Asesorías y Tutorías para la Investigación Científica en la Educación Puig-Salabarría S.C.
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RFC: ATI120618V12

Revista Dilemas Contemporáneos: Educación, Política y Valores.
http://www.dilemascontemporaneoseducacionpoliticayvalores.com/
Año: VI Número: Edición Especial Artículo no.:89 Período: Diciembre 2018.

TÍTULO: Formar la disponibilidad de ingenieros-gerentes para una actividad innovadora para la industria de alta tecnología.

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RESUMEN. El artículo muestra varios enfoques para la definición de la actividad innovadora. Según diferentes autores, el término "actividad innovadora" se considera como un tipo de actividad, un proceso, un sistema de actividades. El artículo presenta la estructura de componentes de un modelo de un especialista disponible para la actividad innovadora. Se presenta la interpretación del autor de los componentes estructurales de la disponibilidad de ingenieros-gerentes a la actividad innovadora para la industria de alta tecnología. Se define la relación entre todos los componentes. El resultado del modelo desarrollado de un ingeniero-gerente para la industria de alta tecnología proporciona un especialista que combina la capacitación en ingeniería con el conocimiento en el campo de la gestión.

PALABRAS CLAVES: ingeniero-gerente, disponibilidad, actividad innovadora, industria de alta tecnología, sector de innovación.

TITLE: Forming the availability of Engineers-Managers to innovative activity for High-Tech Industry.

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ABSTRACT: The article shows several approaches to the definition of innovative activity. According to different authors, the term "innovative activity" is considered as a type of activity, a process, a system of activities. The article presents the structure of components of a model of a specialist available for the innovative activity. The interpretation of the author of the structural components of the availability of engineers-managers to the innovative activity for the high-tech industry is presented. The relationship between all the components is defined. The result of the developed model of an engineer-manager for the high-tech industry provides a specialist that combines engineering training with knowledge in the field of management.

KEY WORDS: engineer-manager, availability, innovative activity, high-tech industry, innovation sector

INTRODUCTION.

The modern stage of society development is characterized by the appearance of new industries and the dynamic development of existing ones in the conditions of the increasing role and pace of scientific and technological progress in science, technology and economics. At the same time, the role of high-tech industries is intensifying, the production of innovative products is being increased, and the quality of designs of products and services is improved.

In these conditions, there is a real need for the forming of a fundamentally new type of engineers capable, on the one hand, to understand in depth the object of high-tech business, be scientifically substantiate and capable to organize work at all stages of the life cycle of high-tech products. On the other hand, such an engineer should possess knowledge and skills of a manager, be able to cope with groups of people, and establish business connections. Such a specialist should have theoretical knowledge and practical skills of both an engineer and a manager. Therefore, the problem of formation the availability of engineers-managers to innovative activity for high-tech production becomes particularly relevant. System, complex approach to forming the availability of engineers-managers for high-tech production to innovative activity give the chance to graduates to be professionally mobile and demanded in the labor market of the high-tech industry enterprises.

DEVELOPMENT.

Methods.

The following research methods were used: *observation, direct analysis, elementary-theoretical analysis, and modeling. Observation* as a method of cognition has allowed obtaining primary information in the form of a set of empirical statements and establishing primary schematization of the concept interpretation of "innovative activity". *Direct analysis* has shown that there is no unambiguous interpretation of the concept of "innovative activity" in the theory and practice of higher education.

Researchers define innovative activity in different ways:

- As a type of activity associated with the transformation of ideas into technologically new or improved products, services, introduced in the market, new or improved technological processes or production methods [V.E. Andreev, 2011; Official website of information on innovations, http://www.vesti.ru/doc.html?id=341389].
- As a process [V.V. Manuylenko, 2012; I. Polushkina, I. Malyavina, 2012].

- As a system of activities for the use of scientific, technical and intellectual potential in order to obtain a new or improved product or service, a new method of their production [N.V. Sergeev, 2005].

The use of *elementary-theoretical analysis* method and *modeling* method has allowed us to study and analyze the conceptual positions of building a model of a specialist (a model of a specialist, including vocational training, personal qualities, physical, mental, moral health and general cultural literacy [O.Yu Hatsrinova, 2010]; invariant model of an employee of automobile profile in the form of an activity model and a personality model [G.N. Akhmetzyanova, 2009]; model of a specialist as a description of the mandatory requirements for the future specialist on the part of the employer [B. I. Seleznev, 2003]) and build our own model of an engineer-manager ready for innovative activity for high-tech industry.

Results.

Availability of engineers-managers to innovative activity for high-tech industry is considered as professional and personal quality, providing the use and commercialization of scientific researches results and developments for expansion and updating of the nomenclature, improvement of quality of products (goods, services) and the technology of their production with the subsequent introduction and effective realization in domestic and foreign markets.

Despite the fact that a number of studies are devoted to the availability of graduates to innovative activity; however, there is no single, generally accepted structure of availability to innovative activity. Some researchers include cognitive, activity, motivational, praxiological components [I.V. Dmitrieva, 2013] in the structure, others believe that availability to innovative activity is a set of interrelated individual psychological characteristics of the individual, professional and special knowledge and skills in the field of innovation [N.S. Ponomareva, 2011]. A number of authors consider that availability to innovative activity as a total availability for various types of activity including research, informational and analytical, informational and technical, organizational and production, economic and managerial work [V. Manuylov, 2004].

Other authors define availability to innovative activity as “a complex reflection of the level of the innovative component formation of specialist professional activity which defines the system of key professional competences” [L.I. Gure, A.A. Kirsanov, V.V. Kondratev, I.E. Yarmakeev, 2006].

