Podniková ekonomika a manažment

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Editorial

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Tel.: +421-41-5133 201
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Obsah

EFFECTIVE PROJECT MANAGEMENT WITH THEORY OF CONSTRAINTS

Azar Izmailova, Diana Korneva , Artem Kozhemiakin

Kazan (Privolzhsky) Federal University, Street Kremlevskaya 18, Kazan, 420008, Russia c
TOC team consulting, Street Moskovskaya 25/29 , Kazan, 420111, Russia

1. Introduction

Here follows further instructions for authors. The project is not only the development of, for example, software or construction documentation. Project - is any activity, which has clear time frame, giving a unique result in the form of products, services, achievements and extending according to a predetermined plan. Therefore, almost every leader in his daily work is connected with some projects.

Perhaps you will agree that no matter how long it takes to perform each task within the project, it is important to complete the entire project in time. Regardless of the type of activity, there is always a need to complete several projects faster and at a lower cost. Accelerating construction projects allows you to launch new factories and shops in production faster and allows you to have faster return on investment. Accelerating the development and launch of a new product expands the market share, increase sales, and for many companies may be the difference between the market leader and outsider.

In the field of information technologies rapid introduction of new online systems means greater opportunities for customer service, inventory management, and a number of other important management measures. For the majority of companies engaged in strategic projects, accelerating the projects is not just important, but essential.

Despite the wide range of different project types, there is a list of questions common for all project types:

- *Projects takes longer than planned*
- *Permanent budget overruns*
- *Payments not received in time*
- *Too many amendments and alterations*
- *Too much overtime*
- *All too often resources are not available in time (even if promised)*
- *The necessary documents are not available in time (information, specifications, materials, design, permits ...)*
- *The constant change of priorities*
- *A lot of effort is spent to achieve the interim results*
- *Superiors requires to increase the number of projects in work*

The simple fact that this list is so common, suggesting that a common problem is much more to do with the way companies manage projects than with any technical or specific factors. But there is a positive thing. The existence of a core of common problems gives companies a great

opportunity to use a standard solution and make significant progress in the implementation of several projects faster and with fewer resources.

2. Literature Review And Hypotheses

Methodology of the Theory of Constraints for project management, Critical Chain, identifies three factors of project management, which almost inevitably cause negative effects listed above.

Here they are:

- *Bad multitasking*
- *Student`s syndrome*
- *Parkinson's Law*

2.1. Bad multitasking

The process of stopping the work before it is completed, in order to do other some work that is perceived as more urgent or important. Each time the task execution is stopped, there are immediate loss of efficiency because of the need to remember details in order to resume the task execution later. Difficult mental tasks may require considerable time to return. Even worse, one task`s execution stop delays the consequent tasks execution as well. As a result, the overall duration of the project increases.

Most companies are willing to admit that a bad multitasking takes place, and that people tend to have a lot of simultaneously opened tasks. This quickly leads to the "cascade effect". In other words, the delay spreads like a domino effect in the project, increasing the overall duration and delaying the project. The second and the third factors are directly related to how companies manage spare time in their projects.

Student`s syndrome associated with the phenomenon that most people begin to fully engage in the task only at the last moment before the deadline, like a student begins to study right before the exam. Student`s syndrome is a form of procrastination. Parkinson's Law is the observation that "work expands to fill all of the time remaining before its completion." Each employee strives to be busy all the time, not to look like a bum. And the bureaucracy will generate enough internal work to keep yourself always "busy" and to justify its existence without commensurate benefit.

Uncertainty is a projects reality. Some actions to reduce uncertainty may be taken, but the complete elimination of uncertainty and variability is simply impossible. Project management can be compared to driving a car in a million city. No matter how well you drive your car, there is always likely to encounter delays (traffic jam, accident, road repair). No one can say exactly how long it takes to get from one place to another. You can only leave early "with a safe time", not to be late. Recall Murphy's Law: if there is a likelihood of some kind of trouble, it will happen. Most companies often behave as if they can eliminate the inherent variability of the project and uncertainty. They do this by trying to improve the quality of their assessment of the timing of the task.

The goal is to learn to identify terms that can realistically be achieved, and at the same time does not have too much reserve, and then impose on the people responsible for the execution of these evaluations. The logical reaction of people responsible for completing some task in time is to give their assessment of the timing, the reality of which they are confident. This means

that people should evaluate the duration of the task with sufficient safety margin to account for a significant amount of things "that can go wrong" on the way.

On the other hand, each task is affected by Parkinson's Law. It ensures that, if the safe time has been added and has not been used up, the task would not be completed before the scheduled time, even if there are not any obstacles. In fact, there are two pitfalls. Firstly, when people have more time to complete the task, they often use that time to "improve" or "polish" it. So that work expands to fill all available time. Secondly, to finish work early - a disincentive for people. Finishing the task long before the deadline indicates the administration that the assessment of the timing was too "fat", and that in fact it can be done much faster. The next time limit of a task will be reduced to reduce the overall project duration. Taking this into account, workers would not ever finish their tasks earlier than expected to keep their safe time untouched. As a result, most companies may be noted that the timing of most tasks are usually very close to the estimates, and the number of tasks completed later than planned.

From this it is easy to conclude that the company does an excellent job of correct assessment on task duration, and thus, it is not so much room for improvement through better synchronization. But this is very far from reality. There is a variability in a nature of each project. One task can take 10 days, and because of certain obstacles or problems, 15 days next time. Therefore, in reality, trying to predict the duration of the task is like trying to predict the duration trip in a big city. It is understood that the trip will take different times on different days.

Methodology of the Theory of Constraints Critical Chain allows to overcome the three main drivers of negative consequences listed above. In order to reduce the effect of bad multitasking, the company has to reduce the number of available jobs on the pipeline. The very presence of many tasks on each desktop creates too many opportunities for poor multi-tasking and prioritizing work incorrectly. Project managers motivated to complete their projects on time will convince to give them more resources and to change the priorities. Clients and administration will exert their pressure to refocus resources. Workers also tend to choose between a variety of tasks based on their own preferences and motivation. All this ensures poor multi-tasking as a result. Critical Chain stimulates the reduction of the number of active projects by freezing a large part of the projects in the pipeline. By reducing multitasking people stay focused and perform tasks much more quickly, allowing them to move quickly from one stage to another, faced with much less work queue.

Freezing at least 25% of the projects are usually enough to speed up the progress of work and, therefore, projects completion time. When initially selected projects comes to the end, the frozen projects can be activated and executed much faster. This mechanism itself usually leads to a significant increase in the number of projects completed on time, without delays of any projects (even if the former were frozen initially).

Coordination of the conveyor of projects with restriction After the initial freezing process, in order to achieve stable working state, it is important to ensure that new projects are launched in metered amounts, so that the number of active projects remains relatively low and declining bad multitasking. TOC indicates that the production line in any system or project can get as much work as it can get through the weakest link (restriction) in the chain of operations. Running more work than the constraint can serve will only lead to the accumulation of work in the front of limitation, not to an increase in the number of completed projects per time unit. Critical Chain requires new working processes to be started according to the capacity of the weakest link in the system (the most loaded resource) and to be coordinated in time with it.

Time planning of the project implementation The second important aspect of the Critical Chain is the projects safety time planning so that the extra time was not wasted, and so that the planned life of the project were as short as possible, while ensuring the reliability of their performance. This is achieved by defining of the longest chain of dependent tasks and resources for the project at the very beginning of its planning. This is very similar to the well-known method of the Critical Path. However, the Critical Path for a number of projects does not allow to take into account the situation where the same resource is required for simultaneous execution of parallel tasks. As a result, Critical Path may give a more optimistic outlook for the end of the project compared with the Critical Chain, but a realistic time frame, as shown in the figure will increase and the plan will correspond to Critical Chain.

