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## MODELS OF INTER-ORGANIZATIONAL LOGISTICS MANAGEMENT IN SLOVENIA

### ABSTRACT

*Throughout the history, the transportation of goods and related logistics have played an important role in human development and existence. This pertains to numerous inter-linked processes, whose management is often linked to social system, international linkages, development of industry, market and market specifics. In modern times, the management of these processes is increasingly bound to globalization of production and market, moving of production to countries with cheaper labour force, environmental protection. The present Slovenian economy depends to a large extent on economies and corporate relations of the European Union and the world. Such inter-connectedness demands frequent transportation of semi-finished and finished goods. By providing timely delivery of goods, transportation consequently enables inter-organizational linkages and individual production, economic, market and other processes. Organizational and inter-organizational management of transport logistics demands profound understanding of transport flows, freight forwarding expertise and knowledge of transport, tax, environmental and other related regulations. Adequate knowledge and mastering of cultural, linguistic, national and other differences is important as well. The presented analysis and evaluation form the basis of the construction of inter-organizational model of logistics management in Slovenia.*

### KEY WORDS

*logistics; inter-organizational linkages; transport; out-sourcing;*

### 1. INTRODUCTION

Inter-organizational linkages of various business organizations enable faster industrial development, market expansion and cooperation of numerous countries. Transport and related logistic processes are service activities, which enable economy, industry, production and other organizations to overcome the time and space and which provide the delivery of

specific goods of specific quality to specific place at the specific time. They enable the exchange of goods, industrial linkages, market expansion, and globalization of production. Slovenian transport organizations that support the transport of semi-goods, industrial production, manufacture, international exchange of goods, market transports, are part of inter-organizational linkages, too.

Main logistic processes that enable inter-organizational linkages are transport, freight forwarding, preparation and acquirement of transport documentation, preparation of goods for transport, insurance, packaging of goods, loading, maintenance of traffic flows, supply. All these processes are more or less standard practice in all forms of industry and beyond. Numerous authors provide various interpretations and understanding of these processes. The bases of freight forwarding operations were described by Jakomin, Jelenc and Vlačič [1], technology of traffic and transport systems by Jakomin, Zelenika and Medeot [2], fundamentals of transportation technology by Gajšek [3], international transport and logistics by Ogorelec [4], transportation law by Pavliha and Vlačič [5], insurance law by Pavliha and Simoniti [6], management of international trade operations by David and Stewart [7], operations management by Haitzer and Render [8], intercultural communication by Lukinykh [9], global logistics and supply chain management by Mangan, Lalwani and Batcher [10], control of traffic systems and transport of raw materials by Usenik [11], fuzzy-set approach for a location-inventory model by Usenik and Bogataj [12], control of the logistics system using Laplace transforms and fuzzy logic by Usenik et al. [13] and so on. While individual processes are well-described in the scientific literature, it lacks a description of unified methodology of inter-organizational linkages, despite it being of key importance for successful organization and execution of transporta-

tion. An exception to this is presented by Zelenika and Pupovac [14], who present logistic processes in inter-organizational linkages as logistic activities, separated from direct production, manufacture or processing, maintenance, packaging, labelling, stacking, sorting, weighting, storage, filling and emptying of transport means, transport, freight forwarding, insurance, customs examination, buying and selling, distribution, management, financing. Zelenika and Pupovac came very close to the processes which form an important part of inter-organizational logistics management, but they, same as other authors, limited themselves to the individual process. Inter-organizational linkages, especially linking of transport organization with organizations which through providing their own services enable the transportation, demands harmonised linking and searching for models that would enable business excellence, success and profit in inter-organizational cooperation.

In the West, especially in the United States of America (USA), inter-organizational linkages are based on long-standing traditions and corporate associations, which merge various business organizations, industry and market and in this way ensure the commitment of the whole organization to the common goal. Good example of this is corporate association and linking in industry sector of production of motor vehicles, Ford Motors Company. Up to 1980, Ford Motors had controlled all phases of production, from output of ore to transportation, manufacturing, production preparation, production, marketing and selling. This is a mode of supply chain and logistics cost management as described by Branh [15]. In modern times Ford Motors has been reorganized and divided into various industry sectors, but their principle of working and interlinking stayed the same. Organization is still monitoring all phases, from production to selling of the final products, as described by Murtič [16].

In the East, especially in the most developed country, Japan, inter-organizational linkages developed through technological development of working processes, robotics and modelling of products. A good example is provided by the motor vehicle industry Toyota Company, which obtains raw materials on the global market, seeking a cheaper supplier. The entire organization is oriented toward a single task, production of motor vehicles, and all processes that are not direct part of production are outsourced. Nevertheless, everything is subjected to Toyota Company; the corporation coordinates all processes of supply of materials, production, supply for the market and sales. Organization does not have the need for monitoring all the processes, the organization wants quality, as described by Murtič.

Both models are very comprehensive, so therefore it is not possible to use them in the inter-organizational model of logistics management in Slovenia.

