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PHYSICAL AND TECHNICAL ENERGY PROBLEMS

IDENTITY OF INNOVATIVE MULTIFUNCTIONAL MATERIAL MANUFACTURING BUSINESS IN LATVIA

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The publication comprises the results from the practical scientific investigation to define the profile and distinctions of the Latvian innovative multifunctional material manufacturing industry. The research is carried out by a holistic approach, including expert interviews, qualitative analysis of the official register data, practical survey, and financial data analysis. The paper seeks to give the detailed data on a technological profile of the mentioned representative companies, if there is a synergy or tough competition in the Latvian market. The current research is topical, because it is unique and does not have analogues in Latvia, and the research is timely due to correspondence with recently stated Research and Innovation Strategies for Smart Specialisation in Latvia. The main findings are associated with recognition of the factors that make impact on commercialisation of the finished goods, obtained financial results and planned directions of development of the respondent companies.

Keywords: *advanced materials, commercialisation, innovation, innovative multifunctional material manufacturing in Latvia, nanotechnology, survey.*

1. INTRODUCTION

The innovative multifunctional material manufacturers in Latvia have tight connections with the academic environment. One of the directions of development of nanotechnology in Latvia is the production of the advanced multifunctional materials and new-generation composite materials, which refer to materials sciences. According to the official data, in the last decade the following research institutions have been working on the issues in materials sciences: the Institute of Solid State Physics, Institute of Physics, Institute of Polymer Mechanics and Institute of Atomic Physics and Spectroscopy at the University of Latvia; the Institute of Inorganic Chemistry, Faculty of Materials Science and Applied Chemistry, Institute of Aeronautics at Riga Technical University; Institute of Physical Energetics; Daugavpils University; and

several spinoff companies [1]. Companies Sidrabe, GroGlass, Neomat, NacoTechnologies, Institute of Stomatology of the Latvian Medical Academy are among the main collaborative partners of the scientific institutions. In 2013, 50 habilitated doctors and over 300 doctors conducted the research in materials sciences in Latvia [2]. In the period of eleven years (from 2002 to 2012), 3,275 scientific articles in the Web of Science database by Thomson Reuters were published by the local scientists in the engineering field. 192 scientific articles are worked out in nanoscience and nanotechnologies with a number of citations per publication 2.23 that is below the global rate of 2.95 [3].

The researchers of the present paper are involved in the scientific project (hereafter – Project) at Riga Technical University to develop the engineering economic indicator system for multifunctional nanocoating technologies. From the perspective of practical application of the research, the innovative and advanced materials have recently been named among the priority branches of science for the Republic of Latvia and shifted to the upper level in the official strategic documentation [4], [5].

In the previous research, the authors came to conclusion that Latvia was at the stage of early development of nanoscience, but at a low level of commercialisation activity [5], [6]. Comparing the three Baltic States, the authors found that at the beginning of the last decade 20 % share from the total turnover of the small and medium-sized companies working in high-technology industries in Estonia was gained from producing high-technology products. Due to that result, Estonia occupied the top position among the Baltic States. Comparing the regional results by separate groups of technology, Latvia did not get any top rate [5]. There might be interaction with an innovation risk management [7]. However, on a national scale the targeted Latvian market was led by a medium-high-technology industry. Local manufacturers showed better results working on the improvement of the items, than launching new products [6]. Moreover, Latvia has one of the best positive dynamics in activities on a global scale with an increasing number of nanopublications since 2010: 11 articles in 2010, 42 in 2011, 66 in 2012 [3]. However, commercialisation capacities in our country are lower than in the partner states expressed by a low patenting rate [6].

Purpose of the research is to find out the identity and distinctions of the innovative multifunctional materials and technology manufacturing units in Latvia. Therefore, the following objectives are set by the authors: 1) to identify the profile of the current manufacturing companies of innovative multifunctional materials in Latvia; 2) to provide a summary on the technical characteristics of the target companies in the framework of the research; 3) to evaluate the aspects of commercialisation of the nanotechnology industry in Latvia. The **subject of the current research** is the innovative multifunctional material manufacturing companies. To keep with the targeted goal, the **research object** is the Latvian manufacturing industry of a high- (HT), medium-high- (MHT), and medium-low (MLT) technology intensity. It has been defined using the Eurostat indicator classification of the high-tech aggregates (hereafter – Eurostat aggregates) or according to the intensity of industry.

The given scientific research consists of three main sections. In Section 1, the scope of the analysed problem is identified, Section 2 contains the description of the methodology of the research, and Section 3 provides main results for the scientific discussion.

