

THE COMBINATION OF INNOVATION AND HUMAN RESOURCE STRATEGIES: THE CASE OF INFORMATION TECHNOLOGY SECTOR IN LITHUANIA

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Abstract. The aim of the present research is to present a set of main patterns, related to the combination of innovation and human resource strategies in the information technology sector in Lithuania. To raise productivity, competitiveness and growth potential of modern economies, business innovation appears crucial; however, these objectives are not likely to be achieved without allocating necessary human resources to innovation projects and introducing an appropriate human resource strategy. Survey results have clearly shown a correlation between variables tightly related to the combination of innovation and human resource strategies; these variables include the percentage of employees with doctorate and master degrees in the total headcount, disparity of net average salaries, investment in research and development, the value-added net profit generated from research and development, the percentage of commercialized innovative ideas, and other important factors. The main findings of the research have also contributed to the identification of the strengths and weaknesses of Lithuanian information technology (IT) companies. It is tempting to believe that this research will serve both the Lithuanian government and Lithuanian enterprises as a platform to discuss, analyze and launch innovation policy initiatives supporting the combination of innovation and human resource strategies.

JEL classification: L860, F190.

Keywords: innovation strategy, human resource strategy, development of information technology sector.

Reikšminiai žodžiai: inovacijų strategija, žmogiškųjų išteklių strategija, informacinių technologijų sektoriaus plėtra.

Introduction

Business innovation is a vital ingredient in raising productivity, competitiveness and growth of modern economies. However, it is not possible to achieve these objectives without allocating necessary human resources to innovation projects as well as introducing an appropriate human resource strategy at both macro and micro levels, which could nourish the innovation culture. Therefore, new technologies call for new ways of organizing and managing work.

Though the scope of research into innovation and human resource strategies is rather wide, literature on the combination of the two policies is far from being rich. Moreover, there is a lack of national-level papers related to both innovation strategies within companies themselves and the combination of innovation and human resource strategies in Lithuania on the whole.

The article is based on the results of a survey on the combination of innovation and human resource strategies in Lithuanian IT companies (2008), conducted by LEFI, the University of Lyon 2. The study was based on the analysis of the experience of other countries and the results of a questionnaire of chief executive officers of Lithuanian IT companies.

Notwithstanding that in a larger country an investigation of 130 IT companies would be insufficient, almost one fourth of the target enterprises were questioned and that is more than satisfactory in such a tiny market as Lithuania. Of 130 enterprises selected, 92 valid responses were received, to give a response rate of 71%, which translated to a standard confidence of 95%.

We have chosen Lithuanian IT companies as the object of our research mainly due to their business models and the main activities directed to the introduction of new innovative products or processes, which is crucial in order to survive in a highly competitive market. Moreover, of utmost importance for Lithuanian IT companies is the ability to attract a qualified human capital as well as to allocate their employees to innovative projects. Thus, the competitiveness of the Baltic countries within the global economy depends on their abilities to take full advantage of their own knowledge-based resources and, especially, of the creative energy of entrepreneurs who develop and generate the value-added to end-users through new products and services.

1. Areas in which Lithuanian Information Technology Companies Encourage Innovations

From the neo-Schumpeterian point of view, innovations and, in particular, technological innovations represent the most remarkable form of novelty. However, apart from the technological innovation, we need to focus on the organizational, institutional and social innovations. Thus, economics is concerned with all the patterns of open and uncertain developments in socio-economic systems.

Innovation may take place through a wide variety of business practices; therefore, innovation and human resource strategies are combined in quite different ways across various Lithuanian IT companies. A range of indicators can be used to measure the level of innovations within an enterprise or in the economy as a whole. These include the levels of efforts (measured through resources allocated to innovations) and of achievement (the introduction of new or improved products and processes). A thorough understanding of the types and levels of the innovation activity in Lithuanian IT companies should help to evaluate the combination of innovation and human resource strategies.

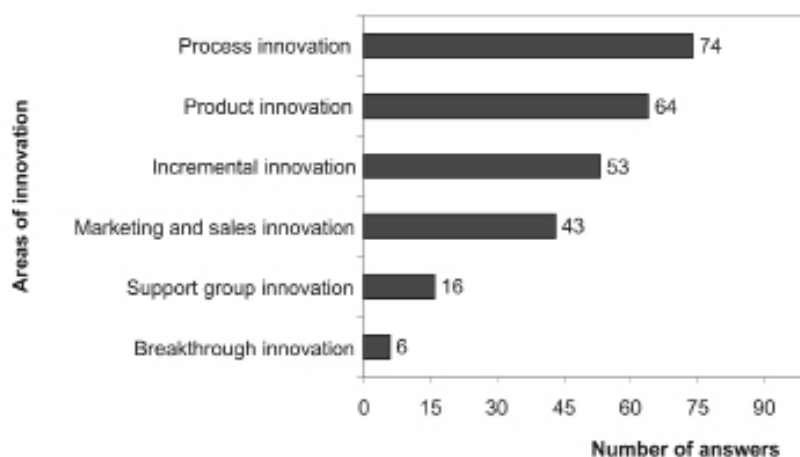
The innovation activity may include: introduction of a new or significantly improved good, service or process; involvement in incomplete innovation projects; engagement in longer-term innovation activity, such as the basic research and development (R&D) or technology watch; investment in areas such as internal R&D, training, acquisition of external knowledge or machinery and equipment related to innovation activities; formal cooperation with other organizations.

