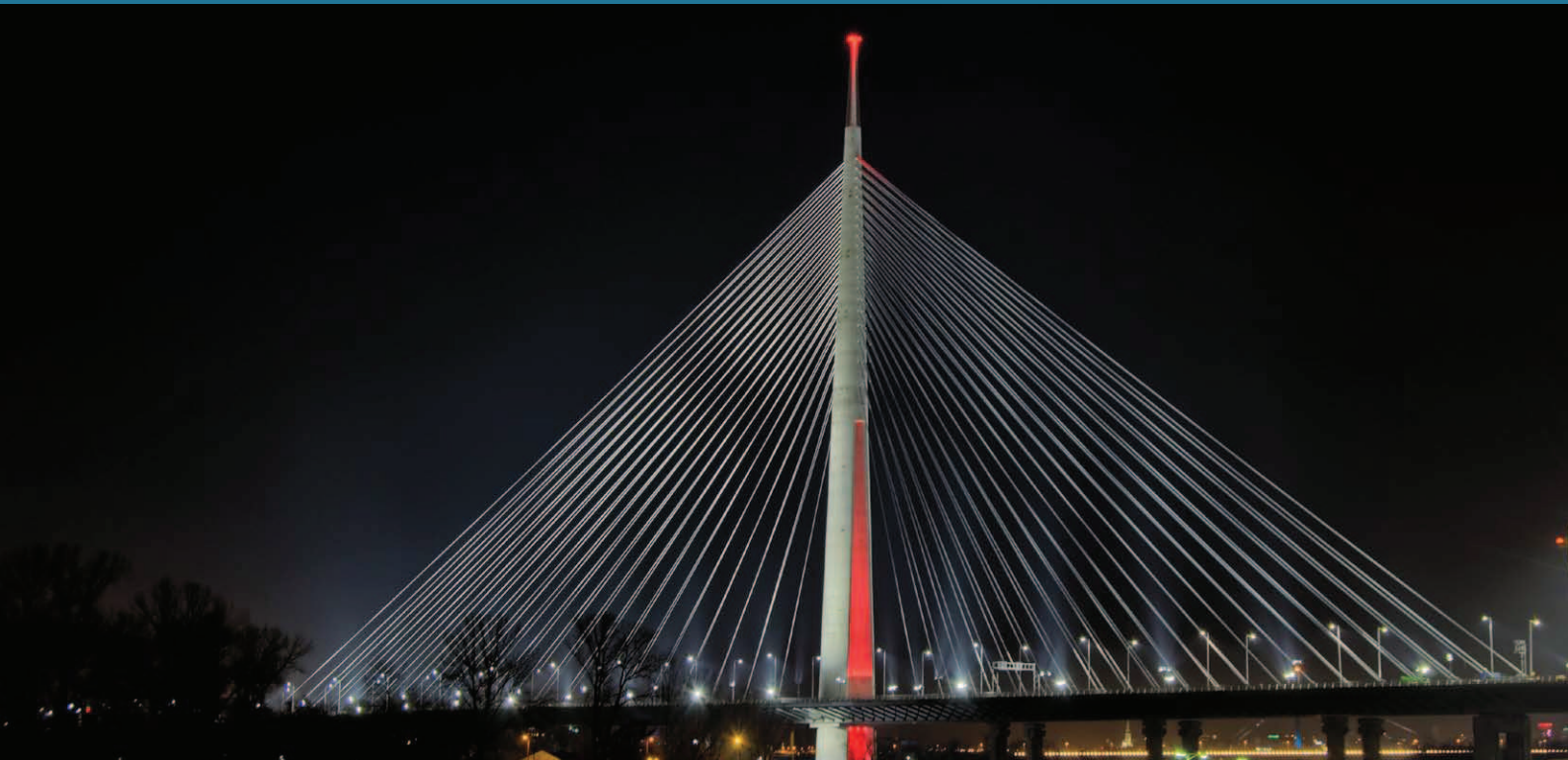


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ICTTE Belgrade 2012 Conference Director's Speech

Ladies and gentlemen, distinguished speakers and guests, dear colleagues,

I am delighted to welcome you to Belgrade and to the International Conference on Traffic and Transport Engineering, 2012. It is a pleasure to be here with you today at the beginning of this two-day conference on traffic and transport engineering.