2. METHODOLOGY

Working on a problem of identifying the aspects of commercialisation of the nanotechnology and multifunctional material industry in Latvia, the authors investigated the research methodology used in other countries. The results of a scientific literature review on development, implementation and commercialisation stages of innovation realisation were used to prepare the questionnaire. The authors concluded that the foreign researchers performed a practical survey to obtain information from the manufacturing companies of the high-tech industries. Interviewing (online, telephone or face-to-face) has been widely used, namely, to find the level of commercialisation activities in the high-tech industry of Europe (Stark, 2007), as well as in the USA to recognise the significance of nanotechnology in the manufacturing industry (2005 NCMS Survey of Nanotechnology in the U.S. Manufacturing Industry, 2006, OECD, 2014) and to evaluate health and safety practices in the nanomaterial industry (Baumgartner et al., n.d., (2009 NCMS Study of Nanotechnology in the U.S. Manufacturing Industry, 2010) [8]–[12]. Following the summarised data from the observed studies, the questionnaires mainly consisted of blocks of questions by a number from 12 to 65. It should be noted that the content of the analysed questionnaires is intended to certain target groups and purposes that cannot serve as a single sample to the local research, and the scales of nanotechnology in Latvia are narrow in comparison with the global practice. Therefore, a need arose to work out a specific questionnaire that could reflect distinctions of the local high-tech industry.

To obtain reliable data, the scientists applied the holistic analysis method, which included expert interviews, qualitative analysis of the data from the official register, followed by practical survey (online, telephone and in some cases face-to-face interviews), and financial data analysis. The practical survey named "Innovative Material Manufacture in Latvia" has been carried out by the Institute of Civil Engineering and Real Estate Economics of Riga Technical University from December 2014 to the middle of February 2015, and the results on a technical profile of the respondents are presented in the present paper.

The survey aimed to acquire information on the manufacturers of the innovative multifunctional coating and materials working in Latvia. The specific issues of the survey were the following: to give a notion of the internal technical and socio-economic factors and characteristics of the companies, to realize the scope of problems of their business activities and influence of the external factors.

In this paper, the scientists provide the results from the survey performed on the technical specification of the target respondents. Taking into consideration nanotechnologies, a series of the expert interviews was carried out by the authors to build a block of technical questions and technological parameters. From the analysed surveys on a global scale, the authors made the logical sequence of the issues and included closed and open questions.

The questionnaire of the performed practical survey consists of 17 questions and 114 sub-questions. There are multiple groups of questions structured in blocks: technical (1 complex question), innovative activities (7 questions), impact of the external and internal factors on the company's overall activity (3 questions), evaluation of the financial results and plans (4 questions), profile of the respondents

(1 question), data of other market players (1 question).

The individual interviewing was limited by a number of responses (only one response was acceptable). The questionnaire was prepared in Latvian and Russian, giving a choice to the respondent. The questionnaire was sent by e-mail directly to the target respondent or to a secretary of the company. The data from the practical survey was coded and analysed using the Statistical Package for the Social Sciences (SPSS) version 20.

Selection of the respondents was made by analysing the resources of a web content of the Association of Mechanical Engineering and Metalworking Industries of Latvia [13], documentation of the project applications, and other available information from the websites to find the enterprises that work in the multifunctional materials and nanotechnology manufacturing industry. A sampling of the business units was made using the NACE Rev.2 coding (hereafter – NACE), and official statistical information was also obtained from the official databases of the Central Statistical Bureau of Latvia and Lursoft organisation [14], [15]. Consequently, fifty-three manufacturing establishments were identified from the economy branches of the following NACE codes according to the identified object of the research: 20 (chemistry industry), 22 (manufacture of rubber and plastic products), 23 (manufacture of non-metallic mineral products), 25 (ready-made metal products, except for machinery), 26 (production of computers, electronics and optical products), 27 (production of electrical equipment), 28 (manufacture of machinery and equipment not elsewhere classified), 29 (manufacture of machinery and equipment), 30.3 (manufacture of air and spacecraft and related machinery), 32.5 (manufacture of medical and dental instruments and supplies) 33 (repair and installation of machinery and equipment) and 72 (scientific research and development).

To ensure the confidence of the companies, which participated in the practical survey, the authors applied identity numbers to each respondent, according to the Eurostat aggregates and the NACE. The results were obtained and summarised. Some statistics of this paper contains those identity numbers (see subsection "Evaluation of the Financial Results and Commercialisation Activities in Latvia").

