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# TECHNICAL UNIVERSITY AS AN INNOVATIVE FACTOR OF CULTURE

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*Abstract:* This study aims to consider the technical university as a factor for innovation in modern culture. The author's task is to identify the phenomenological (sociocultural) and ontological (pedagogical, personal, organizational) foundations of a technical university as an innovative factor. The methodological basis of the study is made up of identifying value concepts, a pragmatic method, and a criterion of effectiveness. The technical university as an innovative factor is revealed through research: concentration of innovations in engineering and technical activities; the cultural meaning of innovation; the peculiarities of the formation and development of the humanitarian environment by the technical university and its spiritual and moral component. The criterion of effectiveness refers to the use of pedagogical models by a technical university and a spiritual and moral component. The study deepens the understanding of the innovative factors of culture that have developed in science and makes it possible in practice to improve the technical university in line with the innovative trends of our time.

*Keywords:* innovation, technical university, techno-humanitarian balance, cultural meaning, humanitarian environment, personality-centered education, spirituality.

## Introduction

Innovations as a cultural phenomenon exist only in an environment that is ready. The basis for an innovative solution to the global problems of mankind is the humanization of production and consumption processes (resources, goods, and technologies). The technical university makes it possible to effectively implement the humanistic innovative values of both the world and the national culture. The educational environment of a technical university reflects and deepens the connection between engineering and technical activities and socio-cultural innovations. The technical university cultivates pedagogical educational models to research the most appropriate forms (humanistic, personality-oriented) of acceptance of the new. The techno-humanitarian balance of knowledge about innovations, introduced at the technical university, guarantees a co-evolutionary and humanistic orientation to the development of culture. Therefore, it is important

to study the technical university as an innovative factor of modern culture.

## Materials and Methods

The meaning of the article is revealed by the most important scientific foundations of the humanities - value, pragmatism, and the criterion of effectiveness. The value aspect reveals the phenomenological (accessible for perception, cognition, evaluation) side of the study. The pragmatic approach reveals the ways of establishing communication links necessary for the implementation of innovations between the technical university, students, faculty, and the public. The detection of performance criteria allows us to provide an understanding of the policy of a technical university for solving innovative problems that are significant for society. The ontological integrity of these approaches and criteria integrates general philosophical, cultural, pedagogical, sociological, and psychological materials in this study. Interdisciplinarity makes it possible to form a methodological toolkit necessary for deepening the existing scientific knowledge about innovative factors. The research methods used are both theoretical (analysis of scientific literature on the problem under study) and applied (observation).

## Results

In the course of this study, the phenomenological (sociocultural) and ontological (pedagogical, organizational, psychological, value, morality-spiritual, and creative) basis of the technical university were identified as innovative factors of modern culture. Pedagogical models (personality-oriented, personality-developing, humanized, humanitarized, and design-creative) and the spiritual-moral component are designated as key to creating an innovative educational environment in a technical university.

## Discussion

Culture is a clash of the traditional and the new. Each new generation preserves some traditions and rejects others (especially those that turn from a mechanism of imitation into a mechanism of compulsion). Cultural dynamics are driven by innovation.

Innovations are the final result of human intellectual activity; a new feature that is introduced which provides a qualitative increase in the efficiency of processes, products and is in demand by the market (Schumpeter, 1982). The concept of 'innovation' is not identical with 'improvement', 'invention', or 'creativity'. Innovation is the result of actions in the system of culture of laws demonstrating connections: the energy of human activity and technical means of its use; scientific and technological progress and autonomous political formations; technical means for the production of a surplus product and a class of specialists capable of organizing and directing the labor of others (Carneiro, 1997). An innovation that transforms the human world for the better can become anything only if it is creative in essence. Innovations today are the result of the generation of new features by the socio-cultural environment, the concepts of which are based on the humanistic interaction of man, society, and nature. The types of innovations are diverse: technological (new product or process); social (renewal of the spheres of human life in the reorganization of society - education, science, management system, charity, service), organizational (improvement of the management system), etc. Innovations bring phenomena that are ultra-significant for their existence (knowledge, technologies, products, organizational forms of society) and values (profit, anticipation, leadership, creativity, progress, higher quality of life). Therefore, national cultures strive to discover and develop the most important factors for the successful implementation of innovative activities. For modern culture, such an innovative factor is the technical university. Labor values and values of professional activity, their imperative power as a social regulator, and conditions of development cannot be understood outside of the context of common life values, especially cultural values (Tsvyk & Tsvyk, 2019).