This conference presents the perfect example of globalization in transportation industry. Nothing illustrates this better than the number of papers from more than 20 countries worldwide. I hope that many conclusions made here will be the key drivers of future development in global transport sector for passengers, cargo and infrastructure.

Naturally, we are ready to share our experience of creating what we think is the world's largest and most successful example of transportation industry in all transport modes.

By providing essential transport links, between ourselves, our companies, universities and countries, we are vital part of global community for integrating and connecting regions all over the world.

International Conference on Traffic and Transport Engineering, ICTTE Belgrade 2012, will be the first conference organized by Scientific Research Center Ltd and its International Journal for Traffic and Transport Engineering (IJTTE). My special thanks and encouragement in their work go to our dear colleagues and friends, key speakers, as well as to our partners: City Net Ltd., South-East Europe Transport Observatory (SEETO), "Kirilo Savić" Institute and Innovation Center - Faculty of mechanical engineering, University of Belgrade. And finally, I would like to mention great support from Center for the promotion of science, and Faculty of transport and traffic engineering, University of Belgrade thanks to which we are jointly hosting this conference.

I wish us all fruitful exchanges during these two days; constructive, testing ideas and identification of the steps we will be taking in the future.

Thank you for your attention.

ICTTE 2012 Director

Dr Olja Cokorilo

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HUMAN RESOURCES MANAGEMENT SYSTEMS IN THE LOGISTIC CHAIN

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Abstract: Developmental trends in the modern economy require a new approach to resource management through logistics and supply chains optimization. Ever-expanding logistics market demands a different approach to key potential of the economy development, and those are employees with their knowledge and skills. Strengthening of human creativity, innovation and efficiency increases organizational skills and the creation of logistics intellectual capital, which includes three important components such as: human capital, structural capital and customer capital. A well-organized human resource management enables companies to achieve competitive advantage, increase productivity, market share, reduce costs and increase profit of the companies in the logistics chain. To achieve the goals and mission of the company's strategy is necessary to build a quality motivational system based on motivational techniques that correspond to each company or corporation in the entire logistics chain. Motivational system can be based on a variety of motivational techniques, such as: material compensation, intangible compensation, benefits, creativity encouragement. Based on these assumptions, it is necessary to create incentive systems for human resources management, which increase efficiency, creativity and greater business efficiency and competitiveness of logistics companies in the supply chain.

Keywords: The Logistics Market, Supply Chains, Logistics Intellectual Capital, Logistics Management, Motivational System, Motivational Techniques

1. Introduction

Development trends in the modern economy imply human resource management in logistics as a requirement of supply chain optimization. Logistics companies integrate different logistics functions that can be divided into primary and supporting functions, of which the most important are transportation, inventory and order management production support and maintenance of constant quality products and services, supply of material resources and informational support. Supporting functions are storage, processing freight, packing, reverse logistics and after-sales. Employees within the contemporary logistics markets represent a fundamental resource development business and the basis of competitive advantage over other companies. The complex and demanding business environment limits the scope for the market ratios of the company which can be compensated for development and investment in human resources, acquiring new knowledge and skills.

Investment in human resources is an imperative in order to achieve competitive advantage which in times of economic crisis is generally neglected because companies are trying to survive the crisis, and in fact the investment planning and selection of human resources can increase efficiency and getting out of the crisis faster. Professional development of managers and workers in logistics encourages competitiveness, creativity in finding new competitive products and services, has appeared on the market and achieve better business and financial results.

Human Resources Management in the medium developed markets as in Croatia, are still not stable in basic conditions of business, but it depends on various factors such as the lack of overall strategic and sector strategies, underdeveloped capital markets, the impact of the crisis in the environment, excessive influence administration and other negative factors.

Motivational system as both material and immaterial compensation of employees in logistics is not clearly established because the collective agreements, tax conditions and financial performance are subject to frequent changes and impacts, the external environment of the company.

Encouraging the development of creativity in Croatian logistics companies analyzed through monitoring and evaluation of work performance, and results obtained are indicators of management success of logistics companies.

2. Analysis of human resources management in logistics companies

Achieving competitive capabilities and performance of logistics companies in the logistics chain linking primary production to final consumption depends on the position in the market, competition, and the most creativity and leadership staff.