3. RESEARCH AND DISCUSSION

1) Basic Data of the Respondents

A total number identified from the official register and by interviewing the industry experts accounted for 53 companies. For a scale of Latvia and in a current development situation, the number of respondents was higher than expected. The chosen companies are manufacturing establishments working with innovative multifunctional materials and technologies in Latvia. However, diffusion of nanotechnology in the economy of Latvia makes it difficult to identify the companies that provide nanotechnological solutions to the market. During the individual interviews, the authors of the paper have realised that 34 % of companies are inappropriate because they work with imported ready-made nanomaterials and use them for manufacturing the end-product. Some companies considered inappropriate have already bankrupt-

ed. Finally, the survey focused on 35 companies, which generated 17 respondents at a response rate of 49 %.

According to the official registration data and Eurostat aggregates focusing on aviation and space industry, manufacture of machinery and equipment, production of computers, electronics and optical products as well as scientific R&D, the respondent companies represent the following manufacturing industries: 1) HT: 18 % (NACE 26), 6 % (NACE 72); 2) MHT: 29 % (other industries); 3) MLT: 47 % (other industries). From the information, one can judge that the lowest share or 24 % of the manufacturing companies producing innovative multifunctional materials in Latvia have specialisation in high-technology (HT). As mentioned in the official statistics above, only HT industry representatives registered their R&D as specialisation, the others did not point it as a main profile of business.

2) Technical Distinctions and Contribution of the Respondents

Moreover, comparing the registration data of the analysed entities and responses on the actual and planned occupation, there was a notable difference in a structure. The respondents were asked to give a view on their production capacities and future alternatives. They could give multiple answers for which industries' needs their products are used and determine if there is a plan to expand the current range of opportunities or to adapt the existing production to meet the customers' needs from other industries. Figure 1 provides a summary of those responses. The percentage is given from a total number of the respondents.

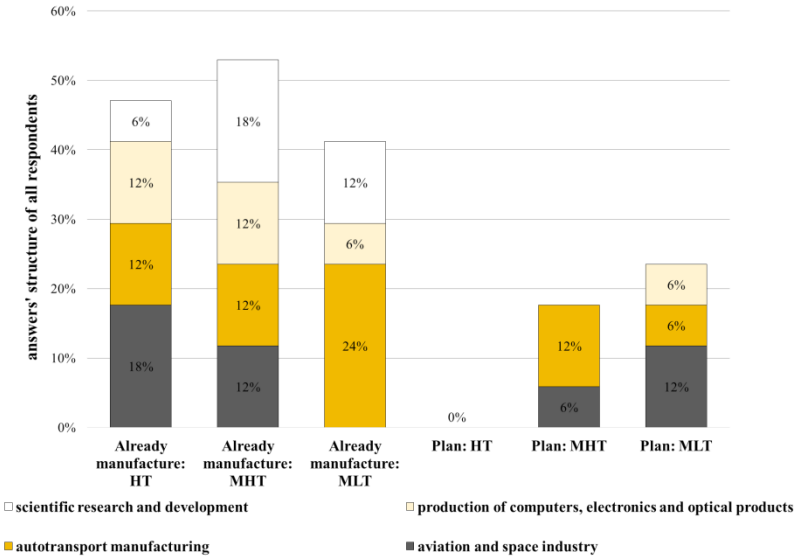

Fig. 1. Occupation of the respondents according to the survey data. Structure from the total number of the respondents per category (already manufacture and plan to manufacture) and type of industry (developed by the authors based on the research findings).

According to official information from the previous subsection, none of the mentioned companies registered their business in the manufacture of machinery and

equipment, as well as aviation and space industry. However, according to the survey information presented in Fig.1, it is clear that about 48 % of the respondents already apply their materials to the machinery and equipment industry, about 30 % from the mentioned companies work for production of computers, electronics and optical products, 30 % produce their goods for aviation and space industry; moreover, about 36 % of the respondents already conduct scientific research and development (hereafter – R&D) for their own products.