In our study, availability to innovative activity is defined as integrative characteristics of the professional training of engineers and managers for high-tech industry, which includes the following components: intellectual, activity, creative, innovative management, motivational, and communicative components:

1. The intellectual component is necessary to ensure the effective implementation of the life cycle of innovative products and includes:

- The process engineering skills in high-tech industry.
- The knowledge of information technologies, ability to use the global information resources.
- The knowledge of the international standards, requirements imposed to the production made at the enterprise in the world market.
- The ability to understand various technical issues, be informed about technical terminology and documentation.
- The ability to conduct tests and quality control of high-tech products.

2. The activity component, which implies a professional individual style of activity to solve innovative problems, consists of the following elements:

- The constant research of production processes in high-tech industry in order to identify productive actions and losses;
- Identifying necessary improvements and developing new, more effective means of quality control;
- The ability to promote new product in the market.

3. The creative component involves the consideration of professional activity not as a combination of ready-made forms and methods of work, but as the assimilation of a certain experience, and then its change, transformation, and contains the following elements:

- The need to create something new.
- The ability to constant self-development.
- The ability to think outside the box and generate original ideas.

4. Innovative management, considered as a system of preparation and decision-making aimed at the formation, support and development of innovative and technical potential of the enterprise, includes:

- Forecasting of possible conditions of the object in the future, alternative ways of development, obtaining scientifically based variants of trends in quality indicators, elements costs and other indicators used in the development of strategic plans.
- Planning a prospective strategy of the firm on the basis of forecasts.
- The organization of a structure or restructuring of an enterprise sensitive to changes, scientific and technological progress.
- The methods of creation labor-intensive innovations possession and the ability to evaluate their effectiveness.
- Accounting, control and analysis to ensure the implementation of management decisions.

5. Motivational component characterizes meaningful attitude to professional activity, awareness of its importance, the presence of strong cognitive interest in innovations and their use in the professional sphere, and assumes:

- The ability to work intensively and creatively.
- The awareness of the incompleteness of the existing results of professional activity, the desire to improve them.
- The need for novelty, self-expression, professional growth and achievement of high professional results.
- Gaining experience after the implementation of innovative projects.

6. The communicative component provides communication support of innovation activity and includes:

- The ability to obtain modern information from domestic and foreign sources.

- The ability to interact with international institutions involved in the innovation process in languages of international communication [A.O. Bagateeva; G.N. Akhmetzyanova, 2017; A.O. Bagateeva; G.N. Akhmetzyanova; N.Sh. Valeeva, K; 2014].

Discussion.

The effective formation of the availability of engineers-managers to innovative activity for high-tech production should be based on the following conditions:

- *The fundamental status of professional education*, which gives the necessary for high-tech production invariance in the training of specialists, providing the breadth of competence of specialists in the related professional fields.

- *Formation of intellectual, emotional and managerial potential of a specialist personality*, contributing to the development of skills of operational decision-making in the conditions of constant changes in knowledge-based technologies, skills to integrate into the social and international technological macro environment, showing leadership, mobility, language adaptability, innovative thinking.

- *A wide range of professional education*, allowing to carry out in practice various types of engineering and management activities, including: designing; production engineering and material science; operational (maintenance, prevention and repair of equipment); applied research; organizational and management, etc.

- *Ensuring the compliance of training in higher education institutions for high-tech industries with the requirements of production*, which is achieved by improving the quality of technological and technical training of future specialists, strengthening the practice-oriented approach to the learning process.

- *Formation of information environment and informatization of education*, providing professional training of engineers and managers in the information society and aimed at optimizing management and engineering activities through the rationalization of intellectual activity of a specialist by the use of ICT in the educational process.

- *Development of sustainable partnerships with enterprises of high-tech industries*, which will contribute to the continuity of education, training continuity, development of mobility and professional adaptation of personnel to work in high-tech production.

- *Interdisciplinary integration of management and technical knowledge in the process of engineer-manager training*, designed to provide a unified approach of the university teachers of various disciplines and practice managers to solve professional educational problems based on the analysis, synthesis and symbiosis of knowledge.

- *Strengthening the scientific potential of higher education institutions*, contributing to the formation and development of innovative activities of the engineer-manager, allowing solving complex problems of high-tech production.

- *Formation of innovative educational and industrial environment*, including associations of professional educational institutions, experimental, scientific and educational, scientific and technical laboratories and centers, industrial and innovative complex of the university (innovative enterprises, technology parks), which allows to provide innovative and educational activities of higher educational institutions (implementation of innovative educational programs, technologies in education, etc.), scientific and innovative activities (carrying out fundamental and applied research, introduction of high technologies in production, etc.).

CONCLUSIONS.

Thus, an engineer-manager for high-tech industry should combine engineering training with knowledge in the field of economics, organization and management in the market environment, and foreign languages; manage the development of new high technology products; conduct business planning in the innovation sector; undertake a management audit of the functional units of high-tech industry; develop strategic, tactical and operational plans, budgets, enterprises of high-tech production; increase the efficiency of functioning of enterprises of knowledge-intensive industries, etc.

System, complex approach to forming the availability of engineers-managers for high-tech production to innovative activity give the chance to graduates to have a wide choice of subject area for the activity, and be professionally mobile and demanded in the labor market of the enterprises of high-tech industries.

Acknowledgements.

The work is performed according to the Russian Government Program of Competitive Growth of Kazan Federal University.

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RECIBIDO: 4 de noviembre del 2018**.** **APROBADO**: 17 de noviembre del 2018.