The last key element of the Critical Chain methodology is about how buffers are used to make management decisions in the implementation of projects. If there are delays on the Critical Chain, than part of the safety buffer at the end of the project will be consumed.

Watching the percentage of work performed on the Critical Chain and the percentage of buffer's time consumed, project managers can see the risks for all projects. When the project's buffer time consumed more rapidly than the work is performed on the Critical Chain, than the buffer is in the red state, or in other words the project runs the risk of being late. When the two, buffer and Critical Chain, moving at the same speed, buffer is yellow, which is good. When the work is done at a faster pace than the buffer is consumed - the project goes ahead and the buffer is green. At a glance project manager can understand which of his projects are going well, which are in danger, and decide where and when to intervene.

For the heads of departments (resources), it is a central question to set priorities and load people and environment with optimal amount of work. Given that each task is listed in the buffer of the project, they can see if the task execution goes well (green buffer), or if there is a problem (red buffer). Project tasks that are red, receive a higher priority than green, that can wait, because they have more guard time. Heads of divisions can thus allocate their resources based on the status of all projects and eliminate the constant battles over priorities. Looking at the challenges ahead for their department and their status, managers are able to plan and allocate resources for the tasks based on the load and relative urgency. Finally, the Critical Chain method provides a model for the functioning of the resources themselves, the people who do the work on the projects. Visibility of each buffer status for each task allows people to clearly see what are the most important tasks right now, allowing them to make informed decisions about priorities without the "help" of senior management.

They can also see that it is important to seek help if there is a delay. Red task should require clear objectives for assistance when there is an obstacle, whereas the green task can wait without compromising the project. Of course, it is important to give some details about the projects to ensure that the necessary information is up to date and accurate. Most approaches to project management are based on measuring the performance as a percentage of completed work, or on the time spent. Unfortunately, these measurements do not indicate how much time is required to complete the task. The reality is that in practice many managers are faced with a situation, when the completion of the last 10% of the problem is as necessary and **important as the first 90%.**

To combat this problem we have a task manager, which report the time remaining to complete the task. In most cases, it is much easier and more accurate than counting the percentage of completed work or hours spent. Knowing remaining time until the completion of all tasks, it is easy to fold the remaining time on the Critical Chain and compare it with the size of the buffer

consumed. There are several software packages available on the market that automatically provide information and reports, as described above, which greatly facilitates the use of Critical Chain in the organization.

3. Conclusion

The result of applying these three key steps (implementation of the project in accordance with the limits of the pipeline, project planning method, Critical Chain buffers and management decisions based on that buffers) is a significant acceleration of the flow of work and completion of the project. Companies using this approach, usually complete more than 95% of the projects on time, project duration is reduced by 25-50%.

They achieve these results by synchronizing workflows through existing resources without adding people and investments in their systems. Reducing the duration of the projects means completion of more projects in the same amount of time, which significantly increases the return on investment in projects and the acceleration of the passage. Although these changes are conceptually easy to understand, their implementation in practice, faces a number of serious problems. Great courage is required to change long-standing practices, procedures and measures used for project management at all levels.

The transition from starting projects in the pipeline as soon as possible, to launching them in accordance with the limits, means a change in the widely held belief that the sooner you start the project the sooner it will be completed. All this need the appropriate support of senior management and cooperation with the sales department, otherwise you will be under pressure to run more and more projects that will paralyze the pipeline and ensure the negative return of bad multitasking. The introduction of buffers in the project requires executive support based on the understanding of basic principles, otherwise it will lead to the destruction of the buffers and the launch of unrealistic plans.

Project management and setting priorities in accordance with the buffers means that managers need to consider the allocation of resources between the objectives depending on the buffer status of each task as the primary means of control. The magnitude of these cultural changes are significant, as each change requires overcoming the inertia of old practices and beliefs, each of which could undermine the process of change.

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POPULATION INCOME IN THE EUROPEAN UNION AND SITUATION IN LATVIA

Svetlana Ivanova

Riga Technical Universty Liepaja affiliation, St. Vanes 4, Liepaja, LV-3405, Latvia

Introduction

The EU is a trans-national region that consists of 28 member states. One of the EU's main goals is to promote human rights both internally and around the world. Human dignity, freedom, democracy, equality, the rule of law and respect for human rights: these are the core values of the EU. (European Union, 2015) To achieve these goals, it is vital to ensure sustainable development of the EU. This can be reached only if all regions of the EU (member states and regions in countries) will attain the same level of development.

Regions of all levels are formed in an interaction of political, social, cultural and spatial dimensions. If there are differences in these factors, the level of social and economic development among the regions may differ. At individual's level, differences in social and economic situation can be considered as main factors that form and contribute to inequalities of various dimensions of life. This can be seen between regions as well as within one region. Objective of this study is to determine differences in population income within the European Union and a correlation of the personal income with the social and economic situation in the country.

Literature review

Inequality can be seen in several dimensions – as a vital inequalities (inequalities of humans as a biological organisms), existential inequalities (inequalities of persons in their freedom and respect) and resource inequalities (inequalities in human agency). (Crow, Zlatunich & Fulfrost, 2009) Amount of income (an absolute indicator) and level of income, comparing to other members of society (relative indicators) are essential indicators of person's life quality and opportunities. The greater are differences of income between members of society, the greater the income inequality is. Accordingly, there can be more expressed disparities in quality of life between members of society. Main source of income for the majority of society is income from work (salary). Amount and level of salary, mainly, are result of interaction of profession, place of work, position etc. factors. These factors can be influenced by level of person's education. Thereby, it might be considered that there is strong, reverse correlation between level of education and income inequality. However, several researches point to distinctive situation. In a research about Portugal is obtained that education increase inequality of wages within one level of education. (Alves, 2012) A research about impact of education policy on income distribution has result that in developed countries income inequality can increase if higher education is made more available. This can happen because wages of unskilled workers decrease and premium for qualification increase. Primary education and literacy improve situation of lower income group, secondary education increase share of medium income group and decrease share of higher income group. Expenditure for education influences inequality. There is option to decrease inequality by investing in human capital. However, greater expenditure for education has not made inequality lower in many developing countries. This is explained by effective usage of resources and the quality of education. In the research (global

data) is found that secondary education, especially enrollment rates, plays a major role in determining why some countries have more equal income distribution than others. Conversely, tertiary enrollment rates are significantly unequalizing. Enrollment rates in primary, secondary and higher education each highly significantly decrease fertility rates, and as high fertility rates generally are highly significantly increasing income inequality, this also indirectly improves income distribution. (Keller, 2010) Other authors, in turn, point that not education, but inequality in education affects economic development negatively and increase income inequality. (Crow, Zlatunich & Fulfrost, 2009)

This coherence can be seen also in opposite direction – income inequality influences education inequality, especially if it is education with a charge. It is always a very important question when income inequality analysis is carried out – there are factors, influencing income inequality and social and economic aftereffect, caused by income inequality. However, what are factors and what – results? For example, health condition (vital inequalities) can influence individual's options of receiving greater income from work.