Phenomenology identifies the characteristics of the existence of the technical university as an innovative essence of culture. This existence is not seen directly, therefore the task of phenomenology is to 'reveal what there is' (Heidegger, 1989). Phenomenology "is initially ontological by its very essence and any movement in its direction inevitably leads to existential problems.

Moreover, phenomenology not only requires ontology but also radically clarifies its idea. So not only is phenomenology essentially ontological, but the face of ontology is revealed only in the light of phenomenology..." (Chubatov, 2018, p. 16). Therefore, when considering this topic, it is necessary to refer to both phenomenological (accessible for perception, cognition, evaluation) foundations, and to ontological principles (objectivity, consistency, development, determinism, hierarchy, various relationships and connections between concepts and conceptual constructions). Phenomenology explicates the perspective of the functioning of a technical university in a constantly updated sociocultural reality, and ontology specifies the process of updating the principles existing in its educational space (pedagogical, organizational, psychological, efficiency, creativity, spirituality) with new content. Innovations form culture as an existential space and a methodological construction for studying its ontological modes (Motorina & Sytnik, 2020).

## *1. Phenomenological Foundations*

Let us single out and characterize the most important phenomenological foundations that determine the existence of the technical university as an innovative factor.

### *1.1. Concentration of Innovations in Engineering and Technical Activities*

The founder of culturology Leslie Alvin White viewed the technological factor as a determinant of the cultural system as a whole, and the evolution of culture as a function of technological evolution. The supremacy of the technological sphere is a reflection of humanity on the satisfaction of primary needs - in food, housing, social communication. The entire "social system of a nation is based on technological means, with the help of which food is obtained, protection from enemies is provided and war is waged. Social institutions that are not directly related to technology are indirectly related to it; they contribute to the coordination of different sectors of society and their integration into a single whole" (White, 2017, p. 50). Therefore, scientific and technical innovations (cycles of ups and downs of technical inventions and their practical uses) coincide with changes in all areas of socio-cultural life, including higher technical education. A technical university, reproducing the country's intellectual potential for engineering and technical activities, must have the ability to advance innovative development, meet the interests of society, a specific person and a potential employer. The technical university implements this ability today:

- forming intellectual potential that can implement innovative projects of varying degrees of complexity;
- commercializing research and development ideas and designs;
- carrying out training and professional development of the teaching staff and personnel for various areas of business;
- integrating science, education and industrial practice;
- introducing new fields of study that are in demand on the market, etc.

At the same time, an expert in public assessment notes significant shortcomings in engineering and technical higher education:

- deficiency in intuitiveness, spontaneity, lack of reliance on the public;
- randomness, secretiveness;
- reduction of democracy, including the rights of collectives of universities in the election of the rector;
- the prevalence of organizational and economic goals;
- the introduction of officials having no experience with education into the management structure and the ousting of professionals, scientists, teachers from it;
- the older age of the teaching staff;
- a lowering of the status of academics and teachers;
- the loss of the essentials of the education system, such as fundamentality, scientific character, consistency, practical orientation;
- a sharp decrease (up to 20%) in the share of the teaching staff performing fundamental and applied scientific research and development work. This means a reduction in the scientific base for the formation of an innovative economy. Universities that finance only educational activities are losing their positions in the scientific and innovative life of the coun-

try;
- half of the universities retain a sectoral focus, even in cases when the sectors themselves no longer exist;
- the slow introduction of innovative educational technologies in universities; the re-equipment of departments and laboratories with modern equipment, software, and hardware systems is difficult;
- the problems of salary increases of teaching staff have not been resolved;
- there is no close connection between universities and secondary schools, which leads to a steep decrease in the quality of training specialists at the university;
- the loss (about 50%) of first-year engineering students, most often due to a low level of knowledge upon admission. Due to the fact that graduates of technical universities do not work in their chosen field, the public funds that have been used to fund expensive education for these young people are lost. It is obvious that the country needs engineers, not technical universities in and of themselves. The solution is simple: cut the budgetary admission for engineering by half. At the same time, double the funding for the training of engineers per student. This will allow universities to update educational technologies and attract the strongest academics;
- the low efficiency of postgraduate studies (technically speaking, not to mention the quality of dissertations).