A company that constantly innovates and expands the range of its products and services, while maintaining a stable quality, can maintain or expand its position in the market, based on investment in human resources at its disposal and management.

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2.1. Achieving competitive advantage of logistics companies by investing in human resources

Employees within the contemporary logistics markets are the primary development resource based business and competitive advantage. Inside the complex, uncertain and challenging business environment to increase market share of the company is directly dependent on the development of resources, knowledge and skills to new employees. With the numerous factors that influence the optimization of logistics services (geographical and traffic, economic, technological, organizational, historical, religious, etc.), human resources in the last ten years represent one of the primary factors.

How knowledge is produced and resources, rather than natural, as the main resource development and distribution of global wealth has changed in recent decades, and the majority of wealth in developed countries with a low content of natural and a significant proportion of human and produced capital. According to research in industrialized countries during the engagement of circulating capital in the direct production of 5% - 10% of the total time in the process of playing the rest of the 90% - 95% are on hold, handling and transport, and logistics, which means that the factor of increasing the competitiveness of Contemporary company lies in optimizing logistics services (Šamanovic, 1994). Increasing the quality of logistics services while lowering costs and creating a fluid organizational structure that can anticipate and timely respond to market requirements, is only possible by investing in the quality of human resources in order to find new ways of adding value logistics services.

U.S. consulting firm A.T. Kearney uses an index of global logistics operation (Global Logistics Performance Index - LPI) developed by the World Bank (2009) to rank the countries in the logistic operations. Seven indicators covered by the index include: customs, infrastructure, and international transport, logistics competence, tracking of goods, domestic logistics costs and timeliness of delivery of the items to the desired destination. The index is a comparison of the average performance of 150 countries according to these indicators and rating the quality of individual indicators nominal scale (ranging from 1 to 5, where 1 is the worst and 5 the best score) as well as the ranking of the country compared to other countries. According to the index logistical implementation, the leading country in the logistics operation is Singapore (LPI value = 4.19), while Croatia is on the 63 place with the LPI value of 2.71 (Fig. 1). From these indicators, Croatia is most notable on delivery shipments in the desired destination, with the score value of 3.45 (Renko et al., 2009).

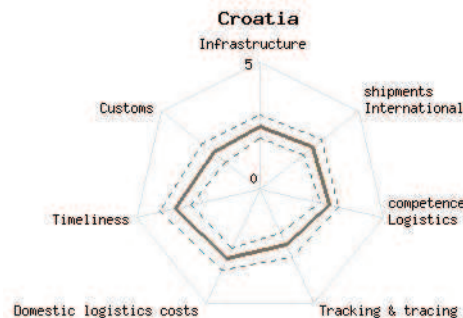


Fig. 1.

LPI value index in Croatia

Source: The World Bank (2009): „Country scorecard Croatia“

Contemporary Conditions organizations focus attention on the degree of knowledge, experience and creativity of employees, entrepreneurial spirit, flexibility and acceptance as a new basis for achieving competitiveness and success. Only creative and inventive managers can make decisions quickly and efficiently, and an optimal mix of human and financial resources, putting resources into operation logistics companies able to market logistics services (Zelenika and Pupovac, 2001). Creative logistics manager is responsible for business development and logistics companies. Innovation and creativity involve strategic action, creating alliances and encourage the development and change.

There has been a certain lack of knowledge and skills within the logistics activities with different shares in European and global opportunities. Developed economies in determining the insufficient level of knowledge logistics organize training packages to help increase the level of knowledge of employees impacted by the increase in business performance.

2.2. Planning and selection of human resources in supply chain and logistics

Human resources management plays a more prominent place in the organizational chart logistics companies although many companies still prevails declarative rather than their actual orientation of the employees. Quality human resource management and development through attracting employees provide support for the realization of competitive advantages, increasing productivity and financial results.

Organization of the Human Resources Department can be vertical, which is also commonly applied form in Croatia (Croatian Railways, Croatian Post) and the horizontal. Managers of human resources services and have an advisory role within the organization and can have functional responsibility or make and implement decisions within a specific area.

