

# **Problems of formation and development of engineering education in Central Asia in the context of the new program of industrial and innovative development on the example of the Republic of Kazakhstan**

## **Introduction**

Today the states of Central Asia endure serious economic recovery, which substantially based on active industrialization of the region. However, there is a significant problem of lack of qualification of personnel in the field of engineering for the full and integrated development. Conventionally, this set of problems can divide into several fundamental problems.

The first and most important aspect is to ensure quality in the training of engineers, the second problem related to the certification of specialists in the field of engineering based on international standards, and the third problem related to the professional development of teachers of engineers.

## **Main Body**

### **1. Ensuring quality in the field of engineering education**

#### **1.1 Accreditation of educational programs in the field of engineering**

Accreditation as a factor in quality assurance appeared not so long ago in the entire region. Initially related to the accreditation system in the region was not unique. The problem is that there are several views and alternative approaches are fundamentally different from each other.

The first approach is that the accreditation system is complementary to government control; the so-called state certification. This scheme promoted in countries such as Uzbekistan<sup>1</sup> and Tajikistan<sup>2</sup>. Here though formally separate institute on ensuring quality also considers accreditation however is limited to standards of the legislation, which leave the right to accredit educational programs and higher educational institutions only behind the state. Under the current legal framework, accreditation is another state mechanism that enhances the state's influence in the field of quality assurance.

In these circumstances, it is natural that the basic standards in the field of accreditation approved by the Ministry of Education becomes SES (State Educational Standards) rather than international standards, compliance with which would approach the issue more systematically.

The second approach considers the accreditation as an alternative to state control in the field of education. By the logic of the reforms carried out in the Republic of Kazakhstan<sup>3</sup> and the Kyrgyz Republic<sup>4</sup>, accreditation should eventually replace the state certification. The meaning of the accreditation will be that the non-governmental sector in the face of accreditation agencies would contribute to the development of quality assurance systems in the country. Also in these countries, it creates a so-called system of national registries. In Kazakhstan, the system creates in Kyrgyzstan is at the stage of formation. The norms regulating activity of national registers does not limit universities in where to pass accreditation. However, the state recognizes only that accreditation which to be carried out by agency which is included into the National register.

However, in both cases there are essential minuses. In the first case the accreditation is considered only as a part of state control in the sphere of education in the second case the rules of national registries do not provide any kind of specifics related to engineering education. Thus, in the National Register of the Republic of Kazakhstan №1 are only two internationally recognized agencies ABET and ASIIN. However, now virtually no national accreditation agency, which viewed in its focus, is engineering education. This issue raises a number of difficulties, as the world's major agencies often do not take into account the local context in the process of training engineers.

### **1.2 Academic Freedom**

#### **1.2.1 Qualifier of specialties**

Important and in our opinion a necessary factor in development of engineering education is the academic autonomy. In order to prepare engineers for the state program of industrial-innovative development of Kazakhstan on the initiative of the Minister of Education and a consortium of universities created Science, consisting of 10 leading technical universities. This is a very important initiative, however, cannot function effectively in an environment where there are so-called classifier of education<sup>6</sup> approved by the Minister of Education and Science of the Republic of Kazakhstan. After all, there is not even a list of engineering specialties. In the modern quickly changing conditions concentration of all specialties within one qualifier it is not possible and it is not expedient. This problem cannot solve at the level of the Ministry in connection with difficult procedures of bureaucratic coordination. In conditions, when interdisciplinary nature of training, when hundreds of new educational programs this right are developed every day extends it is necessary to provide higher education institutions themselves.

#### **1.2.2 State educational standards**

In absolute majority of the countries of the region so-called state obligatory standards of education<sup>7</sup>, which do not give sufficient freedom in development of the most educational program, still dominate. This factor also deprives the educational programs of flexibility and hinders the preparation of competitive staff.

### 1.3 Lack of close connections with employers

Unfortunately, today the countries do not pursue the accurate policy directed on involvement of employers in process of formation of curricula. This aspect causes concern from expert community as such institutional reforms as the program of industrial and innovative development is not possible without close connection with the employer. Today the statistics of employment of graduates on technical specialties does not exceed 50 percent that points to very low level of integration of education and production sector.

### 2. Certification of engineering staff

In the countries of the region is almost no concept of the engineering staff. It reflected, as in the qualifier of specialties where this concept is absent, and on lack of accurate system of certification of engineering personnel. The issue of certification of engineering personnel remains difficult because the state has no clear understanding of the policy in this area. Over the past 10 years, the state is trying to form a national qualifications framework, based on the European experience. However, these attempts have so far not lead to positive changes, since there is no clear experience of cooperation between government and business in this area. Of course, there are some attempts of social organizations like the Kazakhstan Association for Engineering Education to develop a similar system based on the principles of international certification according to the criteria of international networks such as FEANI, APEC Engineer. However, it does not have sufficient effect in the absence of a clear legal regulation of the activity of the state. Moreover, in the European Union there is a clear understanding and recognition of legal certainty on the part of the state on the same criteria of FEANI. In some countries, results of certification of this society admit other cases of the state and only the state resolves an issue of certification of engineers as this branch is the vital priority in development of national economies. Moreover, FEANI in itself is not government institution, which unites national engineering associations of the countries of Europe on the course of the activity. That is the question of the legitimacy and the legal recognition of this kind of certification. However, countries in the region need any experience on certification engineering staff, without which the engineering education in the region may be left out of the recognition of qualifications.

### 3. Professional developments of teachers of engineers

Today one of the most serious problems is the training of teachers of engineers. In a number of countries in the region operates a free system of training teachers. However, for example the recent reforms carried out in this area in recent years in the Republic of Kazakhstan limited the ability of universities in the organization of training courses. Because of Institutes of professional development, there was a national giant "Orleu" and in the field Nazarbayev, university has rights to conduct activity. Any concrete justification about this restriction it was not necessary. As a result, the faculty lost possibility of professional development in the leading higher education institutions of the country. It especially strongly struck on engineering education. In general, the legislation is contrary to the formation of a modern training system. Since established training centers KazNU - IGIP, this works because of an accredited educational program. The joint IUCEEI platform KazNU of al-Farabi developed that allowed to create the new KIUC EE platform. However, despite these reforms the Ministry of Education and Science has decided to transfer the professional development of teachers of Nazarbayev University, which does not have the necessary experience in this field.

## Conclusion

Problems of formation and development of engineering education closely intertwined with the decision of the three tasks. This quality assurance of engineering education programs by building a balanced system of accreditation and the expansion of academic freedom of universities, secondly certification engineering personnel and capacity to adequately respond to any changes in the market of engineering services through the establishment of a national qualifications framework and the progressive implementation of an international certification and the third is to build effective and transparent system of training teachers in the field of engineering.

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**Keywords**

Engineering education, professional development