

COMPETENCY PROFILE OF THE INNOVATIVE ENTERPRISES

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Abstract: *Innovative enterprises have a key role in the recognition and the sustainable development of the knowledge-based economy. The different innovative enterprises have different contribution and value for the economy and the social development. The R&D personnel and its acquired and developed competencies are basic characteristics of the innovative firms. On the base of the R&D personnel's competencies a company competency profile is designed. This model may improve the innovation activity and the organizational performance of the enterprise. It can be used for making differentiation between innovative enterprises and on its base to be delivered conclusions on their competency competitiveness. The competency profile can be useful for choosing what kind of innovations to be produced and in what innovate projects the company may participate. These innovative projects need concrete and specific competency tools. The competency profile works within a framework for improvement of the whole competency management of the innovative enterprise and introducing the best performance management practices for the R&D personnel.*

Keywords: COMPETENCY, INNOVATIVE ENTERPRISE, PERFORMANCE, R&D PERSONNEL, COMPETENCY MODEL

1. Introduction

Innovative enterprises are essential in today's knowledge-based economy with their ability to generate, create, develop, transfer and integrate knowledge in the form of new products, services and processes. Trends in developed economies are centered on increasing their dependence on knowledge, information and technology and on the developing and enhancing the qualification of the human resources, engaged in research, development and innovation. The innovative enterprise have a key role and a crucial importance in the growth and development of the economy and society [1, 2]. The creation and development of high-technology enterprises is a priority for the economy and policy of the European Union. These businesses require significant financial and highly qualified human resources to be directly involved in creating high added value innovations [3]. Different innovative businesses have a different contribution and value to the economic and social development. Innovative enterprises can be characterized with increased scientific research and development activity and with employment of highly qualified personnel with specific professional qualifications and work experience. Therefore innovative enterprises are able quickly to respond to changes in consumer demands as well as to the new perspectives of the scientific and technological progress. Most of the enterprises in Bulgaria do not have their own research potential. A small part of the big hi-tech enterprises in our country have developed research and development units that mainly transfer technology or finance translation and clinical research. In Bulgaria, the largest number of innovative enterprises are in the sectors: Information Technologies, Engineering and Consulting, Financial Intermediation. By the year 2020, about 1/4 of all employees are expected to work in innovative and creative businesses in Bulgaria, accounting for around 40% of GDP. This requires a certain professional qualification and personnel's competence that are related to the production of high added value products [4].

One of the most significant features of innovative enterprises is the personnel, involved in innovation activities and their characteristics - educational level and professional experience. The share of scientific and engineering personnel in the total number of employees in innovative enterprises is above average.

Recognizing that research and development (R&D) employees are the most important resource for creating innovations, the innovative enterprise has to adopt a competency framework emphasizing the management of human resources to achieve excellent performance as well as results that are relevant to the organization's innovation strategies [5].

The competency profile indicates the competencies of the organisation that underlie successful performance in a given role and includes information that will be helpful in preparing for staffing processes, performance evaluations, identifying learning and

development needs and career planning. The profile will be used in performance discussions between managers and employees to identify innovation competencies that need development.

The competency profile framework provides an overarching structure under which each enterprise has to develop its own tools of competencies and behavioural indicators for its own jobs or job families.

2. Research and Development Personnel

Employment in the knowledge-based economy is characterized by increasing the demand and hiring of highly qualified specialists with specific skills and competencies. The main advantage of innovative enterprises is the highly qualified research and development (R&D) personnel with a professional structure and specific competency profile consistent with the specific of the innovation activity of the enterprise. The professional structure of innovative enterprises is characterized by the significant share of researchers, engineers, technical specialists and innovation managers.

Management and development of human resources in innovative enterprises is essential for the creation of innovations. Managers should improve the innovation performance through hiring people with innovation capacity and competencies. Key innovation competencies have to be identified and developed in the enterprise in order to increase the organizational competitiveness. They need to be developed and improved by creating an inner environment that stimulates creativity, innovation and entrepreneurship. This is possible through the implementation of a holistic and integrated competency management approach that provides opportunities for purposeful improvement and development of personnel's competencies. Competency management in innovative enterprises helps to build and develop research personnel, stimulates and supports the growth of innovation potential and innovative business solutions. According to [4], the entity, that organizes, conducts, maintains, stimulates and develops innovation in the enterprise, is the R&D personnel. The researchers, together with the technical associates, represent the human resources directly responsible for the creation, implementation and dissemination of new knowledge and innovations in the enterprise [4, 6, 7]. People are generators, analysts, and innovators in the enterprise. R&D personnel includes the specialists with the highest educational level and best-developed professional competencies. These are researchers, technologists, designers, programmers and others who have the potential to create, absorb, transfer and use new knowledge for the development of innovation.