Prevailing models of human resource management in the logistics companies are (Zelenika and Pupovac, 2001):

- The model of administrative efficiency emphasis on administrative activities and staff is not treated as a source of competitive advantage. The primary tasks of this model are to reduce absenteeism, information and scheduling of workers, rights of employment, termination, litigation management, organization, payroll and the like.
- Partially strategic model includes providing necessary information on human resources management, or information about the possible implications of various strategic plans on human resources.
- The model is characterized by professional management support for the involvement of human resources in the process of strategic planning. This model is most applicable to companies with a large number of employees with college ready, aimed at increasing the quality of logistics services to build their competitiveness on innovation and knowledge of employees.

Planning the number and structure of employees in logistics companies includes an analysis of market structure, the degree of liberalization, competition, competitiveness and vision of the organization and its objectives, trends in the labor market, labor relations legislation, predicting trades workforce, due to the introduction of modern technology, new means of transport and working procedures and preparation skills inventory list.

Inventory lists of skills give management insight into jobs that existing employees based on their education, work experience and qualifications can be conducted. Analysis of the structure of human resources reveals a tendency of increase / decrease in the total number of employees or the number of individual organizational units, identifies reasons for the increase / decrease in the number of employees, defining the existing staff qualifications and desirable, necessary and funds for the realization of the desired structure, technological change and recognize the consequences will have on the existing structure of human resources, estimated the flexibility and adaptability of the organization based on the age structure, work experience and special skills, and analyzes and explores the problem of fluctuation.

The planning process of human resources provides the answer to the question: How many employees and what skills, knowledge and abilities to the logistics organization to achieve its business objectives. Way to provide the necessary structure to employees and existing employees to prepare for the future needs and requirements of the logistics market.

The selection process involves the selection of candidates to the fullest extent possible; meet the requirements of the job. Selection process prior to the determination of the key features (five to seven attributes) based on which the selection is made. Characteristics which are helpful in making the required profile of a future employee: motivation, thinking (to process information and make decisions), action (to execute tasks) and the interaction (how to communicate with others).

Logistics Companies commonly used pre, which should be as short as possible and cheaper, and can consist of filling out forms, test or interview and serves to eliminate undesirable candidates. Forms for employment gathered significant information about the candidates and serve as an aid to prepare the individual interviews. Interviews allow candidates personally meet and differ according to the number of participants, the number of pre-prepared questions and duration. Often with a narrow selection of candidates by more than one interview for optimal selection. Check health capability is often needed in jobs that require physical fitness. There are several types of tests that are applied in the selection process: tests of mental abilities, motor skills tests, mechanical tests, sensory abilities, and specific skills tests, tests of knowledge, interests and personalities.

2.3. Professional development of employees and managers in logistics

In an entrepreneurial society, individuals are before continuing need for continuous learning and development (Drucke, 1992). Individuals who were educated were the exceptions in traditional societies that were based on applying the knowledge acquired during the training by the end of its working life. In today's business environment such individuals become role models and imperatives of progress.

Education system that is in use today, with significant modifications still based on the European educational system in the seventeenth century and since today need a whole new thinking and a new approach to the challenge of improving education is highly educated adult individuals. Individuals are increasingly responsible for continuous learning and revising skills, personality development and career (Drucke, 1992). Challenges related to learning are more demanding because the skills, knowledge and production are changing at shorter intervals so that it can be expected that individuals will change over its lifetime goals and often career.

There are four approaches to employee development and a combination of approaches tailored to the specific company: formal education, assessment, work experience and interpersonal relationships. Formal education programs include programs designed for employees of the company in the form of short courses, master's degrees in business administration, university programs. Assessment includes gathering information and giving feedback to employees about their behavior, style and communication skills. Work experiences include relationships, problems, requirements, tasks, and other features with which the employees encountered during their employment. Interpersonal relationships in the form of employee development often involve mentoring (experienced employee - a mentor helps the development of less experienced colleagues - dependent) and coaching (a process in which a colleague or manager as coach working with employees in order to motivate, develop skills and provide feedback).

Human Resource Managers are made and training programs to employees and these programs should be the result of cooperation of managers and human resource managers from other logistics companies departments to achieve the performance of employees. Education and training of staff is a continuous process that should ensure the growth and development of the organization. Objectives of training and education of employees are learning with modern technologies, exploring the current state of the market, training for work in accordance with the security measures, developing work habits, creating a solid base for further career development, developing a positive attitude towards the employees themselves, by their own workplace and the organization for which they work, and to cause to be useful within your company and society as a whole. These programs can be organized within the company in the performance of managers, or they can hire experts from outside the organization.