Overall, 92% of the enterprises under investigation were classed as innovation-active, encouraging more process than product innovation. In addition, the level of product and process innovations was considerably higher in large firms. Such results were more than satisfactory, given a lack of formal cooperation with other enterprises or institutions regarding innovation activities as well as insufficient financial and informational resources, as the major factors inhibiting development of the innovation strategy in Lithuanian IT companies. The claim regarding the lack of financial and informational resources was supported by the fact that only one third of the companies under investigation were involved in internal R&D, training, acquisition of external knowledge or machinery and equipment necessary for innovation; even fewer companies (14%) were

engaged in longer-term innovation activities, such as the basic R&D or technology watch. The reason for such a situation may be a low level of cooperation with educational institutions and intermediaries.

Our survey has shown an increased engagement in innovation activities in Central and Eastern European countries (CEEC): 58% out of 92 companies under investigation encouraged incremental innovation during the investigation period (see Fig. 1). Given insufficiently encouraged marketing and sales (47%) and support group innovations (17%), breakthrough innovations were poorly supported by Lithuanian IT companies (7%). However, this clearly shows the existing potential of Lithuanian IT companies to switch from incremental to breakthrough innovation and to intensify efforts in increasing marketing and sales as well as support group innovations. The results of the survey have also proved that large enterprises were more likely to engage in various forms of innovation activity and encouraged innovations in more areas than small ones. Such a situation seems natural, as large companies allocate more human and financial resources to innovation projects and use more ad-

Figure 1. Areas in which Lithuanian IT companies encourage innovation (investigation period: 2004-2008)



(Source: Survey on the combination of innovation and human resource strategies in Lithuanian information technology companies; LEFI, University Lyon 2, 2008)

vanced managing techniques, which create a better innovation climate in the company.

2. Identification of Factors Preventing Innovation-related Activities

An important aspect of policy analysis is the identification of the factors constraining the ability of enterprises to engage in innovation. These can include obstacles that the enterprise encounters

during the process of innovation as well as factors preventing innovation. The companies under investigation were asked about the range of constraining factors and the extent to which these factors affected the ability to engage in innovation. As we expected, two main groups of factors preventing innovation in Lithuanian IT companies were identified: available human and financial resources.

A particular vulnerability to innovation cost, especially in small and medium enterprises, was observed. This could be explained by the fact that Lithuanian IT companies face a necessity to increase general and administrative expenses in order to organically grow their businesses, to expand their services to a larger and highly competitive market as well as to regularly update its technologies in order to respond to the higher requirements of the customers. Currently, the majority of Lithuanian IT companies are focusing on growing revenues, while the bottom line and margins are insufficient to boost the innovation culture. In particular, obtaining affordable finance was more often a problem for small and medium firms than for larger enterprises.

Among other factors constraining the innovation culture, the lack of qualified personnel, which is not unusual in emerging countries facing the “brain drain” phenomenon, was mentioned. Financial and human resources were followed by the excessive perceived economic risk: 33 companies felt constrained by economic circumstances. The third group of heavily influential factors was related to informational issues, such as the lack of information on markets and technology as well as the lack of customer responsiveness. These factors have been mentioned by 24, 22 and 7 companies respectively.

The impact of regulations and standards and organization rigidities were not thought to be substantial barriers to innovation (6 and 5 answers out of 92 companies under investigation).

3. Main Contributions from Investment in Research and Development

Many economists believe that among the main patterns of the Soviet model of innovation we could

find important answers to questions regarding current transformation issues in Eastern Europe, particularly, how the transition experience and previously taken decisions influence the current innovation performance in CEEC. According to Malerba (2002), we should discuss a set of the following issues in CEEC during the transformation period: the absence of important relationships and feedbacks as well as severely hampered inter-organizational learning. In particular, the Eastern countries faced serious problems with respect to the integration between R&D and production. As Malerba claims, this was and is “a well-known problem also in Western systems, but, whereas in the West R&D is, to a great extent, an in-house activity and, therefore, carried out in relative proximity to other activities, Soviet-style R&D was almost exclusively extramural (i.e. firm-external) and thus often carried out at both organizational and geographical distance from production units” (ibid.).

According to Radosevic (2002), “the principle issue in the Soviet system was the lack of enterprise as an independent agent and the main carrier of the innovation process”. Being regarded as mere production units, enterprises were more discouraged than encouraged to exercise innovative activities, which was further aggravated by difficulties to move innovations horizontally, i.e. between sectors. After the collapse of the USSR, the main challenge was to shift from a system where the innovation process was organized and managed centrally, to a system where innovation is generated by enterprises through a network of public institutions. Similar transformation issues are relevant to the Lithuanian economy and, particularly, to the Lithuanian IT sector.