Education and specialization of population cannot be analyzed disconnected from overall situation. ***Higher level of education cannot increase wealth in countries that do not have demand for educated employees***. Rising of level of education will ensure economic growth and increase of wealth only, if there is developed industry in the country that will provide workplaces for these people. Otherwise, there is only education of emigrants. (Reinerts, 2012) A research about connection of income inequality to different social and economic problems in several countries has a conclusion that income inequality in country or in individual regions in country (in research – USA states) influences and promotes following problems:

- *Mental health and level of stress*
- *Physical health and life expectancy*
- *Level of education*
- *Teenage pregnancy*
- *Level of violence and system of penalties etc. (Vilkinsons & Pikita, 2011)*

Other researchers also point to close link of income inequality to these problems. Differences in the level of income inequality are able to explain a sizeable share of the geographic variation in teen pregnancy rates. Women who grow up in low socioeconomic circumstances have more teen, nonmarital births when they live in higher inequality locations. Greater levels of lower-tail income inequality – which can informally be thought of as a greater gap between the "middle class" and the "poor" – lead to a heightened sense of economic marginalization and desperation among those at the bottom of the income distribution. Authors offer model that when a poor young woman comprehends economic despair in this way, perceiving that socioeconomic success is likely unachievable to her, she is more likely to embrace motherhood in her current position, as there is little option value to be gained by delaying the immediate gratification of having a baby. (Kearney & Levine, 2014)

Results of previous mentioned research coincide with a conclusion that level of birth increase inequality significantly (but loose influence in developed countries). Higher level of births is more characteristic for lower income classes. Hence, part of lower income group is redistributed to more persons. Thus, income inequality is magnified. (Keller, 2010) A research about 33 countries shows that income inequality correlates with trust (-0.51), health expenditures (-0.45), life expectancy (-0.74) and mortality (0.55). Trust correlates with life expectancy (0.48) and mortality (-0.47) and partly mediates their relation to income inequality. Health expenditures do not correlate with life expectancy and mortality, and health expenditures do not mediate link between income inequality and health.

Health problems, caused by socioeconomic status are more widespread in societies with higher dispersion of personal income. Differences in income inequality between countries are associated with mental and physical health problems, as well as with rate of mortality. Income inequality also harms public health through the psychosocial impact of relative deprivation, class conflict or the lack of social capital, and not primarily through the lack of government investment. Differences between social classes get wider, hostility, violence and psychosocial stress increase, but moderators of stress (e.g. social support and cohesion) reduce. The results of research gives conclusion that in society where are great difference in income and low level of trust may lack capacity to create system of social supports and connections that contribute to health and successful aging. (Elgar, 2010)

2. Results

There are remarkable differences in terms of the population income in the EU countries. We can create two groups of equivalent countries – **15 old member states** and **12 new member states**, see Table 1. In the group of old member states median equalized net income, in average, is 4.4 times higher than in the group of new member states. The difference decreases gradually – it was **576**% in year **2005** and **273%** in year **2013**. Median equalized net income in Latvia is one of the lowest in the EU. Furthermore, 6 years during the covered period it is also lower than average income in new member states group.

Median equalized net income in **Latvia comprised from 17.4% up to 36.7% from the EU** average indicator. Up to year 2009 decrease of disparity can be observed. This is result of more rapid income increase (absolutely and relatively) in Latvia than in EU 27 countries in average (except year 2007). Though, after economic crisis rapid changes in situation can be seen – median equalized net income in Latvia decreases by 16.6% and 6.9% in years 2010 and 2011 respectively. That is one of the highest decreases among EU countries. During next two years income in Latvia increase, but in year 2013 difference still exceeds 2/3 of EU average indicator. Income is an essential factor that determines quality of person's life. Low level and great disparities of income can cause many serious social and economic problems in society. To evaluate impact of income to life quality of population and society as a whole, a correlation analysis is performed.

The correlation is evaluated within one year by comparing situation in 28 EU member states. Health index (life expectancy at birth) is used as indicator that characterizes quality of person's life. It is influenced by housing conditions, mental health, physical health, availability and quality of health care, level of criminality etc. factors. Risk of poverty and social exclusion is the proportion of those persons in country, who have income and resources, lower that is assumed in society and who are not able to integrate in the society due to poverty or other reasons (unemployment, disablement, discrimination etc.) This indicator is used to describe quality of society's life. In the analysis are not used indicators that characterize situation of education, as it is very difficult to evaluate its quality and impact. This problem is described in other researches that are analyzed before.

There is strong, opposite correlation between median equalized net income and risk of poverty and social exclusion. Consequently, there are more pronounced problems with distribution of income in lower income countries. As the result, in such countries is higher income inequality. We can analyze this correlation also inversely. If there are problems in retraining of unemployed persons, adjusting the working environment for disabled persons, racial, sex or other kind of discrimination, great number of alcoholics, drug users etc. negative processes in

society, that prejudice ability of such persons to earn income and integrate in the society properly. As the result, it leads to higher income inequality and can reduce median equalized net income in the country. There is also strong correlation between relative indicator of income (Income index) and life expectancy at birth. In countries with higher level of income is greater chance to ensure better living conditions (higher quality of life) and that provides greater life expectancy.

Thereby, it is obvious that existence of income inequality in the country significantly affects different areas of population life's quality. As there are different approaches in the analysis of causality, it is evident that there must be used comprehensive approach to prevent (or reduce) income inequality and social and economic problems (whatever is considered as the initial factor). It is vital also because analyzed correlations cannot be viewed separately from overall situation. Level of income, income inequality, health or other problems in the regions are the result of interaction between many social and economic factors.

Conclusions

The issue of income inequality is very topical and there are many researches about it. The results of researches cannot be interpreted unambiguously neither between different researches nor within results of one research. The reason of this is the complicated nature of income inequality's formation process. ***This process is influenced by person's level of education, profession, position, health condition, as well as by overall social, economical, political situation and other factors.*** Furthermore, these connections can be viewed also reversely – income and distribution of income have significant impact on person's life, as well as on situation of all country/ region. The population income inequality can be included in the models of competitiveness of nations (or regions) as indicator, but in the models describing sustainable development – as factor. There are remarkable differences in terms of the population income in the EU countries – great dispersion of income and large income inequality. Differences of income determine other dimensions of person's life quality – there is a sufficient correlation between the amount of income and the risk of poverty and social exclusion, as well as between the level of income and the life expectancy at birth.

The population income can also be seen as the effect of economic activity in the country. It is obvious that countries have diverse reactions to economic shocks – there is a different dynamic of the income after the economic crisis. The results of research show a very varied competitiveness of nations that can sufficiently determine the social and economic development of the EU member states and the EU as a whole. The results of research can be used to evaluate regional development performance, implemented in the EU and Latvia, as well as to consider future priorities and activities that will ensure sustainable development of countries and the EU region.

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EVALUATION AND IMPACT OF INNOVATION FOR ECONOMIC GROWTH: COMPARATIVE STUDY OF EU COUNTRIES AND SLOVAKIA

Peter Pisár[1], Hussam Musa[2], Martin Varga[3]

Introduction

The issue of innovation processes is one of the most discussed topic and innovation is considered to be a major tool for the long-term economic growth of the regions. There are already many well-developed literature that examines the relationship between innovation and economic growth. This article is based on foreign literature, which quantify the impact of innovation on the economy situation in Europe. Most of the literature notes a positive correlation between innovation and the economic growth of the economy. Much better results of innovation are outlined in innovative services. Delivering new ideas to the global economy in the form of new products, technologies and services will result in a better competitiveness of the regions and give the countries the benefits of the world market.