The Research Sector Skill Councils for the Freight Logistics Industries (Skills for Logistics, 2011) resulted in interactive competence" steps" that provide a valuable tool for planning and career development within logistics organizations. This tool starts with the initial level jobs progressing to global managerial positions and can be grouped into three levels: operational, middle management and top management. Logistical steps competencies include 470 located at 34 different positions within the logistics sector.

According to the report by the Lisbon Council for Economic Competitiveness and Social Research in 2007, the Economics Human Capital Index in Croatia, Bulgaria and Poland is placed at the very bottom of the scale with respect to four criteria: the stock of human capital, its use, productivity and demographic features (EHCI, 2007). The main problem is considered a declining population, the continuous brain drain, chronically high unemployment and inadequate investment in education and skills which are specifically related to the age of 45 (Verdiš and Jurišić, 2008). Business School for logistics and inventory management of the Faculty of Transport and Traffic Sciences in Zagreb is one such initiative by a system of lifelong education officials in logistics companies offering development of the existing knowledge according to current knowledge of science and the profession.

3. Characteristics of the employee performance management practices in logistics companies in Croatia

3.1. Motivational system in logistics companies in Croatia

Research motivation and satisfaction of employees should be a significant factor in any human resource strategy for several reasons. First, the company acquires the ability to track trends in the level of employee satisfaction through a certain period of time and through acquired knowledge has the ability to create and use appropriate techniques to prevent voluntary turnover. Second, systematic testing company acquires satisfaction findings on the effects of changes within the organization (change in business policy, personnel, etc.) on employee attitudes. Thirdly, the use of standardized instruments (questionnaires, etc.) gives the company the possibility of comparison with its competitors and use insights gained to achieve the desired level of satisfaction. Fourth, insights allow control between business units and selection of the best practices that can be applied at all levels. Fifth, employees are given the opportunity to express their thoughts and concerns in the workplace, which gives them more opportunities to resolve them. It is crucial to a company that conducts employee satisfaction survey is ready to act on the basis of the information gathered. In the process of employee motivation in logistic companies and businesses operating in the supply chain, it is necessary to elaborate the elements that can affect employee motivation and increase the company's fortunes. Very often, we assume that the wages fundamental motivating factor, but studies that have been conducted in this study through a questionnaire that contains up to 40 questions that affect the motivation and other factors.

3.2. Tangible and intangible compensation in logistics companies in Croatia

As a first indication of the motivational systems in logistic companies take the regularity of conducting investigations of employee satisfaction and confidence of respondents to the motivational system that is in the application best suited to their company.

In Croatia logistics organizations motivational system is only partly based on the features of each company separately. Motivational techniques by 66% of respondents report their company (including a 33% full and 33% partial) while 33% is worth the contrary, the motivational system is not appropriate for their company. 33% of companies regularly conduct employee satisfaction survey and as many as 66% never or very rarely.

Research shows that Croatian companies devote most attention to the mandatory pension and health insurance (100% of companies). 100% company paid reimbursements and Christmas bonuses, of which 83% regularly. 83% of companies take into account the internal pay equity and 66% on the outside. Wage levels affect the employer's ability to attract, motivate and retain the best employees who will invest the optimal level of effort to achieve the objectives of employers.

In 66% of the surveyed companies, there are fixed and variable pay and the same shall ensure that employees are clear grounds and criteria for the variable part of the salary. Of that 50% of companies use the system to reward teamwork versus 16% of the companies applying for the bonus system based on individual performance. Only 16% of company loyalty rewards and 33% of companies reward learning different skills. 16% offer subsistence and other insurance. Most employees in 83% of companies have permanent contracts.

Permanent contracts in the Republic of Croatia, as well as EU member states are still fundamental form of hiring workers. The research results indicate the high level of awareness in Croatian logistics companies on the importance of job security for their employees.

83% of companies are investing in employee education. We have no data for those groups of employees are most invested in education, however, and without this information the results are optimistic.

83% of the company ensures that the goals are clear about achievable, allowing independence in performing tasks, invest in an external image of the company through an elaborate marketing strategy.