There are three key areas for innovative change in the university:
- to form educational structures and programs in accordance with an innovative economy;
- to overcome pseudo-education, and seek to attain modern standards of professional and analytical competencies;
- to create a transparent system of financial instruments that stimulate the development of institutional forms of improving the quality of education (Ivanov & Kondratyev, 2014, p. 263).

Thus, a radical transformation of the technical university is the basis for innovative training of specialists who are able to coherently combine natural science, engineering, and socio-cultural training in professional competencies.

### *1.2. The Crisis of Engineering*

Researchers today designate "four areas of such a crisis: the absorption of engineering by non-traditional design, the absorption of engineering by technology, the awareness of the negative consequences of engineering, the crisis of the traditional scientific and engineering worldview" (Rozin, 1997, p. 16).

The existence of each of these crisis areas has negative consequences:
- creative design leads to the fact that the engineer undertakes the development of processes that are not described in the natural and technical sciences and, therefore, difficult to calculate;
- the absorption of engineering by technology as a broader domain of the creation of objectives turns engineering into a spontaneous, uncontrollable, destructive force. Increasingly, the setting of engineering problems is determined not so much by the need to satisfy human needs (in energy, mechanisms, machines), as by the capabilities of the technological process itself;
- the impact of technology on humans and their way of life is less noticeable than on nature. However, it is essential and manifests itself in the obvious dependence of a person on: technical systems (starting with living quarters); the pace of technology (production, transport, communication; beginning and end of programs, processes, results); technical innovations that increase the range of needs;
- the crisis of the scientific and engineering view of the world is revealed in humanity's awareness of the impossibility of solving all its problems (including innovative ones) only with the help of technology (Rozin, 1997).

The crisis in innovation is exacerbated by the devaluation of the engineering profession and its results due to the prevalence of the service sector in the post-industrial world, and the performance of the engineering corps having not a creative, but rather a supporting and auxiliary technical function.

In such circumstances, an engineer is compelled to master a broader range of key competencies, to move away from a narrow professional specialization to interdisciplinarity even at the stage of training at a technical university.

*1.3. The Cultural Meaning of Innovation*

The cultural meaning of innovation is a meaningful category associated with the expression of the essence of the era and the emotional mood of society, with the 'inscribing' of the individual into the social unit, with the creation and adoption of his conceptual model of statehood. Understanding the cultural meaning demonstrates the growth of a person into the information fabric of a single cultural space. Meanings cannot be invented: they are unique and natural for the entities of a given culture. Meanings act as existential-informational constants, due to which they become the basis for specific outlooks on life. The acquisition of the cultural meaning of innovation is comparable in importance to the establishment of a nation's own identity. So, it is no coincidence that the "National Report on Innovations in Russia" (Kuznetsov, 2015) contains cultural recommendations for introducing innovations into the lives of citizens:

- to create a cult of knowledge;
- to increase the prestige of the opinion of scientists and the actions of entrepreneurs, the importance of a cultural code;
- to create an innovative environment and a society that will consciously form a new mentality and the ability of citizens to change it further.

In order to involve society in providing broad support to scientists, entrepreneurs, and innovators in various fields of activity, it is proposed that the government influence it from the aspects of:

- demand (through media promotion of the achievements of scientists; active influence on the school and university curriculum; encouraging advanced training and additional education for people of middle age);
- suggestions (popularization of knowledge);
- infrastructure (arrangement of platforms for communication, exhibitions, libraries, book forums, TV channels, magazines, Internet resources).
- Suggested ways to improve each aspect:
- forming and developing innovative ecosystems;
- tracking innovations from the stage of scientific research to their commercialization;
- completing the process of formation and implementation of innovations with encouragement, and turning the encouragement back into innovations (Kuznetsov, 2015).

The problem of the cultural meaning of innovation can be successfully solved through the establishment and use of the link between innovation and the technical university as a tool for integrating education, science, business and government in training personnel for high-tech industries. A technical university must demonstrate a willingness to cooperate, as well as a high level of competence in the field of international project management and communication in a cross-cultural space (Zaikov et al., 2021). The world public in discussions on education reform raises the topic of the relationship between innovations and a technical university. Strategies for forging this link are driven by countries' aspirations to achieve global technical university quality standards through: diversifying its activities in modern conditions of financial constraints; strengthening its role in the economy; strengthening positions in the social sphere, in the creation and commercialization of innovative goods and services; establishing partnerships with business and expert communities; consolidating efforts to introduce innovations into the educational space for active interaction with educational, methodological and scientific centers, gymnasiums and lyceums; creating an intellectual resource for the development of not only federal but also regional (municipal) innovation systems.