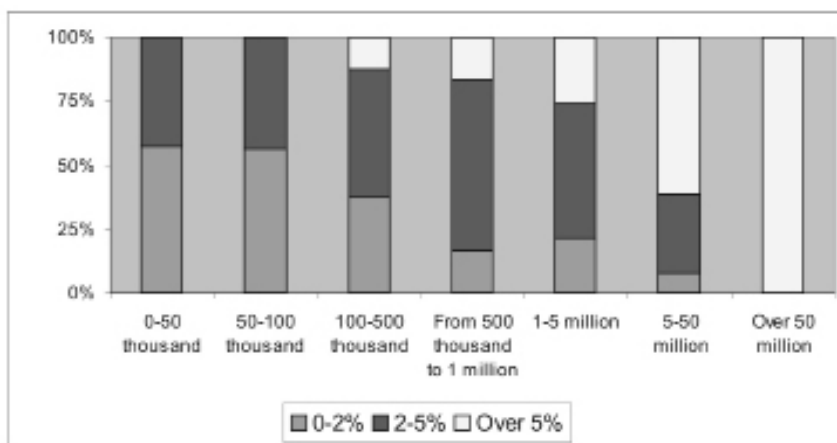
To boost the innovation culture via various innovation activities and projects, IT companies need to invest in R&D, which appears to be an important indicator of a company’s efforts to increase its competitiveness in the market. However, investment in R&D is not possible without qualified professionals, i.e. without the allocation of the necessary ‘know-how’. Thus, we have tried to evaluate the combination of innovation and human resource strategies through interpretation of the prime sources, related to investment in R&D and human resources allocated to innovation projects. In more than two thirds of the companies under investigation from 2% to over 5% of the

total annual revenue were invested in R&D. Nearly one third of the respondents managed to allocate up to 2% of the total annual revenue to R&D. Such results were surprisingly high, as, for instance, Scandinavian IT companies invest in R&D approximately 2%-4% of the annual turnover.

On the other hand, such findings can be considered as slightly disappointing taking into account the fact that Lithuanian IT sector still needs to catch up with better developed Scandinavian countries. As mentioned above, larger companies have more financial resources to allocate to innovation projects. This was clearly demonstrated by the results of our survey: more than 80% of larger companies (annual turnover amounting to LTL 1 million - LTL 50 million and above) invested in R&D from 2% to over 5% of the total annual turnover, while in smaller companies less finances were allocated to R&D (see Fig. 2).

Findings concerning the value-added net profit, generated from R&D in percentage added to the bottom line, were also quite unexpected. The profit derived from R&D activities indicates how efficiently investments in R&D are utilized in order to cut both general production costs and general and administrative expenses. According to our survey, approximately 74% of the respondents managed to add from 1% to 5% of the profit derived from R&D activities to the bottom line, while 16.31% of the companies under investigation managed to add from 5% to over 10% of profit to the bottom line. Such results indicate quite rapid positive changes in Lithuanian IT companies. In addition, only 10% of the companies managed to add up to 1% of the profit derived from R&D activities to the bottom line.

Figure 2. The percentage of annual revenue invested in research and development during the period 2004-2008; by the size of a company

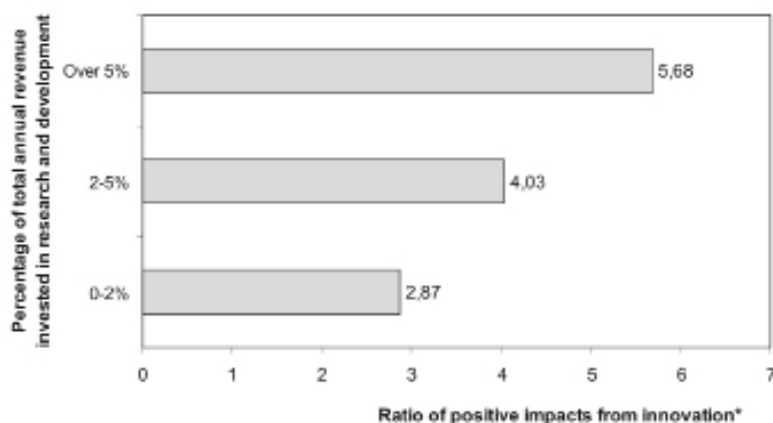


(Source: Survey on the combination of innovation and human resource strategies in Lithuanian information technology companies; LEFI, University Lyon 2, 2008)

Our survey has shown that the spread of impacts of innovation depended on the amount of total annual revenue invested in R&D. Companies spending more on R&D (higher percentage of total annual revenue invested in R&D) could take advantage of a vaster variety of positive impacts of innovation activities. Ratios of positive impacts of innovation were calculated: firms spending up to 2% on R&D indicated approximately 3 impacts of innovation (a ratio of 2.87); for companies investing from 2% to

cialized by using the existing resources and acting within a particular business strategy and innovation culture of each company. Given a robust organic and structural growth in terms of revenues, commercialized innovative ideas should not necessarily generate a net profit, as it largely depends on the companies' strategies. Furthermore, high percentages of commercialized ideas demonstrate the companies' capabilities to reach their goals.

Figure 3. Ratios representing positive impacts of innovation during the period 2004-2008 *



*The ratios vary from 0 (minimum) to 9 (maximum)

(Source: Survey on the combination of innovation and human resource strategies in Lithuanian information technology companies; LEFI, University Lyon 2, 2008)

5% of annual turnover a ratio of 4.03 was calculated; a ratio of 5.68 was calculated for companies investing over 5% of annual turnover in R&D (see Fig. 3).

The larger were companies' investments in R&D, the more positive impacts of innovation (except an extended range and an improved quality of goods or services) were noticed. Such a situation can be explained considering the main trends in the product-oriented IT market, where increasing competition and higher customers' requirements oblige companies to invest in the development of new products and the improvement of the existing ones.