The official data showed that 18 % of the respondents categorise their business for the production of computers, electronics and optical products; however, in reality this number was 1.6 times higher and presented by the companies from HT, MHT and MLT intensity industries. Officially, the named 18 % was represented by the HT only; however, from the received responses the HT companies' share accounted for 12 % or 0.67 times less companies, in 12 % and 6 % of cases, the companies from the MHT and MLT industries correspondently produced the goods for that purpose. It is worth pointing that dominant activities are expected from the companies of lower intensity industries (MHT and MLT) that plan to develop the products for the high-tech industries in the nearest future. Cumulative percentage from statistics in Fig.1 is as follows: aviation and space industry – 18 %, manufacture of machinery and equipment – 18 %, production of computers, electronics and optical products – 6 %. The authors assumed that the issue lied in potential competition and decided to provide calculations on the potential growth of the rivalry share provided in Table 1.

Table 1

Structure of the Innovative Multifunctional Material Manufacturing Industry According to the Current and Planned Specialisation of the Respondents (results from the practical survey)

Industry	*Share of the total responses, %*	
	Real share	*Potential growth*
Manufacture of machinery and equipment	16 %	2 %
Scientific research and development	12 %	-2 %
Aviation and space industry	10 %	3 %
Production of health industry, biomedicine and biotechnology	10 %	2 %
Production of computers, electronics and optical products	10 %	0 %
Ready-made metal products, except for machinery	8 %	-1 %
Chemistry industry	8 %	-1 %
Production of electrical equipment	6 %	1 %
Manufacture of rubber and plastic products	6 %	-1 %
Manufacture of non-metallic mineral products	4 %	-1 %
Other industries	8 %	-1 %

From the provided results of the carried research, the scope of technological opportunities or specialisation of the companies does not fully correspond to their official data. According to the survey, the production of the respondents is used for a multiple purpose. The authors concluded that it might be impossible to determine

from the official statistical sources a realistic scope of competition in the local market of the advanced technology. According to the data presented in Table 1, the scientists consider that the highest rivalry share and more intensive growth is expected in manufacture of machinery and equipment, aviation and space industry, as well as production of health industry, biomedicine, biotechnology. The scientific R&D is the industry of less competitive risk because the number of the companies from the respondents occupying that niche is going to remain the same. However, in case of opportunity expansion of lower intensity industries, the R&D may potentially be acquired by attracting outsourcing services.

Theoretically due to multiple functionality of the existing production, several types of the technologies may be used simultaneously by the manufacturer. The summaries below comprise structures of all answers of the respondents and do not consider giving a sum of 100 %. The most part of the respondent companies are involved in physical and chemical manufacturing. Many of them have production by both profiles. According to a structure of the answers, a dominant number or 76 % of the respondent companies produce multifunctional materials within the physical manufacturing. 53 % of the respondents identify their production profile in the chemical manufacturing industry.

The innovative multifunctional material manufacturers in Latvia mostly produce non-metal products (see Fig. 2.1; Fig. 2.2).

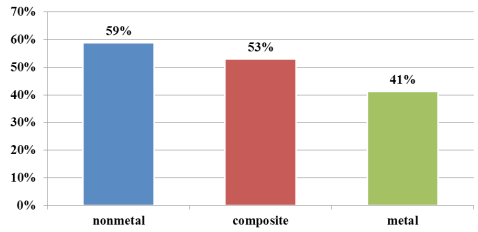

Fig.2.1. Weight of the respondents' answers on a type of produced multifunctional materials from a total number of the respondents (developed by the authors based on the research findings).

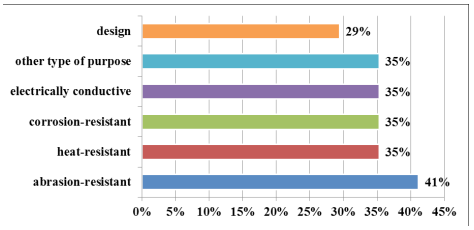

Fig.2.2. Weight of the respondents' answers on the targeted use of the multifunctional coating from a total number of the respondents (developed by the authors based on the research findings).

Composite multifunctional products are named among the advanced types, too. Abrasion resistance is the main type of the produced multifunctional material characteristics in Latvia (41 % of the respondents answered, i.e., 19 % of all the given responses). Heat resistance is named among the second dominant purpose of use of the manufactured multipurpose materials in Latvia together with corrosion resistance and electrical conduction. In other words, calculating from all the given responses almost each fifth innovative manufacturer in Latvia produces the multifunctional materials for a purpose of heat resistance, corrosion resistance or electrical conduction. Design is the least mentioned case.

From a technological point of view, the most popular multifunctional coatings are obtained from powder. This technology is used by 29 % of the respondents; vacuum and deposited coatings are used by 24 %, respectively (see Fig. 3).