Theoretical basic

Innovations help any entity to achieve both qualitatively and quantitatively higher levels ofntheir competitiveness. Innovation is one of the main prerequisites for long-term economic growth, which was first highlighted by J. A. Schumpeter (1987), who introduced this concept into economic theory in his Theory of Economic Development. Groosman and Helpman (1991) followed Schumpeter's knowledge and examined the relationship between industrial innovations and macroeconomic growth, and the dependence of the price of innovation on market conditions at the micro level. In their work, they confirmed the need to create innovation in relation to long-term economic growth and, in addition, emphasized the need for commercialization of new knowledge and its subsequent placement on the market. In addition, Stiglitz (1997) emphasizes the need of new knowledge in economy to increase the competitive advantages of an enterprise, but also identifies innovations as non-codified public goods which value becomes codified in the form of implementation of knowledge on the markets. Buček (2006) characterizes innovation as an event occurring at a specific location that causes a market or organizational break. Some authors restrict the explanation of the concept of innovation to the outcome of scientific research such as Kováč (2006), which considers innovation as the final realization phase of the "basic research - applied research - development - innovation" process. Deeper definition of innovation notes Nižníková, Bilohščinová (2010, p. 4): "Innovation can generally be defined as a process of securing with new better capabilities or increased utility. Innovations are not science or technology but a value that can be measured by the impact on the environment. "

[1] doc. Ing. Peter Pisár, PhD., Univerzita Mateja Bela v Banskej Bystrici, Ekonomická fakulta, Katedra financií a účtovníctva
[2] doc. Ing. Hussam Musa, PhD., Univerzita Mateja Bela v Banskej Bystrici, Ekonomická fakulta, Katedra financií a účtovníctva
[3] Ing. Martin Varga, Univerzita Mateja Bela v Banskej Bystrici, Ekonomická fakulta, Katedra financií a účtovníctva

There are several approaches for innovation segmentation. As mentioned earlier, one of the first economists to mention innovation was Schumpeter (1987), who defined five basic types of innovation: introducing a new product, introducing a new way of production, discovering a new market, using a new source of initial inputs, and changing a business organization. Vaňová (2006) notes that innovations may not only concern products and markets but also marketing processes. Ručinská (2008) devotes attention to the innovation process and identifies eight basic areas of innovation strategies and completes Schumpeter's division with business innovation, business relations and management innovation. Modern authors agree on the innovation categories of product, process, marketing, or market innovation. Innovation drivers are mostly businesses, but innovation can also be found in the public sector or their cooperation. Depending on the type of the innovation markets, different types of innovations are emerging. While in enterprises we can monitor the occurrence of technological innovations, the public sector is more oriented to innovate the provided services. Innovations are the result of innovative processes that take place in individual entities.

Dunning (2002) identifies innovative processes as the main engine of economic development and the gateway of countries to the global market. Fagerberg (2006) points to the great orientation of economists to acquire innovations and resources for their creation, while the innovation process is referred to a "black box" whose operation is not entirely clear to anyone. However, several authors notes attention to the importance of implementing the whole innovation process (Verloop 2005; Mowery, & Nelson, 2005). Mothe - Paquet (2013) attribute an important role to the innovation process and state that innovations are insignificant to the economy if they are not part of the interactive mechanism with the environment in which they are created. Elimination of barriers in innovative processes is possible through greater concentration of processes, for example at lower regional levels. Concentration of innovation processes at the regional level allows savings in transaction costs, due to the location of innovative actors in a single region and the simpler security of products, services, workforce or information itself tailored to the needs of the participating companies (Hudec et al., 2009). Lingelbach (2015) identifies an innovation process similar to Sabadka and Lešková (2002) as part of its three principal parts - creation of invention, innovation creation, diffusion of innovation and depending on the complexity of the process and the various cultural complexities, similar to Hudec et al. (2009) identifies the need for greater concentration of innovation processes at lower national levels. Regions with high innovation performance achieve higher economic growth, better international competitiveness, and, ultimately, better quality of life for the regions (Acs - Groot - Nijkamp, 2013).

The EU has set out its vision of a European social market economy in the Europe 2020 strategy, which aims to confront the structural weaknesses through progress in three mutually reinforcing priorities:

- smart growth in terms of creating a knowledge-based economy and innovation,
- sustainable growth, i.e. Growth based on promoting a more resource-efficient and competitive economy,
- inclusive growth, which means promoting a high-employment, social and territorial cohesion economy.

The main objective is a strategic and integrated approach to innovation that maximizes European, national and regional programs for research and innovation potential. To meet this goal, the EC has approved a number of sub-targets, where one of the aim related to innovation performance is that R & D investment levels should reach 3% of EU GDP by 2020. Based on Figure 1, Denmark, Finland and Sweden exceeded the 3% share of spending on science and

research in Europe across Europe in 2014. Austria also reached a high 2.99% of GDP, showing a significant increase in spending on science and research in recent years. The Slovak Republic with a share of 0,89% of GDP belongs to the countries with the lowest share of science and research expenditures. The EU average thus reached 2,03% of GDP expenditure in 2014 and is progressively closer to the target.

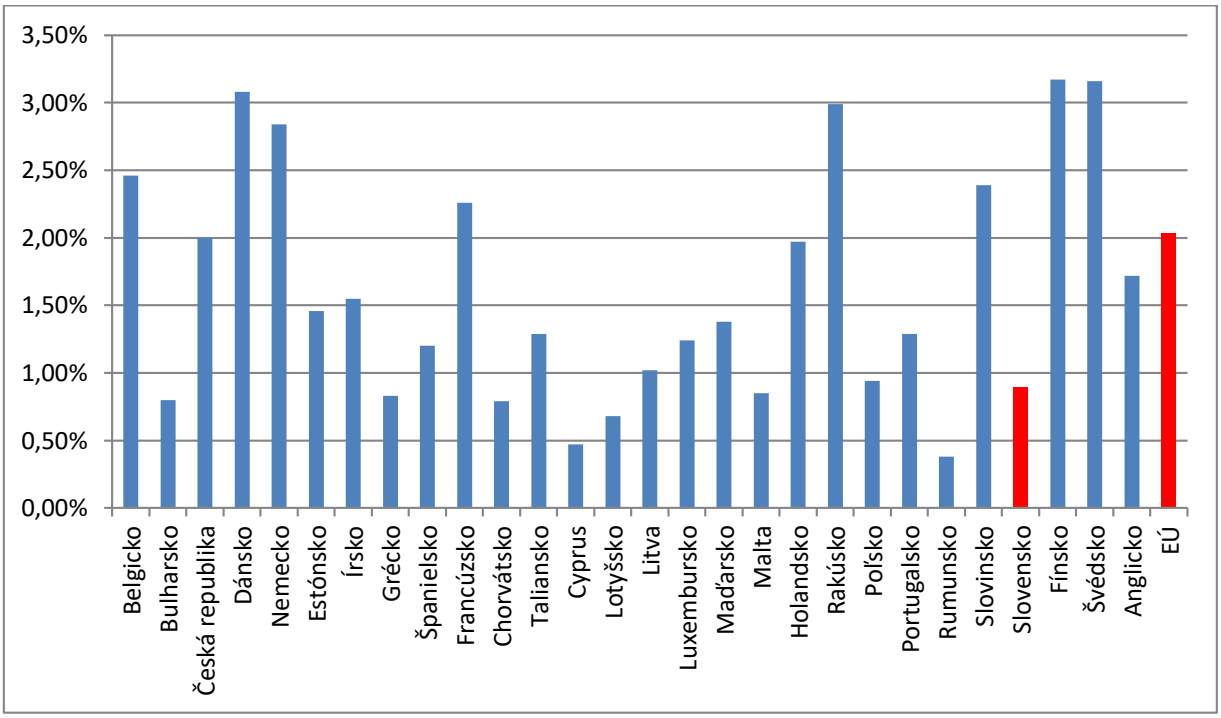

Figure 1 Share of EU spending on Science and Research on GDP in 2014 (%)

Source: Processed according to the data available at epp.eurostat.ec.europa.eu

The European Commission's priority is therefore to stimulate the European economy by creating new technologies and products that can be placed on world markets. The programs and objectives of Europe 2020 and the Innovation Union relate mainly to strengthening research and development for tangible products and tangible products manufacturing processes. In addition to the priorities, however, Nakamura (2012) notes that the strategy contains little reference to basic research aimed at achieving a deeper understanding of the causes of the financial crisis of 2008 and seeks to discover and develop new financial sector products, institutions and regulatory approaches that could help solving post-crisis problems and needs. In the area of strategic document creation and policy design at both national and transnational level, an analysis of the current state of innovation performance as well as the identification of weaknesses and strengths is required for the proposal of objectives and measures. The basis for these analyzes are the indexes.