4. Commercialization of Innovative Ideas and Value-added Net Profit

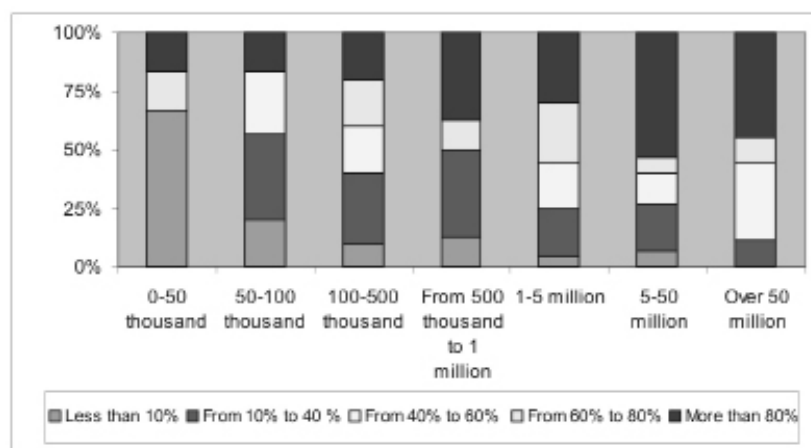
The efficiency of the utilization of financial and human resources can be also expressed by the percentage of commercialized innovative ideas. This variable cannot be measured in cash; however, it shows how many innovative ideas are commer-

According to the results of our survey, the companies under investigation were more successful in the commercialization of innovative ideas than in adding a net profit to the bottom line: 46.74% of the companies were able to commercialize from 60% to 80% and over 80% of innovative ideas; 36.95% of the companies managed to commercialize from 20% to 60% of innovative ideas; 16.30% of the companies managed to commercialize up to 20% of innovative ideas. Our survey also revealed a strong interdependence between the percentage of commercialized innovative ideas and the size of a company in terms of the annual turnover. The larger an IT firm is, the more innovative ideas are commercialized. Such interdependence can be explained by

a number of factors: availability of vaster financial resources, more developed organizational structure and management techniques creating favourable conditions for innovative activities as well as greater cooperation with partners regarding the issues of innovation. More than two thirds of the companies under investigation with annual turnover from LTL 1 million to LTL 50 million were able to commercialize from 40% to 80% and above 80% of innovative ideas, while less than a half of the enterprises with annual revenues up to LTL 1 million achieved such high results. More than a half of the companies with the annual top line up to LTL 1 million commercialized less than 40% of innovative ideas (see Fig. 4).

Innovation is the key to success, and companies seem to experience no problems in finding good new ideas. Nevertheless, turning those ideas into tangible results, i.e. implementing innovations, is not an easy task. The problem, apparently, is that many companies take a partial approach to innovation. They are successful in finding and assessing new ideas, but rarely complete innovation-related activities. Often there is a lack of time dedicated to effective imple-

Figure 4. Percentage of commercialized promising innovative ideas during the period 2004-2008; by the size of a company



(Source: Survey on the combination of innovation and human resource strategies in Lithuanian information technology companies; LEFI, University Lyon 2, 2008)

mentation of new ideas that will bear fruit in the future. With reference to the results of our survey, several solutions may be suggested. For example, companies can develop formal, end-to-end innovation processes that encompass everything from the generation of an idea to the evaluation and, especially, implementation. They should outsource some activities and work with partners in order to supplement their overstretched internal resources.

5. Headcount Involved in Research and Development

Given the adverse market conditions within knowledge-intensive economic sectors, the reduction of cost and time necessary to create and release a new product or service is challenging for many companies. Customers become more demanding, and emerging companies find it difficult to generate a robust organic growth and high margins at the same time. The larger players are looking for new sources to grow revenues and profits; thus, they face the necessity to invest in both R&D and human capital. According to Lucas (1988), investments in human capital enhance the economic system’s productivity and foster its growth. Technological changes are positively affected by the average level of human capital which determines, as Schultz (1975) argued, the ability of individuals to adapt to technological dynamics. Moreover, labour productivity growth depends on the quality of the physical capital, improvements in the skills of the labour force, technological advances and new ways of organization.

The performance of innovation partially depends on the development of highly trained science

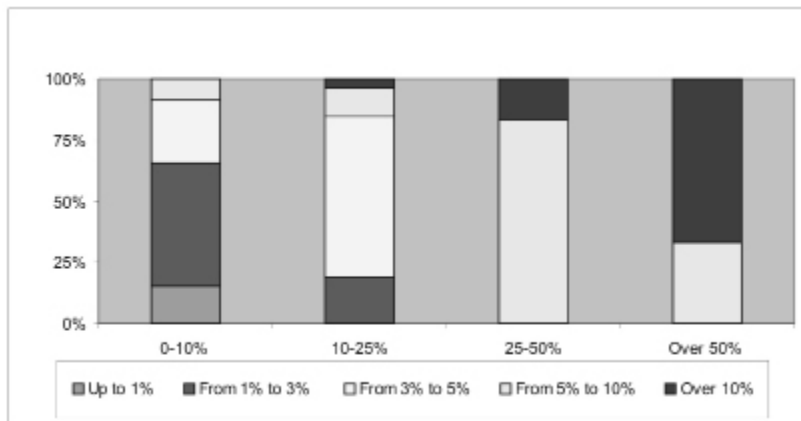
and technology (S&T) human resources and on a firm’s capacities to integrate such human resources into innovative activities. Thus, another important factor having impact on the value-added net profit generated from R&D is human resources allocated to innovation activities, particularly R&D. According to our survey, Lithuanian IT companies failed to allocate existing human resources to R&D, as more than two thirds of respondents indicated allocating only up to 10% of the headcount. One third stated that there were from 10% to 25% of the employees involved in R&D, while nearly 10% pointed out having from 25% to 50% and

over 50% of the employees involved in R&D. This is largely dependent on the organizational structure of a company, as many Lithuanian companies do not have a special R&D department; thus, there is no clear designation of tasks. On the other hand, they fail to attract qualified human resources, mainly due to inefficient cooperation with educational institutions and incapability to apply new management techniques in order to improve the innovative culture in the company.