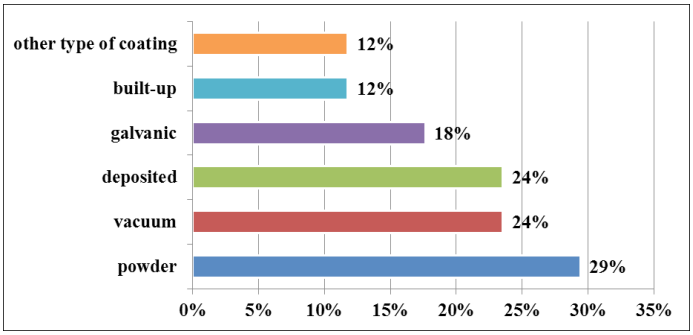

Fig. 3. Weight of the responses on a type of technology used from a total number of the respondents (developed by the authors based on the research findings).

Intriguing statistics appeared from the nanotechnology profile of the respondents. The authors gained it by selecting the companies working with coating thickness up to 1 micrometre scale. 8 respondents of such a profile were identified, which accounted for 47 % of the total number of respondents. Most of their contribution to employment goes to the high-intensity technology industry, and 42 % to the middle-low intensity technology industry. Both rates are considered high (see Fig. 4).

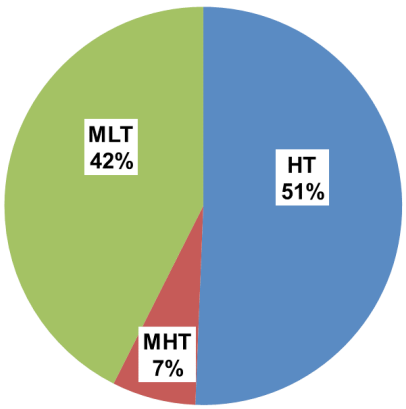

Fig. 4. Structure of contribution of 8 nanocompanies to employment by HT aggregate (developed by the authors based on the research findings).

47 % of the respondents answered that they produced the multifunctional coatings of a thickness from 10 to 20 micrometers, and 24 % of the respondents produced the multifunctional coatings of a thickness from 20 to 500 micrometers. Only two companies (one of MLT and another of MHT intensity industry) marked all types of thickness as optional for their production.

3) Indicators of Commercialisation Capacities of the Respondents

Impact on the Companies' Overall Activity

The respondent companies were asked to evaluate their internal capacities. A general structure of all the responses is given in Fig. 5.

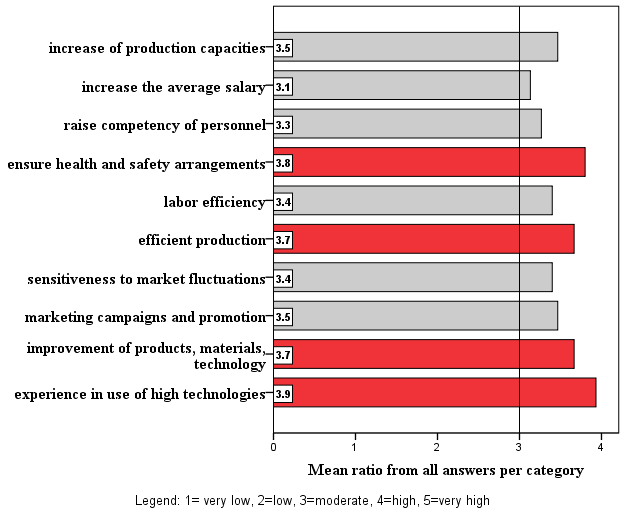

Fig. 5. Respondents' evaluation of the internal business capacities, from 1 to 5 in comparison with a moderate level (developed by the authors based on the research findings).

Experience in use of high technologies that corresponds to the companies' operational background statistics in years and ensuring health and safety arrangements got the best scores – 3.9 and 3.8, respectively. The second named ratio reflected the companies' activities according to local legal requirements to the business. Efficient production and capacities to improve the performance of the manufactured products were valued by the majority of the respondents higher than average. However, an ability to increase the average salary and raise competency of personnel got the lowest rating that pointed to the weakness of the local enterprises that could potentially grow to a threat in case of severe rivalry.

Figure 6 demonstrates the extraction of data from the responses according to the companies' profile. The answers of those enterprises, which produce multifunctional coating at a thickness of up to 1 micrometer or targeted business niche to the project technology are defined by "yes; up to 1 micrometer" in the graph, the rest of the answers provided by respondents are defined by "no; more than 1 micrometer".