There are different classifications that try to categorize the personnel, engaged in innovation activity in the enterprises [8, 9, 10]. According to the National Statistical Institute (NSI), the personnel involved in innovation activities is divided into researchers, technical personnel and support staff (from 2012 the NSI brings together the

categories of "Technical staff" and "Support staff" in one general category "Other R&D personnel"). According to the National Classification of Professions and Positions these specialists refer to the categories - analytical specialists, technical specialists and other applied specialists. According to the functional activities, the following personnel categories can be defined in innovative enterprises: 1) managers; 2) administrative personnel; 3) researchers; 4) technical personnel; 5) support staff (Fig. 1).

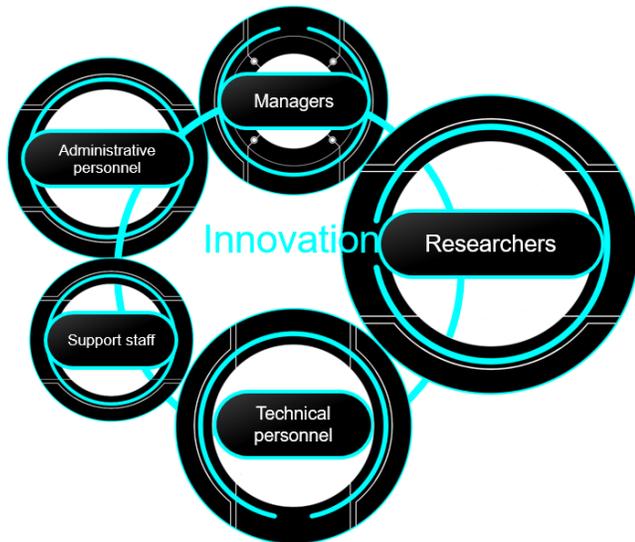


Fig. 1. Personnel categories in innovative enterprises

This distribution is more typical for medium and large enterprises. In small enterprises personnel categories are less clearly distinguished and employees often combine job functions and activities. The figure shows the different ratios of the categories of personnel in an innovative enterprise. Differences in circle size indicate the predominant number of collaborators, engaged in a certain innovation functional activity. Each of the categories - administrative personnel, researchers, technical and support staff have specific competencies, educational and professional levels.

Managers and administrative personnel are committed to planning and managing the operational aspects of researchers' work. In some enterprises, the management function can also be executed by the researchers. Researchers in innovative enterprises have priority-specific competencies and they are mostly engaged in scientific research and innovation activity. Typically, the various innovation professionals are scientists and engineers with scientific and technical background and can generate innovative ideas and quickly to respond to the innovations made by the competitors. Very often, researchers are managers of innovative projects or teams. The innovation themes are related to different scientific and applied disciplines.

3. Competencies of the R&D Personnel

Innovation requires knowledge, ideas, cognitive abilities and creativity. This requires innovative enterprises to work with interdisciplinary teams and professionals with different professional qualifications [11]. The characteristics of the R&D personnel, involved in innovation, can be analyzed by the quantity and quality of their work and their professional competencies. Different personnel categories, engaged in innovation have different educational, professional and knowledge requirements.

Competencies are a set of knowledge, skills, abilities and attitudes that are necessary for successful performance in a given professional role or in an enterprise [12, 13]. Competencies of the personnel engaged in innovation are valued at different levels of the enterprise -

in selection, when an entity should choose employees with specific skills for the purpose of future project, in planning a career growth and development. Depending on the different stages of innovation activity, the competency requirements of R&D personnel are different.

Competence is an expression of the professional and personal development of the employee, depending on the competency model for the job and the requirements of the standards, adopted in the company. The identification of key competencies and their improvement through the design of a competency model is the base for appraisal and performance management.

Competency model is a competency framework which describes what behaviour is needed to achieve the best results at a given position, organizational level, or specific function [13, 14, 15, 16]. It combines multiple competencies that, used together, determine the successful work and organizational performance. There are many classifications of competencies that divide them according to different criteria. For the purpose of this paper, the classification for basic, functional and specific competencies is adopted.

Basic competencies - these are typical and required for the whole enterprise abilities and attitudes.

Functional competencies - characteristics that are required for a particular function or unit, e.g. innovations.