VARIOUS APPROACHES OF THE INNOVATIVE PERFORMANCE MEASUREMENT

In order to analyze and measurement of the innovation potential and level of each region as well as the analysis of the strengths and weaknesses of regional policies and strategy papers are used indexes. They are based on the collection of statistical data and the calculation of indicators that quantify different areas of innovation performance (mostly human resources, patent policy and so on). The most important index across Europe is the Summary Innovation Index (SII), which has been evaluated since 2001 for the EU27 countries, plus several non-member countries. This index was created to measure the country's innovation performance and is part

of the European Innovation Scoreboard that is being compiled annually. The SII values are in the range 0-1, where 1 indicates the maximum innovation performance. Since the creation of this innovative performance tool, index composition has been adjusted, and the number of indicators has been changed to its present form.

SII currently consists of core areas divided into two groups depending on whether they are inputs for innovation creation or are the output of innovation processes. Within the input group the SII index takes into account (Lučkaničová -Maliková, 2011): tertiary education, information and communication technologies (ICT), expenditure on science and research and ICT and business practices of small and medium-sized enterprises.

Output Group includes high-tech export, employment, sales of new products on the market, patents and trademarks. Based on the level of innovation index SII, the countries are subsequently integrated into 4 basic groups: innovation leaders, innovation followers, moderate innovators and modest innovators.

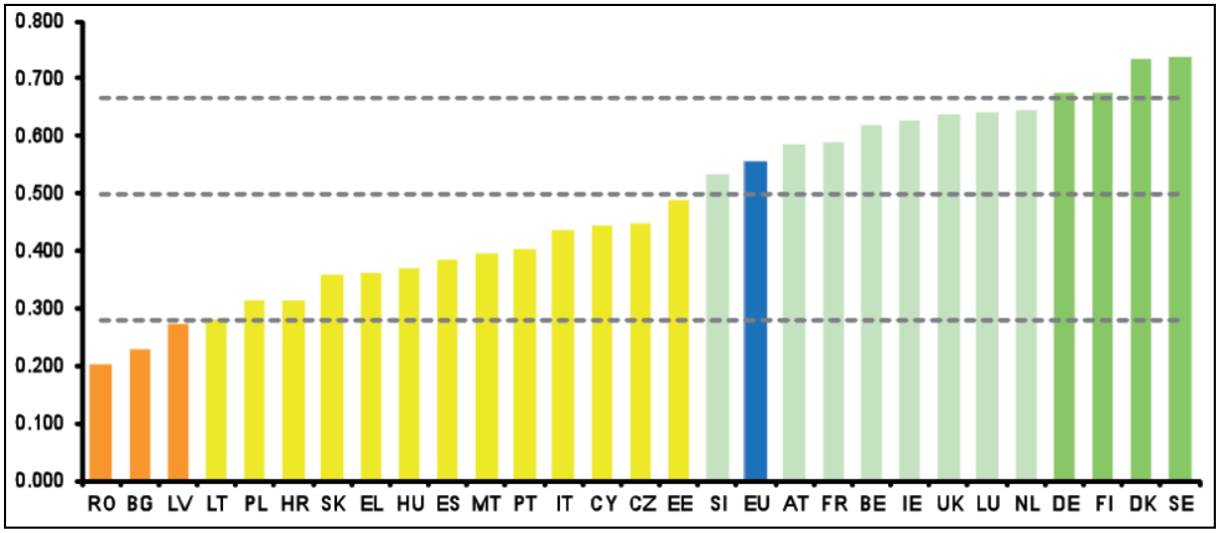

Figure 2 European SII values for 2014 (%)

Source: Innovation union Scoreboard 2015

Figure 2 illustrates innovation performance using SII values, and color resolution is a breakdown of countries into four groups. Based on the data, countries can be divided into those groups where the orange color represents the values of modest innovators, the yellow represents the countries from the group of average innovators, the bright green color of the distinguished lands are considered as innovative followers, and green are the innovation leaders. Slovakia is ranked in a group of average innovators in that rating. Based on the development of the SII value per country, the growth rate is derived, indicating more about country developments. The innovation performance of the SR increased between 2007 and 2014, but declined in 2010 and 2013. Performance in relation to the EU has more fluctuations, but has increased significantly over the last few years. Slovakia's innovative performance compared to the EU peaked at 69% of the EU average in 2012, but fell to 64% in 2014.

For a deeper analysis and clarification of the areas in which the country is progressing or failing to generate innovation and innovation performance, the SII methodology is exploring Innovation Union Scoreboard (2015). According to the source, it is about human resources, research system, financial support, business investment, innovation and entrepreneurship, intellectual property, innovators and economic effects.

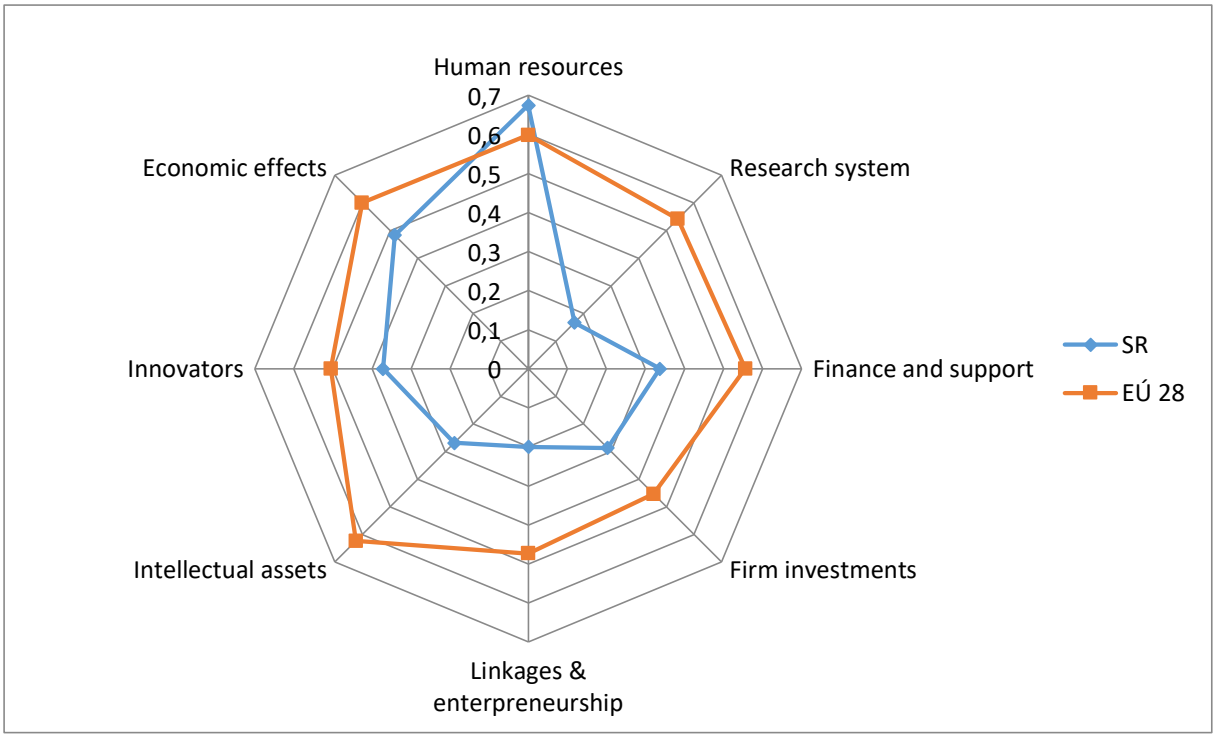

Figure 3 Innovative SII performance from the point of view of the innovation dimensions of SR and EU28 in 2014
Source: Processed by Innovation Union Scoreboard 2015

To achieve a high level of performance, the countries need a well-functioning and balanced innovation system in all dimensions. Slovakia is below the EU-28 average in all dimensions except human resources. Positively assessed indicators are in sales of the share of new innovations and new postgraduate students. Relatively large weaknesses are in intellectual property, licenses, patents, or innovators themselves. The performance of innovation systems and business links, business investment or research systems show very low values compared to the EU-28 average. We can also find relatively low values for the investments of the enterprise that ultimately result not only in the growth of their innovative Capacity and activity, but also in the growth of total investment in the country's GDP.