The companies from the targeted nanotechnology market niche showed different results from other answers in regard to stronger internal capacities as having more experience in use of the high technologies, having higher ability to increase the capacities of production and level of the salaries. The nanocompanies in Latvia consider that their production is not much dependent on the market fluctuations, they have moderate labour efficiency, however, are less flexible for improvement of the quality of the production and weaker in increasing the qualification of the personnel. This is common to general characteristics of the local high-tech industry. However, nanocompanies are stronger than expected in production efficiency and marketing campaigns and promotion, which may be associated with their extensive practical experience. Comparing the required internal abilities to initiate the commercialisation of the project technology to the current evaluation of the target businesses, a wide experience that is the only position, where the largest gap from the desireable level is marked, is not enough for keeping the competitive position in future.

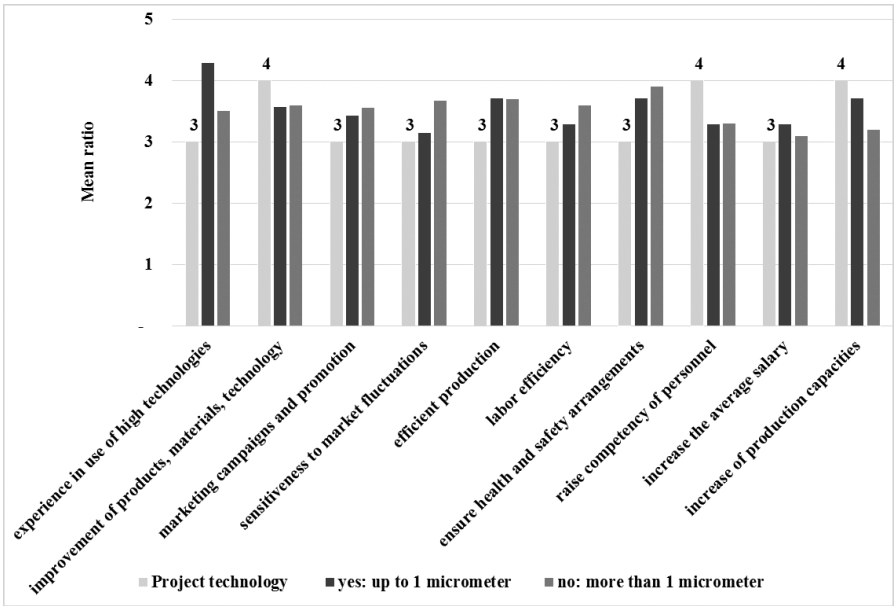

Fig. 6. Respondents' evaluation of the internal business capacities (from 1 to 5) in comparison with minimum requirements to the project technology (developed by the authors based on the research findings).

The Ministry of Economics of the Republic of Latvia states that it is necessary to change the structure of the economy in a country to ensure the implementation of the common goal of the development of the national wealth. According to the data of Eurostat, currently the economical activities and priorities are based on the low level of labour costs and low-intensity technology branches. In 2013, the LT and MLT generated 84 % of the total manufacturing industry of the country. The HT and MHT shares equaled 5 % and 11 %, respectively [16]. According to the labour market research made by the Ministry of Economics of the Republic of Latvia, a considerable lack of balance between the demand and suppply in the exact and production specialisation will be expected by 2020 due to focusing on life and social sciences, education and service fields. Engineering, production, construction, IT and natural sciences will suffer the most from the current educational priorities. There evidently might be a lack of the local specialists in the high-tech industry, which might request for an ability of the production companies to ensure higher salaries and social guaranties, as well as provide qualification studies for the personnel and even consider attraction of the candidates from the foreign countries. Those measurements will potentially cause the growth of operational costs and rise in the production prices that surely will ask for the current and future financial accountability of the company and ability to keep the business competitiveness.

In addition, the scientists analysed the respondents' answers on evaluation of the impact of the external factors and abilities of the companies on overall and innovative activities. The obtained data were structured according to three identified stages of the innovative product development and commercialisation – technology, marketing and production.