Hindering the establishment of a link between innovation and the technical university are:

- the departure of education from innovative development, starting from the school stage;
- inconsistency of the innovative development of university education at federal and regional levels;
- lack of mechanisms for long-term financing of the development of innovative education in order to increase the number of highly qualified jobs;
- the increase in bureaucracy when integrating universities;
- the impossibility of making education at a technical university interdisciplinary due to the dominance of teaching pure science, and not engineering practice (Untura, 2013).

As a result, innovative start-ups, which have been bringing good profits in many countries for

some time, remain at the initial stage of development in Russia, for example (platforms of massive open online courses 'Open Education', 'Universum', 'Lectorium', 'Coursera', favourable from the point of view of venture investment) (*Massive open online courses (MOOCs)*, 2015; Timkin, 2015).

However, at the technical university, innovative activities are carried out in many areas: "development of innovative educational programs (technologies); increasing the financial literacy of scientists and inventors; education of innovative culture of students, teachers, scientists; creation and implementation of educational programs on innovative entrepreneurship, innovative management, preparation of methodological, educational material, etc." (Efremova & Romanova, 2016, p. 64).

According to "the opinion reflected in the majority of normative legal acts regulating innovation activities, in programs, scientific papers, reports, etc., innovative activity in a higher educational institution is assessed as an activity aimed at commercializing the results of research work, which is reported to the state and society as a whole" (Efremova & Romanova, 2016, p. 65). Ignoring innovation in other environments (educational and administrative) significantly reduces the synergistic effect of the formation of its own innovation potential by a technical university. Among the factors hindering the development of innovative activities in universities, researchers distinguish:

- perception of innovation in the context, to a greater extent, of research activities;
- an excess of educational, research and development and a shortage of production, as well as infrastructure facilities responsible for marketing innovations;
- underdevelopment of modern mechanisms associated with the commercialization of technologies (licenses, start-ups, spin-offs); the formality of organized business entities;
- ineffectiveness of innovation portfolio management (lack or shortage of specialists and competencies in investment, financing, innovation management);
- low level of implementation of the declared positions of innovative culture;
- poor study of the system of motivation of scientists for the commercialization of research activities;
- the trend towards diversification of financing of activities of higher educational institutions;
- difficulties associated with the development of new markets in the educational sphere, with the expansion of the list of additional services provided and the organization of endowment funds (Efremova & Romanova, 2016, pp. 72-73).

The creative connection between innovations and a technical university is the key to success in the formation and implementation of innovations in culture. However, many countries are still far from complete victory. The annually published 'European Innovation Scoreboard' in the course of a comparative analysis of the innovative development of 128 countries of the world divided them into groups: 'innovative leaders', 'innovative followers', 'moderate innovators' and 'catching up countries'. The leaders were Switzerland, Sweden, Great Britain, the USA, and Finland (Churlyaeva, 2005).

The biggest problem of a culture is the introduction of innovations in a 'big leap forward' manner, following a socio-technological and production-engineering scenario. This deprives the innovation process of a humanistic component – the personal incentives (to cognize, create, act creatively, be professionally mobile) which underlie science-intensive innovative programs (for example, space). All the efforts of countries (political attention, power mechanisms, and resources) are directed towards the innovation of specific functional institutions and intellectually effective institutions. Priority is given to departmental and sectoral projects. For example, in Russia such projects were: the National Project 'Education'; Education Modernization Program; the New School Presidential Initiative; creation of federal and national research universities, the Skolkovo Innovation Center, and the ROSNANO Group. Projects such as these are significantly financed by the state and should ensure the provision of manufacturing and technological leadership and the formation of an innovative economy. However, expectations for their effectiveness may not be justified.