66% of companies provide some of the benefits (discounts on some of the company's products, membership interest clubs, paid time off and absence that are not included in the annual leave, use of a company car, some form of care for children and the elderly, such as the company's nursery and dependent children, seminars for retirees, etc.). These benefits fall into one of the most used in Croatia with the benefits provided meals (restaurants, vending machines food) covered travel expenses, paid accommodation and a company car which is used for private purposes. Also, 66% taking into account the working conditions suit the needs of employees, organizes seminars on teamwork, invests in managers through some of the programs (such as internships, visits to targeted organizations, consultation, organized with the help of self-education, organization of seminars and specializations covering costs and graduate studies), provides the opportunity to participate in setting goals and decision making, and their managers take into account differences in personality, needs and attitudes of employees when assigning certain activities.

50% of companies awarded an impressive title in workplaces that allow it.

33% of companies provide opportunities to expand work assignments, advancement through internal recruitment and their managers use an oral or a written acknowledgment.

In only 16% of companies there is a possibility of the property, carried out enrichment work tasks that were previously performed superior, formed an autonomous working groups and offers one of the following: the division of work between two or more employees with part-time in a job, the ability to work distance learning, flexible working hours. Possibility of profit sharing for employees and job rotation is not applicable, no company.

4. Creativity development in logistics companies in Croatia

4.1. Monitoring and evaluation of work performance

Basis for monitoring and evaluating the work performance of employees creativity development that can stimulate a variety of ways, such as bonuses, rewarding creativity and innovation.

Unfortunately very few companies, only 33% of the rewards creative achievements and innovation, while only 16% of companies use some of the analytical techniques or creative group has formed to find new creative ideas, and none of the companies surveyed by no rules of inventions and patents.

Monitoring and evaluation of employee performance carried 66% of the company.

50% of companies use some of these techniques to evaluate the work performance of its employees and provides feedback to employees about the results of the assessment.

The analysis showed that almost is not applicable employee satisfaction survey, the tangible and intangible compensation is mostly related to the satisfaction of the need for job security while the higher-order needs are ignored. Monitoring and evaluating work performance of the companies performed only while the development of creativity in their infancy. Given the results of the opinion that the first hypothesis should be accepted and concluded that logistics companies in Croatia with underdeveloped function of management for Employee Performance.

4.2. Indicators of Performance Management in logistics companies

Indicators of success of business analyzed in this study were: total income, profit after tax, the share of income in the total income, the share of income on equity (ROE Return on equity / return on equity shows how much profit per capital invested curve, ROE = net profit / capital) and the relationship between profit to total assets (ROA Return on assets / return on assets, ROA = net income / total assets). The financial statements for year 2009 for each of the surveyed companies take with the Register publicly available annual financial report (RGFI). On the Internet, everyone, starting with the business year 2008 year, available financial statements and other documents that the contractors according to Article 20 Labor Law, shall provide for publication of the annual financial statements of the Register kept by FINA.

Correlation analyzes were performed using IBM SPSS Statistical Software Data showed the following: 1) the total revenues of the company are associated with the existence of the bonus for individual results and the possibility of employee profit sharing 2) profit after tax associated with the possession of the invention Regulations 3) share gain in total revenue associated with the possession of regulation on inventions 4) ROE was significantly associated with 7 variables and 5) ROA was significantly associated with owning ordinances invention and use of analytical techniques and creative groups to come up with new ideas. Dependent variables and objective indicators of success associated with 8 independent variables. Ownership rules of inventions associated with the four indicators of success, which indicates the importance Croatian logistics companies should devote this indicator².

Table 1
Objective performance indicators in correlation with the results of research in logistics companies in Croatia

Statement	Indicators of success				
	1	2	3	4	5
We apply the system of bonuses in the form of cash payments based on individual employee performance.	X			X	X
There is a possibility of profit sharing for employees to participate in improved business performance.	X			X	
Our company invests in employees training on one of the following ways: by covering the cost of tuitions and scholarships, granting leave (one day to several months) for the needs of education, organization of seminars or investing in professional and technical training.				X	
Our managers use oral or writing recognitions for employees as a form of feedback.				X	
In our company, there is at least one of the following options: the division of work between two or more employees with part-time in one job, the possibility of teleworking, flexible working hours.				X	
We allow the formation of autonomous work groups responsible for the implementation of specific projects.				X	
We own rules of inventions.		X	X	X	X
When there is a need for creative ideas we use analytical techniques (listing, Input – Output, pro and con), or organize creative groups (Brainstorming, Gordon technique, Hum Groups)					X

