# Engineering Axiology or Why Is Engineering Education in Crisis?

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**The article is devoted to the cause clarification of engineering education crisis. According to the authors' point of view, this is the world complex nature characterized by the moral human autonomy. Crisis overcoming problems will be solved by the social justice modeling praxis in the educational process. It must be stressed that interdisciplinary module development aimed at humanitarization of engineering education is of great significance.**

***Key words:*** *crisis of engineer's education, humanitarization of engineer's education, moral human autonomy, phronesis technologies, social justice.*

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The crisis of engineering education is doubtless. Moreover, it has the status of legitimate nomination. After the parliament hearings "Modern engineering education as a significant component of engineering modernization in Russia", the participants discussed the problem of engineering professional staffing in Russian economics and came to the conclusion that neither the engineering education infrastructure, administration (including legal support), and the age qualification of the faculty staff, nor the amount of research and development financing activity meet the modern demands of engineering knowledge in the domestic manufacture [1].

The resulting crisis of education is due to the "juvenility trap" (by V. Polterovitch) where Russia was caught into, when modern economical growth is characterized by the significance of the scientific and engineering progress and intellectualization of the production principal factors [2].

The main activities to overcome the crisis are of institutional character. They are aimed at the reconstruction of the engineering education key status which would be appropriate to the technical engineering role in the national innovation system, especially in the scientific research activity and personnel training [2]. However, speaking of the crisis in engineering education, we think that the essence of the matter is in the existence of a human being in the time of the science-based world situation.

First, the existence of the present institutional barriers among science, education and areal sector of economics should be explained, so far, as the global history process is characterized by the social complication in the solidary space and time i.e. by the tendency of the present social institutions autonomism and the formation of new ones. Why does the natural autonomism of social institutions become the institutional barrier in the Russian reality? The answer to this question will allow to identify of the nature of the engineering education crisis and, thereby, to development of the adequate measures for its overcoming.

The engineering education crisis has the complex world character. The fact is that the external engineering educational environment is characterized by the "imported reality" [5] operating in the resource routine of the national economy development. It is just the "imported character" that explains the low demand for the engineers in the Russian Federation, particularly for the experienced ones (engineering elite) according to the engineering education terminology submitted in "The major principles of the national doctrine" by the engineering education Association in Russia [6]. The low demand for the innovation key specialists, moreover, the clear mobilization tendency in the conversion development confirm the fact that the crisis of engineering education is, indeed, the existential one. Global history says that the modern reality of the reflexive society with the nonlinearity in the social and economical processes is the historically identified form of the moral human autonomy as the form adequate to the historical progress with its science and advanced technologies.

The understanding of the engineering education crisis essence is based on the fact that engineering activity in the high education society is the phronesis. The phronesis sphere (according to Aristotle) [7] is connected with the human deeds, with the praxis and poesies of the human life, i.e. when the knowledge in natural science modus is transformed into the knowledge in the modus of good. I.G. Fikhte, the European industrial revolution thinker, said that philosophy teaches us to find everything in ourselves (Ego). Only through the human being's Ego the dominated rules are distributed around him up to the borders of his investigation. The more he develops his investigation, the farther his harmony and order are [8].

Human autonomy of the objective reality as the highest unreliability widens the innovation problem area up to the ontic – ontological problems of the human objective reality. Hence, theoretical and methodological innovation monopolization by economists and financiers is not considered to be relevant to the existential sense. "Merchant time" is the term coined by the French historical school representative (Jaques Le Goff) means that time commercialization as an independent variable contradicts the engineering activity praxis. As some investigation results show, the investigation idea is the result of the creative activity of the staff within the company, but does not relate to the market demand and changes in the market. A new idea is chosen for the commercial value only at the latest stages of investigation. R. Nayak and D. Katteringham, innovation process investigators, claim that market seeking is being done after the problem has been solved. In some cases the field investigation is carried out simultaneously. We couldn't find any example of the market demanding the realization of the product until the researcher made it [9].