Specific competencies - specific competencies are required for a particular profession, position or activity. Developing innovations requires knowledge and experience in the relevant field related to the core business of the enterprise.

Innovative work requires the accumulation and sharing of knowledge, working in project teams and building productive working relationships and collaboration both within and outside the enterprise. The innovation team includes collaborators with different contributions to successfully achieving innovation goals. Some of them are powerful in generating ideas, performing analyzes, setting guidelines for work. Other participants have strengths in support, assistance and collaboration. Third group are best in the implementation of the practical plans, in the observance of deadlines, in the elaboration of various details [17]. This, together with the peculiarities of innovative enterprises, predetermines the wide variety and complexity of the requirements for the R&D personnel.

Identifying and scheduling the competencies of the R&D personnel will help managers to plan and organize innovation work better. Competency management will have an impact on work performance and human resource management functions and activities such as job design and job description, recruitment and selection, training and development, talent and career management. By developing the competencies of the R&D personnel, the added value that people create in the enterprise will increase. In order to create more innovations in the enterprise, it is necessary to attract and develop highly qualified professionals with specific knowledge and skills, with higher motivation and higher productivity. Qualification of the personnel in innovative enterprises is higher than in traditional enterprises where manufacturing personnel is predominate and in which the personnel qualification may vary widely [15, 18, 19].

According to [20], key competencies of researchers can be grouped into three groups: scientific competencies, project and team management skills, and interpersonal competence. On the basis of researched multiple and different competency models [18, 19, 20, 21, 22 and others] the competencies of R&D personnel can be grouped as it is shown in Table 1. Competency groups are summarized for all personnel categories in innovative enterprises. Some of the competencies are not mandatory for researchers, who are directly involved in creating innovations, such as Leadership competencies. The results of the innovation activity depend directly on the professional and personal competencies of the collaborators acquired through formal education, training, lifelong learning programs as well as in the work process. Professional competencies correspond to the functional and specific competencies, while the personal competencies

correspond to the basic ones. Personal competencies are manifested through a specific attitude and demonstrated behavioural pattern. Competencies such as teamwork and interpersonal skills are general and usually they are required for all employees in the enterprise.

Table 1. Generalized groups of competencies for all categories of personnel, engaged in innovation activities

Competency group	Example of competencies
Basic competencies	Communication, teamwork, creative problem solving, analytical and conceptual thinking, interpersonal skills, self-discipline, customer relationship management, flexibility, professionalism
Functional competencies	Knowledge and skills for the core of business processes - financial and business knowledge, project and process management, human resources management
Specific competencies	Scientific knowledge - specialized knowledge in a concrete scientific field, consulting, design and instruction
Technical competencies	Knowledge, skills, abilities, required for the technical analyses and performance of the products and services
Administrative competencies	Knowledge and skills for maintaining the operational work
Leadership competencies	Leadership, vision, teamwork, situation evaluation, conflict management, mentoring and training of employees
Personal competencies	Creativity, imagination, intelligence, initiative, achievement orientation, interest in new ideas, persistence in overcoming difficulties and obstacles, self-confidence, believe in the success of the enterprise, taking risks, a skill to overcome the resistance of others

Depending on the personnel’s category competencies are required and developed for the different innovation activity. An important feature of the innovator is his/her personality traits which distinguish him/her from all other specialists in the same position and who perform the same routine tasks and duties.

4. Competency profile of the innovative enterprise

The competency profile of the innovative enterprise shows the actual status of the competencies owned by its associates. This is a set of all competencies for a particular unit, position or group of positions.

The competency profile is a model that combines different classifications of competencies. Competencies are combined by function and activities. On the one hand - basic, functional and specific and on the other - scientific, technical, administrative, leadership and managerial (Table 2). The R&D personnel has predominantly specific competencies and managers - functional.

Table 2. Competency profile of the innovative enterprise

Functional competencies / Personnel competencies	Basic competencies	Functional competencies	Specific competencies
Managerial and administrative competencies	++	+++	+
Research and innovation competencies	+	++	+++
Technical and support competencies	+++	+	++

Diagram models of the competency profiles of two different innovative enterprises are shown in Fig. 2. The basic, functional and specific competencies form the inner layer of the enterprise's profile, and the other competencies divide it into shares, depending on how much percentage or share the enterprise owns. The company's competencies are the sum of the competencies of the collaborators working in it. They are employed with a specific set of competencies which improve, develop and meanwhile acquire new skills in the work process. In each share of scientific, technical and managerial competencies, the amount of basic, functional and specific competencies is different, for example, the specific competencies are predominant for the researchers, while for the executive positions these are the basic competencies.