Source: Made by authors

² Var 15 – Pearson coefficients 0,834, Kendall's tau_b coefficients 0,775, Spearman's rho 0,845

Var 23 - Pearson coefficients -, Kendall's tau_b coefficients 0,856, Spearman's rho 0,926

Var 26 - Pearson coefficients -, Kendall's tau_b coefficients 0,856, Spearman's rho 0,926

Var 31 - Pearson coefficients 0,864

Var 32 - Pearson coefficients 0,906

Var 36 - Pearson coefficients 0,914, Kendall's tau_b coefficients 0,775, 0,775, 0,775, 0,802 Spearman's rho 0,878, 0,878, 0,878, 0,891

Var 37 - Pearson coefficients 0,814

On the basis of the indicators we conclude that the successful logistics companies in Croatia (Table 1) reward individual results and allow employees to participate in the profits. In these companies invest in employee education through some of the existing programs, there is a possibility of flexible working hours in order to allow employees balance work and private life. Managers use oral or written confession and implicated in the formation of autonomous work groups and creative groups that will generate innovative ideas. Successful logistics companies have rules about inventions. Results of statistical analysis showed an association between seven indicators of management success and objective indicators of financial performance of the company and gave guidelines for further action and improvement of the existing system of human resource management on the basis of which we conclude that the second hypothesis should be accepted.

3. Conclusion

The realization of the strategic potential of logistics and its role in the logistics supply chain, which is presented in a continuous improvement of the flow of goods and services, it is possible through the integration of key components of the logistics system. An important internal factor for competitive advantage and performance of logistics companies in the structure of the supply chain consists of four basic resources, such as: financially, physically (material resources), and systematic human and technological resources.

Human resources in the logistics and supply chain management are fundamental to the success of the assumption of a high level of knowledge, skills and competencies of employees, whose creativity and dedication we have to stimulate the various tools and models.

In the global market of individual functions and activities are geographically dispersed, including a growing number of participants in the logistics supply chain, different payment systems (currency), macroeconomic risk (crisis), mismatch of infrastructure, laws and standards on environmental and consumer protection, different standards products, and there is a gap under the influence of cultural habits of the population of some countries, which emphasizes coordination of logistics activities that may have a significant impact on business performance.

The introduction of new, highly sophisticated technologies that have a huge impact on the quality of logistics services and customer-supplier, require a high level of knowledge of staff who can offer solutions to customers by prime ministers, identify requirements and needs and find the appropriate range of logistics solutions and services. Performance management of human resources working in the logistics companies in Croatia can leverage to better business performance and achieve competitive advantage in the market through increased satisfaction and employee motivation.

The results of the statistical analysis presented in this paper, have shown an association between seven indicators of management success, financial results, and all provides guidelines for future action and improvement of the existing system of human resource management.

The results of studies and surveys have shown that successful logistics companies should encourage and reward individual and group results and enable employees to participate in the profits of the company. You need to invest in various forms of education, such as external logistics schools, seminars, forums, postgraduate studies, and internally through the stimulation of what awaits them in the market, team building and other forms of lifelong learning.

Managers should provide for flexible working hours in order to create balance work and private life, then use oral and written confession successful individuals, creative and autonomous working groups that will generate new and innovative ideas. It is very important that logistics firms adopt ordinances on inventions and patents, and various forms of innovation to further stimulate employees to improve logistics and logistics processes in logistics companies and logistics supply chains.