The reason is that the innovation system being created is based on the priority of scientific and technological achievements and their commercialization. The connection between the problems of technical development and the problems of the existence of a socio-cultural envi-

ronment capable (or not capable) of reproduction, implementation and use of innovations is not taken into account. Technology is a social and cultural phenomenon. Therefore, no matter how important technological innovation is, the main subject of its concept will be the effectiveness of human interaction with society, culture and nature. Without knowing this, it is impossible to implement solutions for innovation in any industry. The innovation process is hindered by the general crisis, market transformation, and the replacement of administrative and sectoral management by systemic management of intersectoral industrial and economic conglomerates (Eskindarov & Silvestrov, 2014).

For knowledge-intensive industries to be able to innovate, an innovative engineering workforce is needed. It is these specialists who will ensure the functioning of three technological streams, giving countries the opportunity to enter the vanguard of world markets:

- modern design (in the same place conceptual design, modern engineering tools and production technologies);
- technologies for obtaining and using new industrial materials;
- "smart" (automated, intelligent, autonomous) systems and environments.

Thus, the integration of a person into the increasingly complex processes of improving machinery and technology only adds to a number of issues (ethical, aesthetic, economic, political, and philosophical) concerning the cultural meaning of innovation. The cultural meaning of innovation lies in the modeling of a humanistic reality to resolve the contradictions between man and technology, nature, society and culture. Engineering personnel who have assimilated the cultural meaning of innovations as the basis for their own ideological acts while still at a technical university will indeed be able to remedy any lag in the innovation of their national cultures.

*Finding:* The concentration of innovations in engineering and technical activities, a crisis in engineering, the desire of society on a global scale to accept the cultural significance of the innovations made the engineering profession much more mobile. An important innovation was the simultaneous implementation by the engineer of many social roles (generator of new ideas; organizer of the production processes responsible for the psychological environment of the collective; creative researcher, scientific director and technical specialist). The creative environment of a technical university forms the innovation of the engineering profession.

## 2. *Ontological Foundations and Innovative Content*

Consider the ontological foundations for filling the educational space of a technical university with innovative content.

### *2.1. Formation and Development of the Humanitarian Environment by the Technical University*

Higher education pedagogy in the humanitarian environment means: "Firstly, the space of the university, which a certain pedagogical system creates with the aim of developing the spiritual, moral and cultural qualities of the student's personality; and secondly, a complex of psychological, pedagogical, professional, organizational, moral and legal measures aimed at intensifying the educational process" (Kolonitskaya, 2012, p. 431). The university's humanitarian environment includes:

- a set of ethical and aesthetic factors;
- a connection between educational and cultural processes;
- a system of social and professional norms and values;
- the pedagogical and scientific activities of every teacher;
- educational, research and extracurricular work of students;
- the activities of all higher educational institutions that organize and support educational activities;
- student and trade union organizations;
- student advice, etc. (Kagan & Belugina, 1996). The humanitarian environment at a technical university, as a rule, is formed mechanically - by increasing the number of humanitarian disciplines and educational programs.

Thus, a survey of students of technical specialties showed the following: despite the overall range of educational activities carried out by the

university, they do not understand the need to study the humanities. 92% of students do not deny the importance of the humanitarian consideration of various life problems as a basis for self-development. However, in a technical university, according to students, too much time is allocated to study subjects of the humanitarian disciplines. This distracts from the study of major subjects. Students are not against studying the humanities in general, but they 'vote' only for those that may be in demand in their professional activities. These are local language (in order to write correctly), a foreign language (to be able to read technical literature and communicate with foreign specialists), and psychology (to improve one's understanding of other people). The uselessness of humanitarian disciplines in a technical university is confirmed, according to students, by the abundance of information on various issues available in the public domain - on the Internet, in textbooks, etc. About 30% of respondents note that they would be more willing to study the humanitarian disciplines if there were no credits or exams for them. The humanities, in their view, have no applied value; therefore, the focus should be on the natural sciences and technical disciplines (Lazorak, 2013).

It is obvious that the humanitarian environment at a technical university is necessary and it should develop naturally. How to form and develop a humanitarian environment in a technical university? The most obvious way is to master the content of humanitarian disciplines, which embody the value attitude of a person towards himself, towards other people and towards the world around him. The substance of the life values of a future engineer is determined at a technical university by the processes of humanization and humanitarization.