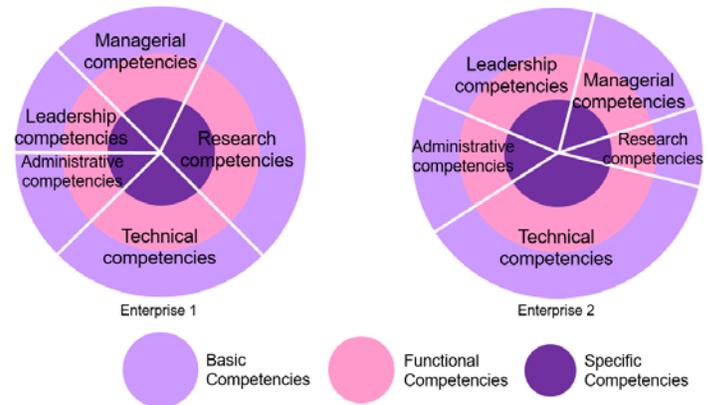


Fig. 2. Competence profile of the innovative enterprise

The competency profile of the innovative enterprise is a model for managing the competencies of the R&D personnel. With its help the enterprise’s profile is compared to the requirements for innovation and specific competencies used in a particular innovation activity. The competency profile can be used to identify the shortage of competencies in a given direction that the collaborators in the enterprise have to acquire or develop. It can be used to identify in which innovation stages and areas there is a need to recruit additional personnel and with what qualifications. It is also useful to identify what innovation skills to be trained and to assess how long it will be need to develop the necessary competencies, whether through retraining or mentoring. The competency profile can serve as evidence that an enterprise has a specific set of competencies - competence in a certain field of innovation activity. The competency profile can serve the leadership of the innovative enterprise and helps the choice of partner enterprise in a business field, depending on its role and what needs to be achieved in the joint innovation project. The account will determine which enterprise to be selected as a subcontractor, supplier or a customer partner.

The competency profile is a very helpful tool for the human resources management as well as for the work and organizational performance management. The comparison between the role of the enterprise and its current state of innovation will determine the positive or negative balance of specific competencies it requires. This comparison can be made on an annual basis, monitored and traced over time.

The competency profile consists only of proven and verified competencies and can be compared with the competency model that is required and developed during the reporting period on the basis of participation in innovation projects. It is important to have a balance between the competencies owned by the enterprise and the ones, needed for the relevant innovation activity or project, because if there is a discrepancy, there will be a shortage of knowledge and skills or if there is a surplus, it means inept management of the potential and the

abilities of the employees. It will lead to undue expenses and a risk of demotion or loss of highly qualified personnel will appear.

5. Conclusions

The competency profile of the innovative enterprises is a model for enterprise competency management. It contains a set of the competencies owned by the innovative enterprise and a quantitative measurement tools. Competencies can be measured with ballistic assessment or degree of proficiency. Competence assessment scale is a description of the individual grades showing the actual level of innovation competence. The model can be used to evaluate and compare different categories of innovative enterprises and on its basis to explore, compare and establish the relationship between the innovation activity of the enterprise and the competencies of the personnel, employed in it. Another dependency may indicate the relationship between formal education and competencies needed to create innovation. There may be a link between the type of innovation and the availability of a certain type of competencies, as well as the dependence on the number of employees in a particular category of personnel and the most appropriate ratio for that. The competency profile can be used to evaluate the individual contributor as well as to evaluate the various teams and departments within the enterprise, and when the percentage is broken, managers seek out people to supplement it with their knowledge, skills and professional experience.

By comparing different competency profiles, conclusions can be made about what makes one enterprise more innovative than another. In this way, the management will know what competencies to look for when recruiting and selecting R&D personnel and when training and developing collaborators. The competency profile can be used to direct employees to a specific type of innovation activity for the needs of the innovative enterprise. It is also possible to distinguish between the different hierarchical levels in the enterprise - which competencies are increased at the expense of others as they are applied in everyday routine work and innovative projects. This shows that, depending on the job performed and the specific work tasks, some competencies are more important and more common than others. Even if a contributor has a specific competency profile, he must apply the competencies that are required to do the job, while the others remain hidden and they are not used, which in a longer period may lead to impairment or loss of competencies.