It is necessary to withdraw the christian-technocratic approach from the engineering education, and it is a sufficient term to form the adequate historical mission for the engineering strategy (e.g. if the idea is significant when the governor of Khabarovsk, V.Shport, wishes to realize it as an engineering forum). In this case the engineering education crisis by its ontic- ontological sources allows to identify the only foundation stating the problem area of the entire system of challenges and risks in Russian Technical Engineering. The foundation like this one is thought to be the social justice praxis modeling during the period of reindustrialization and post industrialization in Russia. Social justice means the social and economic process authors' belief, that the stable possibility field development provides equal access to the principle development resources.

Social justice praxis modeling will allow formation of the value score of the engineering education. It means to create the uniform conditions for ontic – ontological, deontological (ethical) constituents of the training, education and rehabilitation processes for the engineer. It is the social justice praxis that locates the universal knowledge inside the individual due to the specific content of the objective reality fundamental pragmatics (M. Khydegger).

Social justice methodology praxis development will allow actualiz ation of liberal education programs for engineers (humanitarization). By the humanitarization we understand the formation of scientific and educational activities organization structures that should provide the humanities knowledge under the logocentrist trend for the professional education program (i.e. the required program manager, tutor institution, etc). Liberal education as compared to the regional world picture ontology and technological engineering world, formulates deontological conclusiveness constant [10].

Educational humanitarization is based on the methodological procedure called sublimation of the backbone didactic units for the educational professional lofty matter program cycle in the ethic and legal matter. Metaphysical sublimation in the educational praxis suggests "theological standard" [11] development for the professional education activity and phronesis technologies [12], which cultivate morals and transform the existing moral dilemma into the practical side for future engineer's educational activity.

Phronesis technologies structuralizing the educational resources so as moral fundamentals of the professional activity become imperative of its existence, allow to actualization of metaethical problems of good and evil. Since phronesis social practices present the society as the natural condition for the human being to self create, these allow reviving the fundamental idea of the society as a reasonable community and a priori contemplation of categorical "Ego" [13].

Historical innovative moral fundamentals of the modern world under the conditions of the democratization process and imperfection value created absolutely new social matter, the backbone core of which is the total human responsibility till the problem raising in natural law and people. In this case, didactic presentation in educational activity and intensive science technologies as the interdisciplinary entity hybrid – is the science personified in technology, science as practice, technoscience, which is capable to be put into practice due to the education activity emphasis on the relationship analysis between the science and society. Notably, by Ch. Logino, on the social expression, or social science face [14].

The first stage to realize the phronesis ideas in the educational practice is to develop the interdisciplinary modular unit pertaining to the humanities for the value-oriented university – level professional education programs. The modular unit objective to become proficient in the moral problems stating and solving the professional ethic competence is essential, but introspection is poor. Poor determination for the benefit of morality dooms the human being to roam in the juvenility trap even in the day time with fire, since the actual human morphology exists, at least, in 6 modality mode. Human autonomy rushes among the following: 1) known and unknown (epistemology); 2) granted and forbidden (deontics); 3) good and bad (axiology); 4) necessary and impossible (aletics); 5) past and future (time); 6) here and there (space). But deontics is primary, because for the trainee to become a skilled engineer he should leave the knowledge space

for the time and space of engineering activity as it is the social one. This very transcendence is very urgent on modern Russia today. The country is short of the engineering component – human capital; the engineering society needs resources – social capital. In the modern world where the social processes associated with high technologies (and it is proved by the international legal nomination "Critical technology") dominate, inadequacy of engineering component in the development resource base of the country allows to qualify the crisis of engineering education as a peculiarity of the territory relating to an overtaking type during the civilized development. This is a challenge for modern Russia, because, due to the large scale and rate of the globalization world the science and innovation nowadays are becoming the most significant components for the cultural and socio-economic development for the human being, society and nation. Engineering elite mass limit absence among the skilled and well – educated people in Russia leads to the fact that the country is unable to provide real and steady development on the endogenous foundation. So, Russia has less chances of success not to fall out of the global history.



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