Another major European index, which is evaluated at regional level, is the Regional Innovation Index (RII), consisting of 17 indicators at the NUTS II statistical level. The Regional Innovation Index divides the index into three areas consisting of assumptions, company activity and outputs. As in the case of SIIs, the regions are then divided into five performance categories: high innovation, medium innovation, medium innovation, low innovation and low levels of innovation. With the exception of the Bratislava Region, the SR regions were included in the category of low innovators in 2014 as a result of which we can state that the innovation performance of the SR is significantly influenced by the Bratislava region.

RELATIONSHIP BETWEEN INNOVATION AND EMPLOYMENT

Several authors have dealt with the issue of the impact of innovation on the economic environment of countries. Blechinger et al. (1997) investigated the impact of CIS data in Europe, and notes that the impact may even be negative. Process and product innovations can have a positive and negative impact on employment.

With regard to product innovation, the direct impact is positive, while the indirect consequences could be positive or negative. Thus, the overall effect is not unambiguous in theory and must

be quantified empirically. New research using statistical methods found more positive relationships between employment and innovation. Merikull (2008) examined the impact of innovation on employment in the enterprise and at the industrial level in Estonia. In his study he found that the corporate and industrial levels of innovative activities can have a positive and statistically significant impact on employment. Peters et al. (2013) used CIS data from a survey of 20 European countries demonstrating that product innovation significantly promotes employment in the service sector. Damijan et al. (2014) examines the impact of product innovation on employment growth for 28 EU countries.

Their results show that product innovation has a consistent positive impact on employment growth, which is reflected in the differential growth of new product production. These estimates are supported by Figure 4, which shows that economies with the economic impact of innovation have higher levels of employment. The x axis represents the innovation impact index, while the y represents the employment rate. Figure show the period of 2011. Studies show that overall employment growth depends mainly on innovative high potential growth businesses, which are lower in Europe than in the United States. The number and percentage of businesses with high growth potential may be small, but the number and percentage of jobs that involve either directly or indirectly is different. In addition, these businesses are the key to productivity growth, as the key driver of this growth is to redistribute jobs in low-productivity businesses in more productive businesses. Based on the study, we can see a relatively strong dependence of employment growth on the range of innovation in the country.

Naturally, the most innovative countries achieve greater competitiveness in the global market due to the influx of new knowledge and technology, which ultimately has an impact on higher employment rates. Based on the underlying foundations of a number of economic thinking from the past, we can also point out the indirect relationship between new technologies and employment as a result of more advanced technology that can save businesses' labor and staff costs or even replace them.

We can assume this fact in technology or production technology innovations.

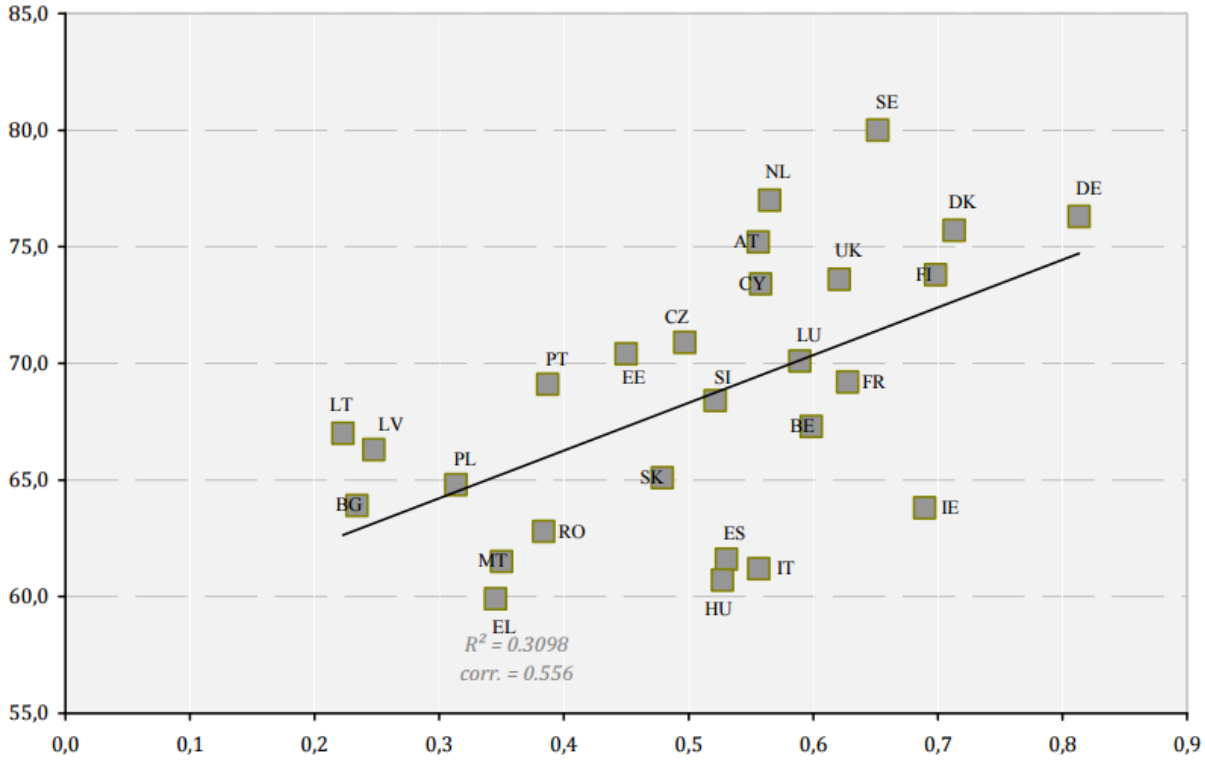

Figure 4 The economic impact of innovation positively related to the employment rate
Source: European Commission data available online http://eur-lex.europa.eu/

Service innovation has a significant positive impact on employment. Using the European Service Innovation Scoreboard, we analyze the growth potential in most EU countries, with the exception of Hungary, Cyprus, Italy and the UK. More innovative services in demanding industries represent new processes and new people needed to apply these ideas in the economy.

There are many other studies that also quantify the relationship between GDP and innovation outcomes. Svenningsen (2015) has used R & D expenditure tailored to innovation and its important role as the driving force of economic growth. The analysis identified the impact of innovation on economic growth. With innovations and new ideas, companies can get new technologies and better technological processes, leading to better use of scarce resources and greater efficiency. In particular, in service innovation, we can analyze the positive relationships between these two parameters, and innovation support should start with the public sector. Innovation leads to higher competitiveness of businesses and countries, leading to better performance and higher GDP per country.