At least 45% of larger companies with annual revenues from LTL 1 million to over LTL 50 million had more than 10% of the headcount involved in R&D, and for the largest companies this figure even exceeded 50%. A different situation was observed in firms with annual turnover up to LTL 1 million: in general, they managed to allocate up to 10% of the headcount to innovation activities, particularly, R&D.

As we have previously stated, contributions from R&D depends on the allocation of both financial and human resources. Our survey resulted in another important finding: a strong interconnection between the value-added net profit generated from R&D and the percentage of the headcount involved in R&D exists, which is as well related to the size of a company. The more employees are allocated to R&D, the higher value-added net profit they generate from R&D. Firms with 25%-50% and above 50% of the headcount involved in R&D managed to add from 5% to 10% and over 10% of the profit to the bottom line, while companies with less than 25% of the headcount involved in R&D generated a profit hardly reaching 5% (see Fig. 5).

Figure 5. Value-added profit generated from research and development during the period 2004-2008; by the percentage of the headcount involved in research and development



(Source: Survey on the combination of innovation and human resource strategies in Lithuanian information technology companies; LEFI, University Lyon 2, 2008)

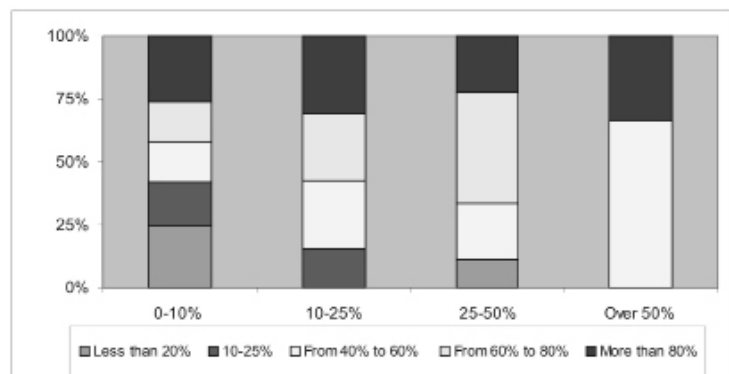
According to our survey, the interconnection between the percentage of the headcount involved in R&D and the percentage of commercialized innovative ideas was not as strong as the interconnection between the percentage of the headcount involved in R&D and the value-added profit generated from R&D. The reason for the more chaotic answers with lower correlation between the two variables was the fact that commercialized innovative ideas are of a quite different character, not so tightly connected to R&D, and deriving from the overall innovation culture in the company, based on such factors as the organization structure, management techniques, cooperation with partners and others. On the other hand, all employees, irrespective of their involvement in R&D, could participate in innovation activities, as they all, directly or indirectly, facilitate innovation activities in the company (see Fig. 6).

6. The Percentage of Employees with Doctorate and Master Degrees in the Total Headcount

One of the major conclusions from the majority of neo-Schumpeterian models is that it pays economically to have a large proportion of well-trained people in the labour force. On the other hand, investment in human capital is a prerequisite but not a sufficient condition for a rapid economic growth.

Therefore, another question of our survey was related to the qualification levels of employees, as it is important to employ professionals having the necessary 'know-how' to exercise innovative activities or work in R&D. Our survey confirmed the paradox stated by the World Bank (2003): "Lithuania is among the most educated and the least innovative countries in the world". Not surprisingly, approximately 94.13 % of the headcount employed in the companies under investigation had bachelor or master degrees including other technical or postgraduate qualifications. Only 4% of the headcount had doctorate degrees, as, in general, they prefer to continue their carrier at uni-

Figure 6. Commercialized promising innovative ideas during the period 2004-2008; by the percentage of the headcount involved in research and development



(Source: Survey on the combination of innovation and human resource strategies in Lithuanian information technology companies; LEFI, University Lyon 2, 2008)

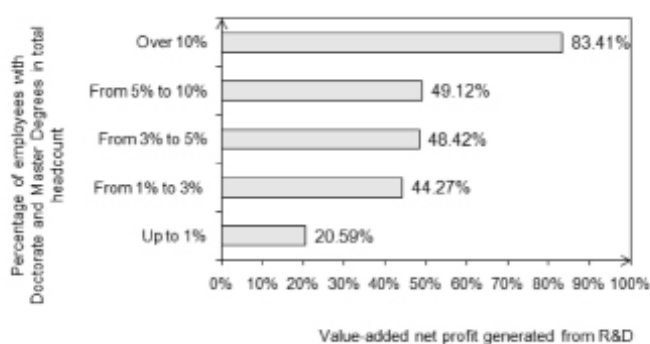
versities or research institutions. In addition, Lithuanian IT companies had very few employees with secondary education or with no qualifications.