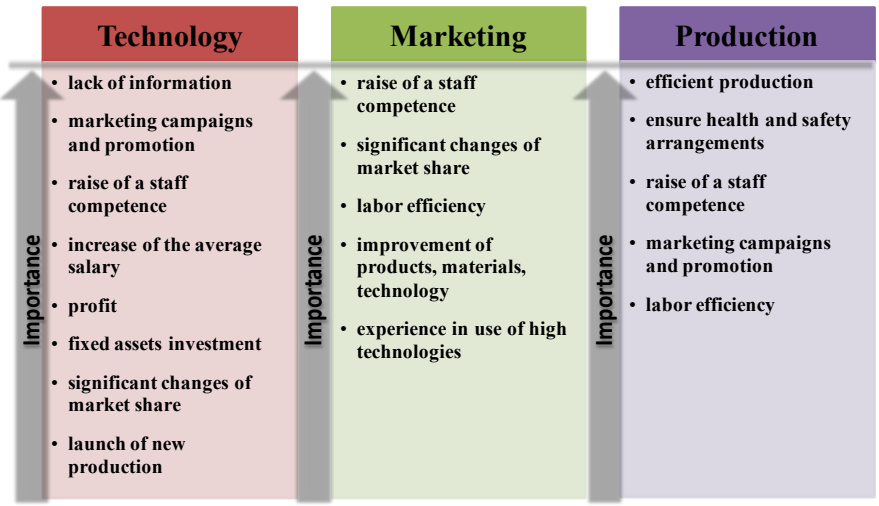

Fig.7. Evaluation of the factor impact on commercialisation of the innovative multifunctional materials (developed by the authors based on the research findings).

In Fig. 7, the economic factors are grouped according to their importance, in the identified blocks for commercialisation of the innovative multifunctional materials and technologies taking into consideration the product life-cycle. The factors were evaluated using the Spearman correlation coefficient. The companies' management needs to be well-informed on the actualities of the technology trends, therefore, availability of information, high internal capacities to organise the marketing campaigns, ability to raise staff competence and to pay a competitive salary are marked among the important forming factors. Those respondent enterprises, which according to the survey results chose those indicators as essential, showed high outcomes and strong assets. To be successful in promotion of the manufactured nanoproducts, the most respondents pointed on the importance of the internal factors. Here, the managers consider the competence of the staff, high ability of labour efficiency, internal capacities for improvement of production of goods and a broad experience in use of high technologies to be very essential. Most of those companies have recently had a significant increase in a market share. In the phase of production of the innovative multifunctional materials, high efficiency of the organised production, realisation of the manufacturer's investments into the health and safety of the staff, an ability to raise the competence of the staff and to execute marketing activities and to increase a labour efficiency are considered to be the best factors by the respondents.

Evaluation of the Financial Results of the Latvian Nanocompanies

Figure 8 demonstrates the results obtained from the analysis of the financial performance indicators of the identified respondents working with nanocoatings. This structure is prepared according to a number of employees.

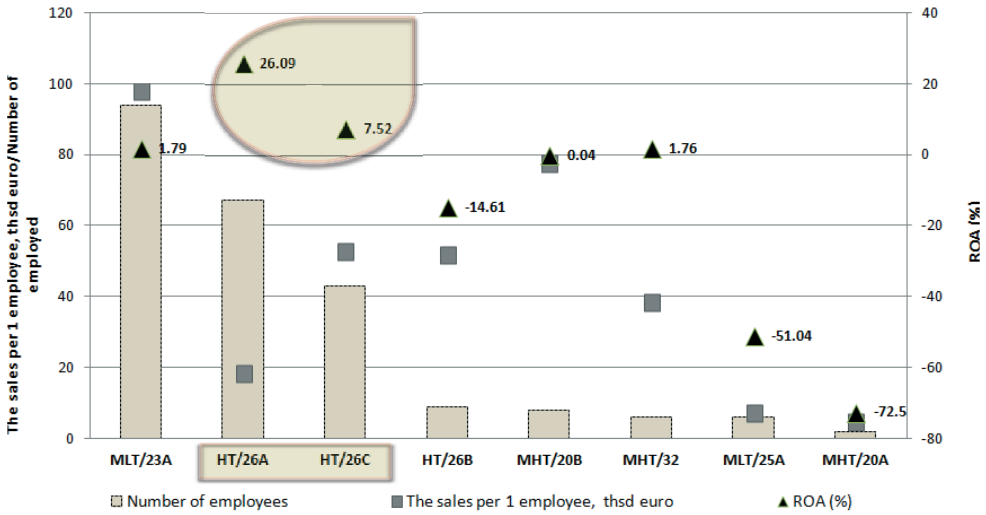

Fig. 8. Performance indicators of the Latvian nanotechnology companies in 2013 (developed by the authors based on the research findings).