CONCLUSION

For several foreign as well as domestic authors, we can conclude the high need for innovation in the economy as a source of long-term economic growth. As we have pointed out to achieve the desired effects in the economy, it is essential that the entire innovation process is fulfilled. It is necessary to fully cooperate with all participants in the innovation process. As we have seen in this document, based on the findings of various authors, we can see a positive correlation between GDP, employment and innovation. Especially in the field of service innovation, we note the growth of employment based on the introduction of new innovations in the economy. Increasing employment can in many cases lead to the emergence of new innovation centers, creating opportunities for many new innovators. In the case of the relationship between GDP and innovations, we also have positive relationships. Better technologies, new innovative products and services make companies and countries much more competitive in the global economy. Ultimately, the results of better competitiveness and new ideas bring more revenue to businesses, reflecting higher investment projections into higher GDP. Innovations are genuinely necessary for the growth of the economy and are one of the most important factors of long-term growth.

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SUPPLY CHAIN OF DISTRIBUTION LOGISTICS IN A FIRM

Juraj Cúg

University of Žilina, FPEDAS, Department of Economics. Univerzitna 1, 01026 Žilina

Email: juraj.cug@fpedas.uniza.sk

Introduction

Distribution logistics is an integral part of the logistics chain. However, in the literature, it appears under different names such as marketing logistics (next to sales by the second part of business logistics), logistics and logistics. It is also very heterogeneous in its division, which almost everyone writes according to himself. However, it is clear from all divisions that this is part of the logistics that begins with the delivery of the finished product to the warehouse of the finished products and involves the entire downstream process until the goods are delivered to the customer.

Pernica states that it would be a mistake to omit any element of the distribution chain (for example, a distribution chain restriction to deliver the product to the closest supplier), this would lead to inadmissible partial optimizations and would not produce the desired synergistic effect. Therefore, the distribution chain must end up with the final customer (consumer). According to Pernica, in the past, the differences between distributive and commercial activities have disappeared, resulting in the confusion or association of these two concepts.

He states that distribution is often considered to be a "set of business activities", meaning distribution, placement of goods from the place of production to the place of consumption with the provision of the services concerned. "More precisely, according to Pernica, distribution would be distinguished as" output of the product, And physically carried out by a manufacturer or an external contractor - on the distribution of downstream - a set of wholesale and retail activities by business enterprises. "

The role of distribution logistics "The role of distribution logistics is to provide manufactured goods defined by type, quantity, space and time so that the delivery times can be met or the most anticipated demand can be met." It is highly desirable for logistics to be involved in the order-making process such as, for example, Was represented on business negotiations, agreement on the type, place and time of delivery and the like. The reason is that logistics knows what its options, constraints and costs are, and thus ensures that a convenient and orderly delivery of a manageable order is achieved, and the need for organizing logistics performance.

The distribution must ensure:

- *A high level of service,*
- *Building a physical distribution network,*
- *An appropriate share of the stocks stored in individual stores,*
- *Direct sales opportunities.*

Distribution logistics for custom-made production When making an order, as the name suggests, the acceptance of a specific order is a prerequisite for starting production. There may

also be a situation where compliance with the plan requires the replacement of the missing order with its own orders. Custom production is typical for investment goods. These are technical goods containing hardware and software components. These components are used to solve individual user problems.

The aforementioned type of goods is characterized by several features:

- *Application and control,*
- *Long-term use,*
- *A large part of the funds.*

Due to the properties, a number of product, quality and service criteria are taken into account when deciding. These are critical when determining whether the device is suited to addressing user issues.

These are:

- *Adherence to delivery times (supply reliability),*
- *Length of delivery times,*
- *Flexibility and delivery quality.*

Distribution supply chain

A distribution chain is part of a logistics chain that begins when the product leaves the production enterprise and ends with the end customer. The distribution chain is often synonymous with the term distribution channel. The distribution chain consists of a set of organizational units of the entrepreneur and external intermediaries who supply (distribute) products to customers. "***The distribution chain is a set of organizational units of the entrepreneur and of the external intermediaries through whom the products or services are sold***."

Distribution means all activities associated with the flow of goods through the distribution chain. Physical distribution connects the supplier with the customer. It demonstrates whether development and production were properly oriented and whether the product would bring profit. It helps to create an environment for successful sales. It is essential that it be made up of a flexible structure capable of responding operationally to the unforeseen effects that may occur.

Structure of the distribution chain

The distribution chain is important:

- *Length - The number of distribution stages through which the product passes between the manufacturer and the customer.*
- *Range - Number of participants in the chain involved in the distribution at a given stage.*

The most frequent connection of the manufacturer with the customer can be illustrated as follows: 1. Manufacturer - customer 2. Manufacturer - Retail - Customer 3. Manufacturer - wholesale - retail - customer 4. Manufacturer - agent - wholesale - retail - customer

Based on these two variables, we can divide the distribution chain as follows: The division by number of distribution stages divides the string into: Direct distribution - one distribution level is used - then the manufacturer delivers goods directly to the end customer. Indirect distribution - goods are delivered to the end customer through several steps.

Depending on the extent of the distribution, the chain divides into:

- *Extensive distribution - an attempt at this type of distribution is to sell the product to all retailers in a given segment, whether it is a sales outlet of several types, one type, or a store in a given location.*
- *Selection Distribution - In this variation, the manufacturer selects only a few stores at a given stage, and the product is distributed only to these selected stores (eg due to the need for a high-level seller's qualification when selling the product).*
- *Exclusive distribution - In this variation, the product is distributed to only one or a few shops (for example, it may be a complicated service).*

Distribution chain functions Even though the distribution chain is lengthening the way for the customer, and the distribution activity binds part of the funds, the distribution chain is irreplaceable and represents a significant role in the logistics chain. The distribution chain has 5 basic functions that must be supervised when moving goods within the chain to avoid duplication (due to cost increase).

These functions can be divided into 3 following groups:

- *Exchange (purchase and sale of goods)*
- *Physical distribution (transport and storage)*
- *Auxiliary functions (standardization, market financing, risk-taking)*

Methods of distributing products Despite the wide variety of distribution systems, where there are many variations in practice, these systems can be classified into three basic systems according to common features. They are designed and operated to ensure maximum system inventory flow. They must respect the technological constraints of the individual components of the logistics chain.

Gradual distribution This system is based on the collection of shipments from different manufacturers to the bulk, where the deliveries are then assembled for distribution to the retail network. This distribution method is used predominantly in food stores. Various assortments and quantities are prepared for individual stores.

This distribution method results in:

- *Saving transport costs,*
- *Fast customer satisfaction.*

Direct deliveries This system uses supplies to the point of consumption from one or more storage locations. The distribution warehouse serves for concentrating and ordering the order. This method of distribution is mainly used for large deliveries to prevent the translation of supplies. Advantages of the system: Reduction of inventory in the distribution channel, omission in different repositories of repositories. The disadvantage of the system is:

- *As a result of the high number of deliveries, high transport costs, the need to operate a sophisticated communication program with customers. A combined system It works as a combination of the previous ones and is also the most commonly used in practice. Whether the supplier selects the distribution between the warehouse or directly, depends on the type and quantity of the ordered goods. This system is used, for example, in the production of automobiles, where parts are only occasionally used in the central warehouse and are sent directly to customers by ordering, and the quick turnaround is sent through the dealers' warehouses.*

Coupling of items The goal of this method is to reduce shipping costs by combining a large number of orders into larger shipments. The larger the shipment, the lower the unit cost per transport, and the control over shipping costs. In practice, three main methods are used: Grouping by Market Segment - Orders for a certain area are linked to a single shipment. Often several suppliers are working together.