Lithuanian IT companies, regardless of their size, were found to have quite equal percentages of employees having doctorate and master degrees in the total headcount; only micro-sized companies were not able to afford such a number of employees with high qualifications. Our survey has not shown any correlation between the percentage of employees with doctorate and master degrees in the total headcount and the size of company. However, a strong correlation between the percentage of employees with doctorate and master degrees in the total headcount and the value-added profit generated from R&D has been observed. Therefore, it is possible to

claim that significant results in innovation activity can be achieved through efficient utilization of human resources, namely, qualified employees.

As Fig. 7 shows, companies having over 80% of employees with doctorate and master degrees in the total headcount managed to add a profit obtained from R&D exceeding 10% to the bottom line. Firms having nearly 50% of employees with doctorate and master degrees in the total headcount generated an extra profit of 3% to 10%. Companies having approximately 44% of employees with high qualifications added a profit of 1% to 3% to the bottom line, while having approximately 21% of employees with doctorate and master degrees in the total headcount allowed to add up to 1% to the net profit. Therefore, it is possible to claim that the larger percentage of employees with high qualifications is employed, the more companies improve their net profit via R&D.

Figure 7. The percentage of employees with doctorate and master degrees in the total headcount during the period 2004-2008



(Source: Survey on the combination of innovation and human resource strategies in Lithuanian information technology companies; LEFI, University Lyon 2, 2008)

Similarly to the existing strong interdependence between the percentage of employees with doctorate and master degrees in the total headcount and the value-added profit generated from R&D, a particularly strong correlation between the percentage of employees with doctorate and master degrees in the total headcount and the percentage of commercialized innovative ideas was observed. Companies having from 45.64% to 58.98% of employees with doctorate and master degrees in the total headcount were able to commercialize from 40% to over 80% of innovative ideas. The situation was quite different in firms where less than 28.44% of employees in the total headcount had doctorate and master degrees. Such companies managed to commercialize up to 40% of innovative ideas. Therefore, we may claim that the larger percentage of employees with

high qualifications is employed, the more innovative ideas are commercialized.

7. Dynamics of Net Average Salaries in Companies under Investigation

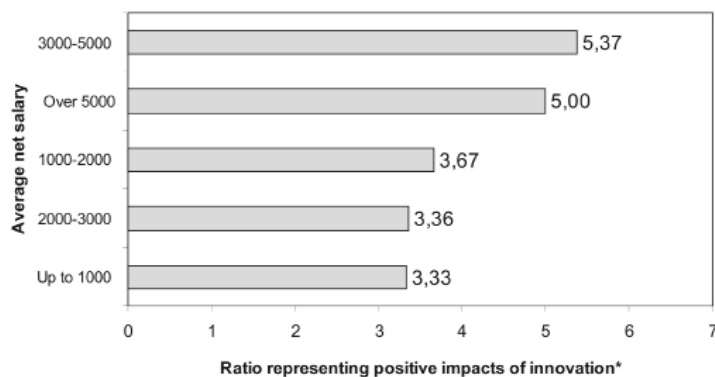
Our survey resulted in several important findings regarding the wage policies of the companies under investigation. At more than 92% of the companies the average net salary ranged from LTL 2,000 to LTL 5,000, which is much above the average salary in Lithuania; and only at 6.52% of the companies the average net salary ranged from LTL 1,000 to LTL 2,000. Companies at which the average net salary amounted to over LTL 5,000 comprise 1% of the sample.

Respondents of our survey indicated a lack of personnel as one of the most prominent factors, which emerge due to the “brain drain” and prices increasing faster than salaries. However, our survey did not prove that the average net salary is the most important factor in attracting human resources with high qualification levels. There was no observable correlation between the percentage of employees with doctorate and master degrees in the total headcount and the average net salary at a company; regardless of wage levels, the companies under investigation were able to attract employees with high qualification levels. This allows us to claim that other factors, such as inefficient utilization of human resources or the lack of advanced management techniques and organization structures in order to boost the innovation culture, appear to be crucial for the combination of innovation and human resource strategies. Another prominent factor, as we have previously stated, is the relatively low cooperation between businesses and educational and research institutions. Thus, an important observation can be made: the average net salary does not depend on the size of company, while the percentage of employees with doctorate and master degrees in the total headcount is neither interrelated with the average net salary nor with the size of company.

Another important hypothesis proved by the results of our survey is related to the human resource strategy, particularly, the motivation of human resources allocated to innovation activities. This finding supports our observation regarding a great interdependence between the impacts of innovation and investment in R&D. According to our survey, com-

panies at which the average net salary was relatively high took advantage of a larger variety of impacts of innovation. Ratios to assess positive impacts of innovation were calculated: for firms at which the average net salary was up to LTL 3,000 ratios ranging from 3.33 to 3.67 were calculated; for companies spending on wages from LTL 3,000 to LTL 5,000 and over ratios ranging from 5.00 to 5.37 were calculated (see Fig. 8).