Humanization is the essence of education, and humanitarization is the way of its disclosure. Humanization means assimilation by the engineering community of the ideas of a personality-oriented model of higher education and the subsequent professional activity of a technical specialist. The consequences of 'humanization' for engineering and technical personnel are: the formation of cross-cultural thinking; consciousness of the humanistic type; an active life and professional position; understanding the value and moral meaning of their own profession; readiness to implement complex social and technical solutions based on their humanitarian expertise. 'Humanitarization' is not only the process of introducing as many social and humanitarian disciplines as possible into the curriculum of an engineering and technical university. Undoubtedly, the insufficient filling of the disciplines of a technical university with humanistic values in the training of engineers is manifested in the loss of the ability to predict the consequences of their professional actions and take responsibility for them. Therefore, the modern understanding of humanitarization is mainly with the knowledge that every engineering problem has, in addition to a technical (rational) component, a humanitarian (value) component, rooted in the minds of students, and then of specialists.

The humanization and humanitarization of all areas of activity of a technical university contribute to the establishment of a personality-oriented and personality-developing educational environment. It is possible to add innovative content to the humanitarian environment of a technical university by:

- transferring the efforts of developers of university programs from disciplinary and organizational models to design and construction models of education. The design and construction approach focuses on the formation of an innovative educational space of a student as a creative personality;
- finally establishing the unconditional importance of not only those humanitarian disciplines that are included as standard in higher education (at a technical university, this is history, philosophy and physical education), but also others offered by the university for study (cultural studies, political science, professional ethics, psychology, sociology);
- ensuring comprehensive and ongoing consideration to the student's personality, assistance in education: self-control, active partnership, psychological stability (during sessions or where there are difficult life circumstances);
- providing information about the cultural and historical context of the emergence of scientific, engineering and technical knowledge (an introduction to the field, the history and philosophy of science and technology, etc.). This will allow the student to identify interdisciplinary connections and thereby increase the level of interest, as well as provide motivation for independent and creative research for

something new;

- creating a techno-humanitarian balance of the educational space of the university by going beyond the technocratic model of a specialist and, as a result: expanding the creative and innovative capabilities of both the individual student and complex science-intensive industries; guaranteeing the co-evolutionary and humanistic orientation of the development of national culture;
- putting an emphasis on student development: intellectual, creative, rational-logical and emotional-figurative. It is not the student who adjusts to the learning process, but rather the learning process is constructed according to the specifics of his perception, motivation, needs, and cognitive abilities. The structuring of educational material should also take into account: the specifics of the perception of information by different people (verbal, visual, auditory); the specificity of temperament and typology of nervous activity (labile, inert); the foundations of developmental psychology (nihilism, maximalism). It is important to use different pedagogical techniques for presenting lecture material (lecture-monologue, conversation, reflection) and the practical part of training (independent examination of assessments, written exam without preparation, anonymous assessment of work results, interdisciplinarity of the exam, emphasis on problematic issues);
- changing the role of the teacher as a curator of students to one with a more fruitful approach, namely, creative mentoring, which should manifest itself openly: in passion for the subject; in the desire to allow the student to sincerely experience different feelings - surprise, distrust, skepticism, dissatisfaction, freedom, embarrassment, courage, pride; in an effort to understand the student, empathize with him, that is, show empathy. Under these conditions, the teacher's pedagogical activity is an example of creative competition, and against this background a student can actively create a personal and professional appearance that is competitive and resilient.

The difficulties of forming an innovative humanitarian environment in a technical university are associated with:

- a lack of any personal developmental experience on a practical level on the part of the organizational and managerial structures of technical universities. If it does occur, then it is often as a result of the intuitive actions of the teacher, and not the strategy of the university;
- the personality of the student himself: there is a desire to get a higher technical education, but the level of interest in knowledge in general, and in future professional activity in particular, is low;
- the level of methodological support of the process of personal development of a student at a university (it is either formal or absent at all);
- the fact that there is still no unambiguous interpretation of the concept of 'pedagogical technologies', they are not classified and listed; the specifics of the interaction between the personal and the technocratic have not been laid out; there are no members of the teaching staff who are in practice ready for the implementation of personality-oriented pedagogical technologies.

*Thus*, innovations in the humanitarian environment of a technical university spring from an emphasis on the humanistic development of all aspects (intellectual, creative, rational-logical, emotional-volitional) of the student's personality. The humanitarian environment of a technical university, filled with a humanistic meaning, will lead the student to accept the engineering profession as a public duty, to the realization of its high spirituality.