Not all enterprises that are innovative carry out R&D unit and have a category of researchers among the personnel categories. Professionals who generate ideas for innovation, develop and implement them are called innovators. These people may be not scientists and researchers but have the knowledge and the innovation competencies to recognize and to apply new ideas, methods and processes. Regardless of the category of personnel and occupation of the enterprise, each employee can and have to participate in the creation of innovations. Depending on the personnel category the innovator has some of the following competencies - scientific, technical, administrative and managerial competencies.

When assessing people at the entrance, managers rely on their innovation potential and personal development. The competencies that characterize the enterprise's innovation activity are specific to the different innovative businesses.

The personnel engaged in innovation in innovative enterprises have a higher level of education and a higher qualification, so its specific competencies are more prominent. Professional competencies are related to the nature of the work, while personal competencies help with relationships with managers, other employees in the company and with customers. The personal characteristics of the innovation personnel are focused on developing creativity, motivation and adaptability to change. Specific and functional competencies are predominant in innovative enterprises and concern a larger number of people in an enterprise than in traditional enterprises with more basic

competencies. Specific and functional competencies predetermine the competitive advantage of the enterprise. In order to facilitate and improve the choice of competencies required for the work performance of each group of positions, a competency model can be designed and developed. The best practices for managing job performance use targeting competencies to a specific type of innovation tasks and projects. For that purpose specific innovation competencies are needed.

The competency profile of the innovative enterprises can be used in choosing a partner enterprise in a business field, depending on its role and what needs to be achieved in the joint innovation project. In this respect, one more definition of an innovative enterprise can be added: an innovative enterprise is one that has a certain type of competence or a ratio of competencies as well as a ratio of personnel categories with specific and functional competencies. It is possible to define specific competencies for manufacturing and executive personnel but it is more difficult and specific to do it for researchers and innovation managers depending on the innovation subject, industry and other characteristics of the innovative enterprise. Properly designed and applied competency profile will help managers to achieve better business results and organisational performance, to enhance the innovation competitiveness, developing the enterprise in line with its strategic goals.

References:

1. Фондация Приложни изследвания и комуникации, 2004. Иновациите: Политика и практика. София.
2. Иновационна стратегия за интелигентна специализация на Р. България 2014-2020, 2015. София.
3. Дракър, П., 2002. Иновации и предприемачество. София: Класика и Стил.
4. Фондация Приложни изследвания и комуникации, 2012-2016. Иновации БГ. София.
5. <http://www.incrementalinnovation.com/innovation-management-development/rd-to-innovation>.
6. Харвард Бизнес Ревю, 2011. Високоэффективната организация. София: Класика и Стил.
7. Танева, Н., Д. Димов, 2014. Фактори, влияещи върху иновационната дейност на МСП, XII МНК „Мениджмънт и инженеринг“ 14”, Созопол, България, 22-25.06.2014 г., стр. 773-781.
8. Measuring R&D Personnel, 2009. Training Workshop on Science and Innovation Indicators.
9. НСИ, НИРД и иновации - Данни, <www.nsi.bg/otrasal.php?otr=16>.
10. Национален класификатор на професиите и длъжностите, 2011; <<http://www.mlsp.government.bg/bg/class.htm>>.
11. Танева, Н., 2015. Иновационен мениджмънт. София: Кинг.
12. Томов, Т., Разработване на компетентностни модели или какво поведение е необходимо за успешно трудово представяне, <http://www.trudipravo.bg/index.php?option=com_content&view=article&id=1124:tp092010st2&catid=14:tpbest&Itemid=33>.
13. Armstrong, M., A. Baron, 2009. Performance Management a Strategic and Integrated Approach to Achieve Success. JAICO Publishing House.
14. www.competencemap.bg.
15. www.mycompetence.bg.
16. Уитмор, Д., 2012. Коучинг за високи постижения. НЛП България.
17. Пелерин, Ч., 2011. Как НАСА създава екипи. София: Инфо ДАР.
18. OECD, 2015. Frascati Manual Proposed Standard Practice for Surveyon Research and Experimental Development.
19. NASA Systems Engineering Leadership Development Program Behavioral Competency Model, <http://appel.nasa.gov/developmental-programs/seldp/program/se_behavior_model-html/http://appel.nasa.gov/developmental-programs/seldp/program/se_behavior_model-html/>.
20. Skills and competencies needed in the research field objectives 2020, 2010. <http://www.eurocadres.org/IMG/pdf/APEC_EN_Skills_and_competencies_needed.pdf>.
21. www.technologica.com.
22. www.mrcctcenter.org/presentations/joint-task-force-clinical-trial-competency-presents-harmonized-core-competencies.