Figure 8. Ratios representing positive impacts of innovation during the period 2004-2008; by average net salary*



*The ratios vary from 0 (minimum) to 9 (maximum)

(Source: Survey on the combination of innovation and human resource strategies in Lithuanian information technology companies; LEFI, University Lyon 2, 2008)

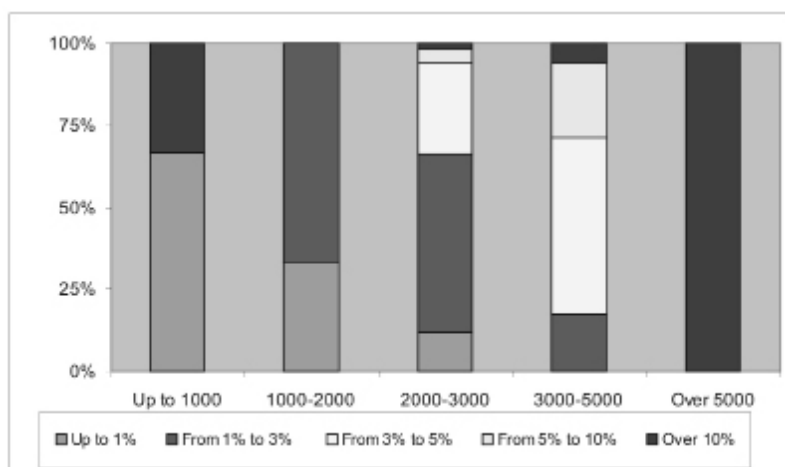
Though wage levels did not prove to be the key factor in attracting employees with high qualification levels, our survey proved that the average net salary has an impact on the value-added profit generated from R&D. The majority of the companies at which the average net salary varied from LTL 3,000 to over LTL 5,000 were proud to announce generating from 5% to 10% and above 10% of profit, while only approximately 30% of the enterprises managed to add such a large profit to the bottom line. The performance of the companies at which the average net salary varied from LTL 1,000 to LTL 2,000 was far away from spectacular: those companies hardly added 2%-3% of extra profit. The results regarding micro firms were quite unexpected: over 60% of the companies added up to 1% of extra profit to the bottom line, while nearly one third of micro firms were able to generate over 10% of a

net profit from R&D. This can be explained by great opportunities for organic growth, a weakly developed organizational structure and quite opportunist business strategy. Micro companies, being particularly vulnerable, are at such a point of the economic cycle, where they cannot efficiently cut the cost-base mainly due to great opportunities for organic growth, which are, in general, their top priority (see Fig. 9).

The importance of the average net salary was proved by demonstrating its correlation with the percentage of commercialized innovative ideas; at the same time the significance of such factors as the efficiency of utilization of financial resources and the headcount as well as the overall innovation culture encouraging innovation activities in the company was observed. Nearly two thirds of the firms under investigation at which the average net salary varied from LTL 3,000 to over LTL 5,000 managed to commercialize from 60% to over 80% of innovative ideas. One third of the companies at which the average net salary was up to LTL 3,000 commercialized from 60% to 80% and above 80% of innovative ideas, while the remaining two thirds of the firms commercialized less than 40% of innovative ideas.

The abovementioned results are only a part of the most important results of the survey on the combination of innovation and human resource strategies in Lithuanian IT companies. Some of our preliminary presuppositions

Figure 9. Value-added profit generated from research and development in percentage added to the bottom line during the period 2004-2008; by the average net salary



(Source: Survey on the combination of innovation and human resource strategies in Lithuanian information technology companies; LEFI, University Lyon 2, 2008)

were fully supported, while in other cases the survey did not show relations between certain factors.

Efficient combination of innovation and human resource strategies is particularly important for emerging economies such as Lithuania. This phenomenon is thoroughly explained by Nelson (2006) in his article "Economic Development from the Perspective of Evolutionary Economic Theory". Nelson argues that successful catch-up is mainly driven by innovation, which in parallel requires having an access to physical and human capital. Going further, Nelson adds: "to a considerable extent, innovation and effective learning tend to draw supplies of physical and human capital by enabling their rates of return to be high" (ibid.). Given successful examples of catch-up in Japan, Korea and Taiwan, everyone could witness the role of innovation in driving the process and in contributing to higher value-added profits; however, all these countries were able to develop a necessary institutional structure and the environment, where supplies of physical and human capital were available and forthcoming if the returns were high (ibid.). More than that, the educational system should be a flexible component of a "Science-Industry/Business" link, which demands a well developed network, including intermediaries, where knowledge could smoothly circulate without being jeopardized by restrictive regulations or the lack of financial and human resources.

Conclusions

Efficient combination of innovation and human resource strategies is crucial for emerging economies such as Lithuania, where successful catch-up is mainly driven by innovation, which, in parallel, requires having an access to physical and human capital. Our survey has resulted in many significant findings related to the combination of innovation and human resource strategies in the Lithuanian IT sector. Firstly, almost all the companies under investigation were proved to have introduced a new or significantly improved good, service or process; however, process innovation was encouraged more than product innovation. We also proved that large enterprises were more likely to engage in various sorts of innovation activity and encourage innovations in more areas than the small companies; this happens due to larger human and financial resources allocated to innovation projects as well as more advanced managing techniques to create a better innovation climate in the company. In addition, we have discovered a huge potential for Lithuanian IT companies to switch

from the incremental to breakthrough innovation in parallel to stronger efforts in marketing and sales and support group innovations.

