. Similarities and differences are identified and reported.

The rest of this paper is organised as follows: the next section covers the country case studies, while section 3 provides discussions on country specifics. The final section provides the conclusions.

Country Case Studies

Cyprus. The engineering and architecture professions are regulated and graduates need to become corporate members through registration to the appropriate professional chamber in order to perform their professions in North Cyprus (TRNC). Union of Chambers of Cyprus Turkish Engineers and Architects (KTMMOB) is the umbrella organisation for all related chambers under which

there are a total of 14 chambers of which 12 are engineering chambers.

Electrical and Computer Engineering professions are regulated by their respective chambers. Membership is only open to graduates of Engineering Faculties of Universities with the appropriate bachelor's degree. By law, all electrical projects and installations need to be prepared and signed by registered members and submitted to the Cyprus Turkish Chamber of Electrical Engineers (KT-EMO), for approval. Foreign persons and companies acting alone or with nationals, need to employ registered engineers in any work related to Electrical or Computer Engineering. Any non-national engineer desiring to act in professional capacity, needs to hold the same credentials as are required from the nationals and needs to make a temporary registration approved by the Union of Chambers.

In South Cyprus, Labour Department is designated as the National Focal Point (NCP) for information on and application of the relevant legislation regarding Recognition of Professional Qualifications. Regulated Professions necessitate the possession of a specific professional qualification and the relevant Directive is 2005/36/EC [6]. Engineering types which are regulated are: Civil, Chemical, Computer, Electrical, Electronic, Mechanical, Mining, Rural & Surveying Engineering. The Competent Authority to receive and evaluate applications is the Cyprus Scientific & Technical Chamber (E TEK). ETEK Law grants powers for licencing to practise the profession in the appropriate field of engineering such that the person: (i) holds a bachelor's degree in engineering, which permits one to practise the profession in the country where it was obtained and which is recognised by ETEK, (ii) is a citizen of the Republic (of Cyprus) or on the date of submission, the applicant is the spouse of a citizen of the Republic with usual residence in Cyprus, or is a citizen of an EU member state. There are two main engineers and architects associations in South Cyprus: Cyprus Professional Engineers Association (CPEA) and Cyprus Civil Engineers and Architects Association (CEAA).

Turkey. The title “engineer” is obtained by graduating from an Engineering Faculty accredited/recognised by YÖK (Higher Education Board). The Union of Chambers of Turkish Engineers and Architects (TMMOB) Law states that any member of the engineering or architecture profession (by virtue of having the title) must register as a member of the appropriate chamber of engineering and maintain this membership. The “title and membership” allows one to work as an engineer in public organisations or private companies. Registration to the professional chamber is not compulsory for those engineers employed by the government. The Union of Chambers (TMMOB) serves as an umbrella institution for the engineering and architecture professions in Turkey. It is formed as a federation of 23 professional societies of which 19 are in engineering.

Currently there exists no formal joint Professional Engineering licensure practise for engineers in Turkey. The Chamber of Electrical Engineers (EMO) in Turkey accepts as a full member graduates with degree titles of Electrical, Electronic, Electrical-Electronic, Computer, Control, Communications, Telecommunications, Biomedical, Software, Information and Microelectronics Engineering. EMO has the authority to certify individual engineers as an Independent Consultant Engineer (ICE or in Turkish; SMM - Serbest Müşavir Mühendis) in one of the following fields: Lift Service Engineering, Electrical Installations with less than 1kV power requirement and Electrical Installations with less or greater than 1kV power requirement. Certification in the first two fields are available to all Electrical, Electronic, Electrical-Electronic, Electronics and Communications Engineering graduates, while the third certification type is only available to Electrical, and Electrical-Electronic Engineers who have High Voltage Techniques, Electrical Machines and Electrical Installations (one or more of: protection, generation, transport and distribution) courses on their transcripts or who have taken courses in this field from universities after graduation. Engineers who have been certified as SMM have the authority to develop and implement designs, test, measure, control and accept implementations, to carry out running, maintenance and support operations, stamp and sign design documents, plans and contracts. They also have the authority to bid for government contracts, carry out private practise/consultancy service and offer these services to the public.

Responsible professional experience is not a requirement in obtaining the SMM certification. Hence, new engineering graduates can also apply for and obtain this certificate. Further, SMM certification is not necessary for services which are not within the field of activities of the SMM. These include work and services within the R&D labs/centres, electricity distribution companies, power generation and conveyance establishments, etc., in both the public and private domains.

United Kingdom. In the UK, the title “engineer” is obtained by graduating from an engineering department of a University with a degree in engineering (e.g. B.Eng. or M.Eng. degrees). However, there is some confusion in the use of the term “engineer” since it has traditionally been also used for non-degree vocations such as technologists,

technicians, electricians, mechanics, plumbers, and semi-skilled occupations. In general, there is no restriction on the right to practise as an engineer in the UK.