Two nanocompanies (HT/26A and HT/26C in Fig. 8) demonstrated the highest level of return on assets ratio among the respondents in 2013. It is essential to emphasise that in comparison with overall sectorial dynamics in the previous years those companies kept the same strong leadership capabilities. Moreover, the mentioned companies have been operating in the marked high-tech intensity industry (manufacture of computer, electronics and optical products or NACE 26) for more than 10 years. Another HT company (HT/26B in Fig. 8) has a negative level of ROA ratio, because it is still developing, and has been operating in the market for less than 5 years, but currently it has a comparatively high volume of sales per employee.

4. CONCLUSIONS

1. Nanotechnological solutions are identified in miscellaneous economy branches. The holistic analysis method has been applied to obtain the unique research results. Already at the beginning of the survey, the authors of the paper have faced a problem of diffusion of nanotechnology. According to individual interviewing, 34 % of the companies have been assessed as inappropriate because they work with imported ready-made nanomaterials and use them for manufacturing the end-product.
2. The survey has proven that the Latvian targeted manufacturing companies have specialisation in the industry of lower intensity. Only 24 % of the manufacturing companies producing innovative multifunctional materials in Latvia have specialisation in the high technology (HT).

3. The respondents use their production for multiple purposes. The authors have concluded that it may be impossible to determine from the official statistical sources a realistic scope of competition in the local market of the advanced technology.
4. The most part of the respondent companies are involved in physical and chemical manufacturing. Many of them have production in both profiles. Abrasion resistance is the main type of the produced multifunctional material characteristics in Latvia. The most popular multifunctional coatings are obtained from powder – 29 % of all the respondents' answers; vacuum and deposited coatings are the second most popular type of technology used.
5. The highest rivalry share and more intensive growth are expected in manufacture of machinery and equipment, aviation and space industry, as well as production of health industry, biomedicine, biotechnology. The scientific R&D is the industry of a less competitive risk.
6. There evidently may be a lack of the local specialists in the high-tech industry that may request for an ability of the production companies to ensure higher salaries and social guaranties, as well as provide qualification studies for the personnel and even consider attraction of the candidates from the foreign countries. Those measurements will potentially cause the growth of operational costs and rise in the production prices that surely will ask for the current and future financial accountability of the company and ability to keep the business competitiveness.
7. While having all the necessary tooling and laboratory, and high professional skills of personnel, the companies need to be able to invest in raising the qualification of the staff. The survey has shown that an ability to increase the average salary and to raise competency of the personnel has gotten the lowest rating, which points to the weakness of the local enterprises that can potentially grow to a threat in case of severe rivalry.
8. The nanocompanies or manufacturers that work with coating thickness up to 1 micrometre scale accounted for 47 % of the total number of respondents. Most of their contribution to employment goes to the high-intensity technology industry, and 42 % to a middle-low intensity technology industry.
9. The nanocompanies in Latvia consider that their production is not much dependent on the market fluctuations, they have moderate labour efficiency, however, are less flexible for improvement of the quality of the production and weaker in increasing the qualification of the personnel. Particular business units have reported very strong capabilities and high ROA ratio.

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ESF EIROPAS SOCIĀLAIS FONDS
IEGULDĪJUMS TAVĀ NĀKOTNĒ

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INOVATĪVU DAUDZFUNKCIONĀLO MATERIĀLU RAŽOTĀJU IDENTITĀTE LATVIJĀ

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K o p s a v i l k u m s

Publikācija sniedz veiktā zinātniski praktiskā pētījuma rezultātus, kura ietvaros tika noteikts Latvijas inovatīvu daudzfunkcionālo materiālu ražotāju darbības profils un identitāte. Pētījumā tika izmantota kompleksās analīzes metode, kas ietvēra ekspertu intervijas, uzņēmumu oficiāli reģistrēto datu kvalitatīvo analīzi, zinātniski praktisko aptauju, kā arī pētāmo uzņēmumu finanšu darbības rezultātu analīzi. Zinātniskais darbs sniedz izsmeļošu informāciju par mērķa uzņēmumu tehnoloģisko profilu un pēta, vai Latvijas mērķa ražošanas nozarē ir sinerģijas vai sīvās konkurences pazīmes. Šim zinātniskajam pētījumam ir noteikta aktualitāte saskaņā ar tā unikalitāti Latvijas valsts mērogā un atbilstība Viedās specializācijas stratēģijai. Pētījuma galvenie secinājumi ir saistīti ar uzņēmumu produkcijas komercializācijas ietekmējošo faktoru apzināšanu, sasniegtajiem finansiālajiem rezultātiem un plānotajiem attīstības virzieniem.

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