The problem with this method is to ensure a sufficient number of shipments to ensure efficient daily transport. The solution to the problem is offered in three variants: An Intermediate Body will be used to ensure the collection and dispatch of bulk mail. Businesses may postpone shipments on selected days to selected destinations.

One company will connect with others and will use a third organization. Market supply of the market segment - market-makers for the supply of a specific market will set the exact days of the week. A distribution plan is submitted to the customer and they will take precedence when ordering them. Compliance with these terms is ensured by the shipping company's interest in following the distribution plan. The use of a third organization that assures bulk shipments by combining orders from a large number of customers. These are shipping companies that complete their packages for reducing transport costs.

Conclusion

This move must be managed in order to avoid duplication and increase logistics costs. There are two management methods to prevent this unwanted condition:

- *Ownership control - to effectively influence the distribution chain (from production to retailing), the entire chain must be owned by one entity. Examples include large food companies owning wholesale warehouses and own stores. They are outsourced to services that they can not afford cost-effectively (eg transport).*
- *Convincing (enforcement) - control and coordination over the entire logistical chain takes the strongest partner in the chain. Its role is to convince companies in the chain of the need for cooperation and the need to take on a certain risk. They use, for example, Large supermarkets.*

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ASSESSMENT OF LOGISTICS PROCESSES DEALING WITH LOGISTICS INDICATORS

Peter Majerčák

University of Žilina, FPEDAS, Department of Economics. Univerzitna 1, 010 26 Žilina

Email:peter.majercak@fpedas.uniza.sk

Introduction

Some processes intended for the construction of transport buildings (e.g. modernization of railways) or some parts of processes are time-limiting factors needed for their realization, cost and quality of their outputs. It leads to the functional reduction of construction companies. Performance measurement and evaluation identifies close position of processes, process costs and the source of their realization. Performance indicators, methods of measurements and target valuations are set to correspond with the strategic objectives of the implementing structures. Application of integrated logistics supply chains for the achievement of intended goals necessarily means to evaluate their logistics variables.

Appropriately selected indicators and effective logistics system to measure logistics have significant cognitive, motivational and diagnostic functions. They provide essential information for logistics management. Their active use in logistics management is becoming an important tool for the unification of sub-goals in the logistics chain. Missing or inappropriate system for evaluating the effectiveness of the logistics system leads to a deepening of the logistical difficulties in realization of transport projects. **Knowledge the values of logistics indicators are used:**

- *to assess their skills (construction company) and their comparison with the requirements of investors and the skills competition,*
- *to identify problematic processes, their subjects and causes,*
- *to identify threats and opportunities for the improvement of the function,*
- *to determine the logistics objectives and measure of innovation.*

The basic characteristics of logistics indicators may include: imaging properties of the material and information flows and logistics processes allowing the comparison (unified content for the type of logistics element, i.e., production point, universal availability for different operating conditions), ensuring the interconnection of logistics chain (the ability to detect how the various sectors are involved in the output of the logistics system).

In carrying out the logistics objectives is monitored effectively overcome time and space with a view to ensuring customer satisfaction (represented by the state as the main investor) for services (logistics efficiency). Logistics efficiency consists of two components – performance logistics and logistics costs. Logistics performance includes the level of logistics services (logistics, quality) and productivity in logistics. Logistics costs include cost items whose value depends on the method of organizing and managing material and information flows. These are the costs within integrated logistics chain.

Logistics system of indicators includes the following groups of indicators:

- *the level of logistics (supply) services,*
- *logistics productivity,*
- *logistics costs,*
- *the structure of the logistics system,*
- *logistics potential.*

Procedures for evaluating the effectiveness of the logistics system must be available for the continuous managing of the logistics system and also for its improvement. [4] Objects to which they relate logistics indicators: logistics system as a whole, the various options to customer-investor, individual processes and place of function. The whole integrated logistics chain is divided into logistics processes.

Evaluation of indicators covers the logistics processes in / on:

- *supply logistics,*
- *production / construction logistics.*

Some examples of the limits of logistics processes by the sequence in which the material is applied to the evaluation by logistic parameters:

- *management of demand,*
- *management of supply,*
- *admission and registration of orders,*
- *order administration and management,*
- *ordering material,*
- *delivery of material,*
- *material sorting,*
- *material handling,*
- *storage of building materials.*

For each process is determined the starting and ending point, the content of process inputs, outputs and place of function. Comprehensive process of assessing the effectiveness of the logistics system with logistics indicators taking into account the aforesaid principle is expressed in a matrix model.

The matrix model allows obtaining: • detailed set of logistic parameters for the horizontal level (variable x process of x variant requirements of the investor, • different final values of variables for each type of logistics chain on the vertical level, • aggregated indicators for the logistics system.

Applying the matrix model in the construction business allows performing a variety of targeted analysis, for example:

- *analysis of the impact of individual processes to the value system of indicators,*
- *analysis of different variants of charge for the individual investor's requirements,*
- *analysis of relation among variables of different groups of indicators of system variables of the process as it means e.g. analysis of relation among indicators of a group of indicators of the logistics services and logistics costs of the group process or any comparison of each group of variables from the set of indicators of the process,*
- *comparison of identical processes but located in different parts of the logistics chain (handling processes in different parts of the building production).*

In next part of the described relation to evaluate the effectiveness of activity changes of the logistics process provides the simply method to evaluate the effective proposals for any change

of inefficient logistics activity at the process of integrated logistics chain. Source hypothesises of a valid relation:

- Construction process consists of m operations of the technological form and n operations of the logistics form where m + n = p, where p is the total number of operations of the construction process
- Hp is the value created by examined construction process, expressed by the price the investor is willing to pay for construction (result) examination of the construction process. Creating value for the building is only involved in technological operations • Only technological operations make the construction value.
- Cp is the total continuous time of the construction delivery to the investor. It is time from its beginning to the completion and delivery to the investor. It consists of a continuous time to perform m operations of the technological form and the continued execution time for n operations (processes) of the logistics form.
- Np is the value of total implementation cost of m construction charges and n logistics construction delivery processes If we reduce the operating time of one or several operations of logistics processes that are part of an integrated supply process we can obtain the reduction of total continuous time needed for construction delivery to the investor by ΔCp.

This operational change generally increases the cost of the logistics activities or activities and thus, the total cost of the supply process by ΔNp. This price increase reduces the total continuous time needed for the construction delivery.

The difference between the value generated by the construction process (Hp) and the cost of this process (Np) we can denote the profit from the process (Zp): Hp – Np = Zp (1)

The intensity of the profit process (Ip) is expressed as: Ip = Zp / Cp

For the assessing of the effectiveness of the activity changes within an integrated supply chain is more effective if the ratio of increase in cost of changing logistics activity to the reduction of the continuous delivery time of the construction to the investor caused by changes of logistics activities less than the ratio of profit in the supply chain to the original continuous delivery time of the construction to the investor.

Logistics activities of the construction company are not worth directly for the investor but they participate in creating of added value for investors. They create conditions that allow the value-creating activities to achieve higher efficiency and so they can increase the productivity of the value-creating activities.

Conclusion

We can say that the effectiveness of changes in the activities of logistics processes within integrated supply chain is influenced by applying the potential of supporting the increasing of company profits. To reduce the construction delivery time is more effective than to reduce the cost of logistics processes.

It is very important to define the parameters of the system parameters (matrix model) suitable for different variants of logistics processes and the requirements of the investor of the logistics system of the construction company. The application of the above procedures provide continuous innovation of logistics processes of the construction company that apply expanded and added value (value innovation) and to achieve a step value for the investor and the construction company as well. It sets the limit values for the parameters of the system parameters required for the operation controls of the logistics system of the construction company.

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