The Engineering Council (EC) is the UK regulatory body for the engineering profession and grants the titles “Chartered Engineer (CEng)” or “Incorporated Engineer (IEng)” declaring them to be “professional engineers” through independent assessment of their competence. The UK Standard for Professional Engineering Competence (UK-SPEC) provides the means to achieve this. Professional competence integrates knowledge, understanding, skills and values and goes beyond the ability to perform specific tasks. The formation process through which engineering professionals become competent generally involves a combination of formal education and professional development.

In the UK, the regulated Professional (engineering and technical) Membership titles, in the fields of electrical and information engineering are given below:

- Engineering: “Chartered” or “Incorporated” Engineer;
- Technical: “Chartered IT Professional” and “Engineering Technician (EngTech)”;
- Membership title: “Member of the Institution of Engineering and Technology (MIET)”.

In the field of Electrical, Electronic, Communications, Computer, Control and Information Engineering, the Institution of Engineering and Technology (IET) is a professional society which has the authority to establish professional registration of engineers (giving the CEng and IEng titles) through the Engineering Council. It represents the engineering profession in matters of public concern. Its corporate members can use the post-nominal title of MIET. British Computer Society (BCS) is a Chartered Institute for IT and hence, only BCS can award Chartered IT Professional status which is a regulated title. Professional Members of BCS (MBCS) meeting the EC criteria can apply for CEng or IEng registration.

European Union. Mutual recognition of professional qualifications in the EU, the European Economic Area (EEA – includes: EU member states, Iceland, Liechtenstein and Norway) and Switzerland is regulated by Directive 2005/36/EC dated 30/9/2005 and it came into effect on 20 October 2007. Since 1 July 2009,

it applies to nationals of one EEA Member State wishing to practice a regulated profession in another EEA state. It will be applicable in Switzerland at a later stage. In order to aid the implementation of this directive, each member state has appointed a National Contact Point (NCP). NCPs provide information and advice on Directive 2005/36/EC and deal with enquiries related to recognition of professional qualifications. Engineering profession or title has different regulatory laws in different EEA countries. The European Commission maintains a database for regulated professions in the EEA zone.

The European Qualifications Framework (EQF) is an EU initiative which has entered into force in April 2008 in order to create a mapping facility for referencing academic degrees and other learning qualifications among member states. It is an outcome based system designed to allow national qualifications to be cross referenced making them more readable and understandable across Europe. In this

way it aims to achieve citizens' mobility between countries and to facilitate lifelong learning. It sets 2010 as the recommended target date for countries to map their national qualifications systems to the EQF, and 2012 for countries to ensure that individual qualification certificates bear a reference to the appropriate EQF level. Eight reference levels have been defined.

FEANI is a federation of professional engineers uniting national engineering associations from 31 European countries. It maintains a register of professional engineers called the "FEANI Register" to which engineers qualifying for the title European Engineer (Eur. Ing.) are enrolled. FEANI aims to facilitate mutual recognition of engineering qualifications in Europe through the exclusive use of this professional title. Over 30,700 European Engineers are listed in the register at the end of December 2009. FEANI membership is only open to candidates who are members of an engineering association represented in FEANI through a National Member. Applicants need to meet the seven years' formation rule which includes university level engineering education (of at least three years' duration) from programs recognised by FEANI and a minimum of 2 years of valid training and professional experience.

USA. In the USA, all 50 states have "state laws" regulating the licensure of engineering and surveying professions. Professional license is necessary in order to perform responsible engineering practise within public institutions, bid for government contracts, carry out private practise/consultancy service, offer engineering services to the public, enter into contracts, stamp and seal designs, or submit original designs, plans, or specifications for approval. In addition, many companies consider licensing important when considering employee's technical advancement and assigning supervisory engineering tasks to them. Each state (and US territory) manages licensure through a "State Board of Licensure". State Boards are members of National Council of Examiners for Engineering and Surveying (NCEES). NCEES is a national non-profit organization dedicated to advancing professional licensure for engineers and surveyors. It promotes uniformity of the licensure processes through services such as credentials evaluations, study materials, developing, administering, and scoring the examinations, etc., for its member licensing boards and licensees. NCEES also facilitates professional mobility allowing them to operate in multiple states by managing a national record system for licensed engineers.

In the USA, the Professional (Licensed) Engineers (P.E.) form a select group since requirements are stringent. In addition to being able to provide service to public they enjoy other professional benefits such as speedier rise to management positions and higher salary levels. Engineering licensure is in general a four-step process for candidates necessitating the obtainment of:

1. A degree from an EAC/ABET-accredited (or substantially equivalent) engineering program;
2. The Fundamentals of Engineering (FE) exam;
3. Registration as an Engineer-in-Training and gain acceptable work experience (typically a minimum of four years) under the supervision of a P.E.;

4. The Principles and Practice of Engineering (PE) exam in the appropriate discipline.

The FE and PE exams are administered by NCEES in April and October of each year in each state on the same dates. The FE exam is designed for engineering (or related field) graduates or for students who are close to finishing an undergraduate engineering degree. The FE exam is also known as the Engineer-in-Training (EIT) exam, since those who pass this exam can be certified as EIT. The FE exam covers fundamental engineering subjects including mathematics and the basic sciences. It consists of two sessions: S1 and S2. S1 is the same for everyone and covers general engineering topics including: maths, chemistry, computers, statics, dynamics, strength of materials, materials science, electrical circuits, thermodynamics, fluid mechanics, engineering economics, engineering management, ethics, and environmental engineering. S2 can be selected to be one of the following modules: Chemical, Civil, Electrical, Environmental, Industrial, Mechanical and Other (alias General) disciplines. The second licensing exam is known as the Principles and Practice of Engineering (PE) exam and is in one of the major fields of engineering (chemical, civil, electrical, industrial or, mechanical).