Our survey did not prove the interdependence between the net average salary and the size of company, while the percentage of employees with doctorate and master degrees in the total headcount was proved to have no relation to both the average net salary and the size of company. On the other hand, companies with higher average net salary took advantage of a greater variety of impacts of innovation, a larger value-added profit generated from R&D in percentage added to the bottom line, and relatively higher percentages of commercialized innovative ideas. Thus, other factors, such as inefficient utilization of human resources, the lack of advanced management techniques and organization structures or low cooperation with educational and research institutions in order to boost the innovation culture, appear to be crucial for successful combination of innovation and human resource strategies. The enterprises under investigation tended to rely on their own experience and knowledge as well as on the information from suppliers, customers and clients; what is more, the customer-focused view on effects of innovation was proved to be taken into consideration.

According to our survey, Lithuanian IT companies failed to allocate sufficient human resources to R&D. This mainly depends on the organizational structure, as many Lithuanian companies do not have a special R&D department, thus, there is no clear designation of tasks. On the other hand, they could attract more qualified human resources through a stronger cooperation with educational institutions as well as new management techniques in order to improve the innovation culture in the company. Furthermore, our survey proved the existence of a strong interdependence between the percentage of employees with doctorate and master degrees in the total headcount and the value-added net profit generated from R&D as well as with the percentage of commercialized innovative ideas. This makes us believe that it is possible to achieve significant results while exercising innovative activities through efficient utilization of human resources, in particular, qualified employees involved in R&D.

Though nowadays technological catch-up seems to be smoother than 50 years ago mainly due to a relatively stronger body of codified knowledge related to the most important technologies (as much of this knowledge can be transferred through training in relevant sciences or engineering disciplines), it is necessary to build an efficient education system possessing proper financial and institutional struc-

tures. To sum up, the results of the research provided an understanding that Lithuanian IT companies are on the right track to catch up their peers in more developed countries; however, many changes need to be done, and we expect a fast transformation process in the upcoming years.

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INOVACIJŲ IR ŽMOGIŠKŲJŲ IŠTEKLIŲ STRATEGIJŲ DERINIMAS: LIETUVOS INFORMACINIŲ TECHNOLOGIJŲ SEKTORIAUS ATVEJO STUDIJA

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Santrauka. Augant konkurencijai tokiuose ekonomikos sektoriuose kaip informacinės technologijos, šis straipsnis – itin aktualus bei inovatyvus. Efektyviai kuriama ir įgyvendinama inovacijų strategija būtina siekiant mažinti naujų produktų ir paslaugų kūrimo bei pateikimo potencialioms rinkoms išlaidas. Be to, pasirinkta inovacijų strategija turėtų derėti prie kompanijos verslo modelio, technologinės bazės bei žmogiškųjų išteklių strategijos. Žmogiškųjų išteklių bei inovacijų strategijų derinimas yra svarbus tokiose sparčiai besivystančiose šalyse kaip Lietuva. Kaip nauji vynai retai tiekiami senuose buteliuose, naujos technologijos organizacijose taip pat reikalauja naujų organizavimo bei vadovavimo priemonių, o egzistuojanti sėkminga kitų nacionalinių inovacinių sistemų raidos patirtis byloja apie dažną drastišką pertvarką ar net skausmingą destrukciją diegiant inovacijas.

Lietuvos – vienos labiausiai išsilavinusių ir mažiausiai inovatyvių valstybių – paradoksas byloja apie sudėtingą transformacijos procesą, kurį Lietuvos nacionalinė inovacijų sistema išgyvena šiuo metu. Šiame straipsnyje siekta atskleisti inovacijų ir žmogiškųjų išteklių strategijų derinimo galimybes Lietuvos informacinių technologijų sektoriuje. Vertinant pagal vieną kriterijų grupę Lietuvos informacinių technologijų įmonės neišsiskyrė iš bendro Vidurio ir Rytų Europos šalių konteksto – atsilikdamos nuo labiau išsivysčiusių šalių pagal vienus rodiklius, pagal kitus apklaustos įmonės pateikdavo stebėtinai gerus rezultatus. Beveik visos apklausoje dalyvavusios kompanijos buvo inovatyvios ir nukreipiančios savo veiklą daugiau į inkrementines nei radikalias inovacijas.

Nors dauguma apklaustų informacinių technologijų kompanijų vadovų, be finansinių išlaidų inovacijoms, kaip vieną svarbiausių informacinių technologijų kompanijų veiklą ribojančių veiksnių nurodė masinę kvalifikuotų darbuotojų emigraciją iš Lietuvos, vidutinis grynasis metinis atlyginimas nebuvo pagrindinis faktorius siekiant pritraukti magistro ir daktaro laipsnį įgijusius darbuotojus. Kita vertus, vidutinis metinis atlyginimo dydis turėjo lemiamos įtakos kuriant pridėtinę vertę iš tyrimų bei įgyvendinant inovatyvias idėjas. Plėtojant šiuos procesus itin svarbi efektyvi žmogiškųjų išteklių vadyba. Prioritetinis uždavinys – įtraukti kvalifikuotus darbuotojus į tyrimus ir plėtrą bei skatinti inovatyvių idėjų generavimą ir įgyvendinimą. Pasinaudodamos savo didžiausiu turtu – žmonėmis Lietuvos informacinių technologijų kompanijos turi nemažai potencialo ir galimybių prisivyti informacinių technologijų inovacijų srityje labiau pažengusias valstybes. Vis dėlto Lietuvos informacinių technologijų kompanijos tik pradeda ilgą transformacijos kelią, grindžiamą efektyviu inovacijų ir žmogiškųjų išteklių strategijų derinimu.

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