References

- Analiza poslovanja poduzetnika prijevoza, skladištenja i veza RH u 2007. Godini. 2008. FINA, Zagreb, Available from Internet: <<http://www.fina.hr>>
- Bahtijarević Šiber, F. 1999. *Management ljudskih potencijala*. Golden Marketnig, Zagreb
- Bloomberg, D.J.; LeMay, S.; Hanna, J.B. 2006. *Logistika*. Mate. Zagreb.
- Bogdanović, M. 2008. Prilog teoriji ljudskog kapitala: koja svojstva radne snage treba smatrati bitnim sastavnicama ljudskog kapitala, *Ekonomija*, 15(1): 45-82.
- Brčić, R. 2002. Organizacijska kultura u funkciji djelotvornosti upravne organizacije, *Ekonomski pregled*, 53(11-12): 1048 – 1069

- Cooper D.; Robertson, I.T. 2006. *Psihologija odabira zaposlenika*, Naklada Slap.
- Denali Consulting. 2009. Logistics Trends – Achieving Supply Chain Integration. Available from Internet <<http://denaliusa.com/whitepapers/41>]>
- Dil, P. 1985. *Psihologija motivacije*. Prosveta. Beograd
- Drucke, P.F. 2007. *Upravljanje u budućem društvu*. M.E.P. Consult, Zagreb.
- Drucke, P.F. 1992. *Inovacije i poduzetništvo, praksa i načela*. Globus nakladni zavod, Zagreb
- Ederer, P.; Schuller, P.; Willms, S. 2007. European Human Capital Index: The Challenge of Central and Eastern Europe, The Lisbon Council for Economic Competitiveness and Social Renewal, Available from Internet: <<http://www.lisboncouncil.net/publication/publication/41-european-human-capital-index-the-challenge-of-central-and-eastern-europe.html>>
- Edgell, S. 2006. *The sociology of work: continuity and change in paid and unpaid work*. Sage Publications Ltd.
- Edvinsson, L. 2003. *Korporacijska longituda, navigacija ekonomijom znanja*, Differo, Zagreb.
- European Human Capital Index: The Challenge of Central and Eastern Europe, the Lisbon Council for Economic Competitiveness and Social Renewal, 2007.
- Marušić, S. 2001. *Upravljanje ljudskim potencijalima*, Adeco, Zagreb.
- Miljković, D.; Rijavec, M. 2007. *Organizacijska psihologija*, Ekološki glasnik d.o.o., Donja Lomnica.
- Noe, R.A.; Hollenbeck, J.R.; Gerhart, B.; Wright, P.M. 2006. *Menadžment ljudskih potencijala-postizanje konkurentne prednosti*, Zagrebačka škola ekonomije i menadžmenta, Zagreb.
- Nordstrom, K.A.; Ridderstrale, J. 2002. *Funky Business – Kapital pleše samo s darovitima*. Differo d.o.o.
- North, K. 2008. *Upravljanje znanjem – Vođenje poduzeća usmjereno prema znanju*. Naklada Slap, Zagreb.
- Performance Index and its Indicators. 2009.
- Petar, S.; Vrhovski, I. 2004. *Ljudska strana upravljanja ljudima*. Mozaik knjiga, Zagreb.
- Petar, S. 2005. *Tamna strana upravljanja ljudima*. Medus Biro d.o.o., Zagreb.
- Renko, S.; Fičko, D.; Petljak, K. 2009. Novi logistički trendovi kao potpora maloprodaji. In Proceedings of the IX. međunarodni znanstveni skup *Poslovna logistika u suvremenom menadžmentu*, Osijek: 33-34.
- RGFI – public disclosure. Available from Internet: <<http://www.fina.hr>>
- Šamanović, J. 1994. *Mikrologistika kao funkcija gospodarenja i instrument prilagodavanja poduzeća promjenama na tržištu*, RIF. Hrvatska zajednica računovođa i financijskih djelatnika: 102.
- Skills for Logistics. 2011. Available from Internet: <<http://www.skillsforlogistics.org>>
- The World Bank. 2009. *Trade Logistics in the Global Economy – the Logistics*.
- Verdiš, M.; Jurišić, D. 2008. Cjelozivotno učenje i fleksigurnost – pozicija Hrvatske, Pravni fakultet Zagreb, katedra za ekonomsku politiku. Available from Internet: <http://www.liderpress.hr/Uploads/2475/38150/Cjelozivotno_ucenje_i_fleksigurnost_pozicija_Hrvatske.doc>
- World Bank. 2009. Available from Internet: <<http://siteresources.worldbank.org/INTTTLF/Resources/lpireport.pdf>>
- Zelenika, R.; Pupovac, D. 2001. Intelektulani kapital – razvojni resurs logističkih kompanija za 21. stoljeće, Izvorni znanstveni rad, *Ekonomski pregled*, 52(9 – 10): 1034 – 1052