In the USA, many states now require licensed engineers to meet requirements in Continuing Professional Competency (CPC) which is mandatory in most states. Licensed engineers often are required to complete a number of professional development hours (PDHs), to renew their licenses. This necessitates continuing education (CE) or life-long learning (LLL) initiatives. National Society of Professional Engineers (NSPE) is the main society in the US promoting PE status and licensure.

Discussions

Professions affecting public health and safety are usually regulated which necessitates the possession of a specific professional qualification in order to exercise it [1]. Different groups of professions are regulated in different countries. Further, the way in which the regulation is established and asserted differs in many countries.

The European Union recognising that such differences exist within the member countries and realising that mobility of workforce could only be achieved by mutual recognition of professional qualifications, has issued the Directive 2005/36/EC [4]. The directive brings about greater liberalization of the provision of services and automatic recognition of professional qualifications which can be implemented in 3 ways:

1. Sectoral professions (covered by 8 "sectoral" directives for: doctors, general nurses, midwives, veterinary surgeons, dental surgeons, pharmacists, architects and lawyers),
2. Recognition of professional experience,
3. General System of recognition (Directives: 89/48/EEC, 92/51/EEC and 99/42/EC).

For cases (1) and (2) above, automatic recognition is given and subsidiary application of the general system is also possible. The general system applies when a Member State requires a qualification in order to practise a

profession on its territory, with the exception of the professions already covered by a sectoral directive. This system is independent of the NARIC system which concentrates on the recognition of diplomas for academic purposes.

In the USA the route to Professional Engineering is quite well defined. Membership of Professional Institutions such as Institute of Electrical & Electronic Engineers is not adequate nor does it guarantee licensure. Licensure is carried out by the Licensing Boards in each state which also hold the necessary exams and carry out the registration. This is in the main quite different from the European system.

In Turkey, the title “engineer” is given by Universities by the authority of law and the membership registration to the appropriate chamber of engineering is needed in order to carry out the profession in any way. Further, in order to have the “licensure” type of authority, engineers may need to go through further assessment by the said chamber of engineering. In Cyprus two separate situations exist. In the South Cyprus which is a member of EU the Directive 2005/36/EC applies. However, in North Cyprus, this Directive does not apply and the authority for engineering registration is given to the Union of Chambers of Engineers and Architects. Engineers need to register with the appropriate chamber in order to carry out their professions.

Comparing the cases in this paper we note that licensure with an exam only exists in the USA. UK has the Chartered Engineer status given after an independent assessment of competence. In Turkey and Cyprus having the university bachelor’s degree is adequate for registration/licensing.

Conclusions

In the provision of mobility for engineering professionals two issues become important: recognition of professional qualifications and experience as well as the recognition of educational qualifications. Since the educational systems of many countries vary, this system in general relies on recognising the accreditation given in one country by others. In Europe, European Qualifications Framework and the NARIC system deals with the recognition of educational qualifications, while a number

of EC Directives deal with comity of professional qualifications across the EEA zone.

In the USA, educational requirement for registration is a four-year ABET accredited University degree. Professional engineering qualifications are regulated by law in each state. There are many similarities between the laws of states and comity of professionals is possible.

Recognition of professional qualifications across countries or even continents is possible. A number of accords (such as the Washington Accord) have been drawn up between the USA and groups in other countries. Within Europe a number of Directives govern the recognition of professional qualifications across countries. These also set the scene for ways in which professional qualifications from third countries are to be treated.

It is interesting to note that among the countries investigated in this paper, only the USA has the professional engineering exam for licensure; all other countries have either registration and/or certification requirements. It would be interesting to extend this work to the rest of the world in order to identify similarities and differences in the approaches of other countries.

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In this paper, Professional Engineering Registration and Licensure approaches in the field of Electrical and Information Engineering as applied within Cyprus, Turkey, UK, EU and USA are investigated. The general philosophy behind licensure/registration, general acceptance, similarities and differences of the approaches used in each country are reported. The advantages and disadvantages of engineering registration approaches in these countries are studied. The strengths and deficiencies of the approaches taken in some developing countries are identified and reported. Bibl. 6 (in English; abstracts in English and Lithuanian).

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Apžvelgta Kipro, Turkijos, JK, ES ir JAV elektros ir informatikos inžinierių profesinė registracija. Aptarti inžinierių registracijos pranašumai ir trūkumai kai kuriose valstybėse. Bibl. 6 (anglų kalba; santraukos anglų ir lietuvių k.).

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