### *2.2. Spiritual and Moral Component of a Technical University*

The total technicalization of modern society has caused the destruction of traditional value systems and the loss of spirituality. In a situation of contradiction between the technocratic and cultural development of society, the problem of youth spirituality, as the most vulnerable (due to lack of experience) in the formation of their own worldview positions, is transferred from the field of theoretical polemics to the field of practice - to a technical university.

In the era of technocracy, the lack of spirituality among the technical intelligentsia is especially noticeable. For a technocrat, a person is self-sufficient, valuable and effective only as part of

the production process. A technical person is guided by ideas: progress, standardization, pragmatism, and the acceleration of all processes and rationalism. Rationalism is increasingly associated with optimism and spreads to the whole society: it is rational to consume more, receive more information, work faster, and produce more products. Human evolution turns into a techno-evolution, as the author of "*technetics*" (the doctrine of technical reality) Boris Kudrin (1993) writes.

The more complex and more active the innovative changes in the modern system 'man-society-nature-culture' (anthropological and technogenic pressure on the environment; advanced development of technologies in comparison with the social dynamics of values; replication of universal morality; polarization and impoverishment of society; genocide in relation to a number of peoples, etc.), the more important is moral competence and high spirituality as the basis for the professionalism of a technical specialist. The Technical University as a flexible self-developing system is able to adequately respond to the innovative requirements of the time: to form highly spiritual professional and general cultural competencies of future specialists.

A person's spiritual outlook is revealed through the core values he holds toward himself and the world. Values are representations that reflect the meaning (positive or negative) for a person of objects, events, phenomena from the point of view of satisfying his needs and interests.

The question of distinguishing between higher and lower values is the question of the content of the spiritual life of a person. The phenomenon of spirituality is difficult to express in rational terms, it is only possible, as Nikolay Berdyaev wrote, to catch the signs of spirit: freedom, meaning, creative activity, an appeal to the divine world, striving for perfection (Berdyaev, 1994). Spirituality is a person's appeal to higher values, a conscious desire of a person to bring his life closer to the ideal. In this respect, not all cultural norms are spiritual. The spiritual must be opposed to the natural and the everyday. Spiritual overcoming of everyday life is individual. Everyone can diversify their daily routine, but not make their life spiritual. Spiritualization presupposes not just copying of high cultural standards, but labor that will elevate a person above vanity and ennoble everyday life. The antipode of spirituality is cynicism, a contemptuous attitude towards people and life values.

The technical university can increase the share of the spiritual in technicalism: here those who generate the technical are formed. This is difficult but possible. It is difficult because the consciousness of a technical person blocks thoughts, judgments, actions, doubts, and morality - everything that threatens the existence of technical reality. A technical person dismissively and aggressively refers to humanitarian knowledge as irrelevant and irrational. What, in the educational environment of a technical university, will allow the building of a constructive dialogue between the administration, faculty, and public organizations with students in order to strengthen their spirituality when mastering a profession?

In this situation, it is essential to keep to the policy of:

- following the educational standards of the latest generation;
- humanization and humanitarization;
- personality-oriented and personality-developing principles;
- intensity and efficiency;
- not a 'disciplinary and organizational' model of education, but a 'design and constructive' one;
- targeting, accessibility (due to digital resources), variability;
- openness, that is, mobility and ability for systemic development;
- constructing competencies in which the personal qualities and professionalism of the teaching staff create unique creative conditions for the formation of knowledge, skills, and abilities of the student and the development of his spirituality.

The problem of the growth of spirituality in the educational environment of the university can be solved within the framework of the presentation of all humanitarian disciplines and especially philosophy. Philosophy explores the world as a whole in its universality, focuses on the worldview, and manifests itself in the attitude of individuals and society. Philosophy has specific features: versatility, intentionality, creativity and development, an inescapable interest in eternal problems. The goal of philosophy is to comprehend modernity. This implies:

- criticism of outdated ways of thinking;
- the creation and introduction of modern ideas and schemes;
- the deployment of new types of communication.

In this sense, philosophy is not only knowledge, but also a form of new life.

The variety of anthropological topics in philosophy forms the necessary system of professional values (responsibility, honor, duty, conscience, freedom, collectivism) among students of a technical university and thereby determines the readiness of a technical specialist to solve problems (environmental, ethical, psychological, production) in a humanistic way. Methodologically, the humanities and natural-technical sciences are brought together by studying the presence of philosophical aspects in the following problems: quantum mechanics in the transition from subatomic systems to macroscopic ones; consciousness and artificial intelligence; cognitive science and neuro-ethics; establishing computer algorithms for communication by analogy with linguistic ones; refutation of functionalism in mentality. As a result, philosophy helps students to acquire "capability, as Ilyenkov wrote, to develop in oneself the need to occupy the mind, the need to think, to reason, and understand what you see. It is hardly necessary to prove that the mind is not a luxury but hygiene. Hygiene of spiritual health is as necessary for life as physical health" (Ilyenkov, 1991, p. 22).

Ensuring the growth of the spirituality of students involves a technical university solving the following tasks:

- to form the ability to introduce into one's life plans something that does not separate, but, on the contrary, unites people;
- to deepen the perception of ethical values as the basis for motivating responsible behavior;
- to prepare for life and work in the global space; understanding the need for solidarity with the state, respect for the values, traditions and way of life of different peoples;
- to promote multicultural education and tolerance through the practical (at lectures and seminars) discovery of interdisciplinary ties of humanitarian, natural science and technical knowledge of different times and peoples;
- to form a conscious attitude to the world, to experience creative social behavior, control, self-control, the ability to adequately assess behavior (one's own, in the first place);
- to master domestic ethno-cultural traditions (native language, history, history of religions, and philosophy);
- to conduct thematic discussions (within the framework of optional and additional classes) as a 'follow-up' of watching films, theatrical performances, reading fiction, and media coverage of political and socio-cultural problems of various countries of the world.

Spirituality education is feasible only in an appropriate communicative environment. Therefore, it is important to ensure the growth of the spirituality of the teaching staff of the Technical University.

They should have the skills to:

- create an environment to solve the problems of spiritual culture;
- identify in the process of teaching one's subject an ethical component that contributes to the formation of students' responsibility for decisions and their consequences;
- establish a person-to-person relationship with students as the most pedagogically appropriate.

They may possess the:

- methodology for creating such conditions for classes in which the structure and teaching methods would reflect the processes occurring at the level of culture as a whole;
- understanding of the need for a humanistic orientation in teaching subjects, the role of humanitarian knowledge as the most important condition for students' evaluative and intellectual activity (Bezklubaya, 2020).

Thus, modern problems of a culture (pragmatism, commercialization of personal and public interests, protectionism, bureaucracy, unclear career prospects, and a decline in the social prestige of engineering and technical professions) lead to the loss of meaningful values and deform the foundations of spirituality. The task of the technical university is to develop innovative (corresponding to new trends in the development of social-cultural interests) compensatory moral and spiritual mechanisms at the level of education, the formation of competencies (professional and general cultural), and the formation of skills for improving the spirit. In solving this problem,

the leading role is played by the spiritual greatness of the teaching staff.

*Finding:* The humanitarian environment of a technical university forms a responsible and highly moral specialist, creatively combining general and professional culture, possessing interdisciplinary professional competencies. The processes of humanization and humanitarization of the educational space creates an atmosphere of natural and positive acceptance of the new at the university. The growth of the spiritual outlook of students and the teaching staff is the basis for the successful implementation of inherently humanistic innovations in the structure of a technical university.

## Conclusion

The obvious innovative path of the technical university is the identification, processing, and use of the best national and world educational programs, practices of modern achievements of science and technology (in particular, engineering training through the implementation of real research work, R&D and R&DT at senior courses on orders of industrial enterprises), and advanced industrial technology. Today, it is important for a technical university to solve a more specific problem: to train specialists who can create not just an innovative product (it can be painfully long and not always successfully implemented), but an economy that generates and uses science-intensive innovation. Therefore, the most promising for the development of an innovation system, the phenomenological and ontological foundations of a technical university are formed by the humanistic component of culture. The educational environment of a technical university will acquire true innovation only as a result of replacing the directive style of decision-making, uniformity, and closeness of employees of all university structures with a constructive polylogue with those specialists who possess modern pedagogical technologies (personality-oriented and developmental, humanizing and humanitarizing, design-constructive) and are able to understand the essence of innovation from the standpoint of a balanced combination of narrow professional specialization and a broader general level of culture of the student.

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