It is not possible to speak about inter-organizational model of logistics management in Europe, at least not in the sense of such strong inter-organizational linking as displayed by Ford Motors Company in USA and Toyota Company in Japan. In Europe there is multi-kind motor vehicles industry. Industry obtains raw materials on the global market in an unorganized way, multiple actors act as competitors to one another, everyone tries to protect its own market share. There is no inter-organizational linkage, at least it cannot be detected in the sphere of production, and there is even less inter-organizational linking in the sphere of transport and related logistics. The entire process of transportation is outsourced. One cannot speak about models of inter-organizational logistics management. Comparison to the US or Japan model is not possible. Market is characterized by individual organizations, dealing in organization of transport, seeking transportation capacities, obtaining business and then transferring this business to transport and other organizations, which work with such association for commission.

Hypothesis that there is no model of inter-organizational logistics management in Slovenia was offered; it demanded the analysis of inter-organizational logistics management to uncover how transport organizations in Slovenia and Europe connect to each other and if adequate model of inter-organizational logistics management perhaps does exist. Employees in companies dealing with organization and execution of transportation, their procedures in searching and connecting individual transports, were subjected to analysis. Organizations providing transportation services for the needs of the Slovenian industry, economy and market were analysed as well.

## 2. PROBLEM DEFINITION

The analysis was focused on global, mutual and inter-organizational relations through which the complete procedure of logistics management in transportation is generated. It was researched how transport and other organizations, included in the transportation of goods, inter-organizationally control logistics, preparation and execution of transport and how successful they are (annual business results). The development of the organization and the bases of that development were researched as well. The analysis was made within the framework of organizational theories; its goal was credible scientific evaluation of actual state of organizational cooperation in the transportation sector and generation of reliable orientations for the development of the model of inter-organizational logistics management, based on a specific model [16].

Research goals and objectives:

- to define the concepts of theoretical points of departure and to determine the building blocks of

inter-organizational logistics management in the area of transportation;

- to analyse the existing situation and to gain new insights into inter-dependent and interlinked area of successfulness of inter-organizational linkages in regard to the economic changes in Slovenia, Europe and the world;
- to search for building blocks of contemporary paradigms that would facilitate inter-organizational logistics management and its changes;
- to discover which model could serve as an acceptable model solution to transport and transport-related organizations;
- to develop the paradigm for the logistics management that would be useful for all stakeholders in transportation;
- to confirm or to reject the hypothesis about unified model;
- to indicate the possibilities for further development in the field of transportation services.

In order to confirm the existence or non-existence of a unified model, factors, deemed to have the most impact on current and future (desired) state, were researched. The multiannual and multilayered research provided the basis for the design of the questionnaire and for the set of adequate suppositions. These suppositions were the basis for reliable and valid measurement of data [16].

### 3. METHODS AND RESULTS

The suppositions defined in the introductory part of the research were meaningfully linked with the suppositions about the impacts on inter-organizational linkages. Each supposition served as a point of departure for several statements, later evaluated by the questionnaire. The questionnaire was designed to measure the perception of the actual (current) state as well as notions about the desired future state. Such approach has potential to reveal the discrepancy between the perception of the current and desired state. Greater discrepancy means greater opportunity for improvement which served as a point of departure for the formation of suggestions for improvement of the situation. This pertains to the development of new paradigms of post-industrial organization [16].

The pilot testing of the questionnaire was performed in 30 transport organizations in Slovenia, which enabled recognition of questions, through which the process of logistics management is generated. The final version of the questionnaire was sent to numerous transportation organizations from all Slovenian regions. The ideal sample was defined as 150 returned and correctly filled questionnaires, which was sufficient for research and data mining. Out of 150 returned questionnaires, 10 were eliminated from

further analysis (one of the organizations returned numerous identical questionnaires. These surplus questionnaires were eliminated from further analysis, since the survey was designed as 1 organization = 1 questionnaire). The remaining questionnaires sufficed for the analysis. Quantitative, factor and experimental regressive analyses were performed. The non-existence of the unified model of inter-organizational logistics management in Slovenia was to a large degree confirmed by the obtained data.

The questionnaire consisted of 50 questions, 33 of them measuring the perception and opinion of the actual state and 17 of them measuring the notions of the desired state. The first part served for the insight into the actual situation in the field of inter-organizational logistics management. The second part focused on the areas needing improvement, and on the areas that would enable identification of key building blocks of unified model of inter-organizational logistics management.

The data were analysed by statistical program SPSS 19.0, which provided deep, complex analysis. The arithmetic type of data was presented in frequency tables, while associations between variables were presented in contingency tables. Basic statistical parameters, like arithmetic mean, minimum value, maximum value and standard deviation were calculated.

The questionnaire was designed as five-item Likert-type scale; respondents rated each item on response scale 1-5, with 1 meaning "strongly disagree" and 5 meaning "strongly agree". Higher rates of individual scale items indicated the need for certain arrangement or transformation. This is clearly seen in the highest rated item on the list measuring the actual state, where the item "economic crisis negatively impacted our business" was rated 4.32, indicating the urgent need for changes and searching of adequate solutions. This was followed by the item "unified model of logistics management would be beneficial for our organization", rated 4.19, by item "in executing transport our organization always considers the demands of the client and adapts to them" rated 4.07, by item "cooperation with new and successful organizations positively impacts success of our own organization" rated 3.94. The acquired data indicate the need for development of a unified model of inter-organizational logistics management and the need for inter-organizational cooperation, tram work, cooperation with successful organizations, continual cooperation.

Similarly, data pertaining to the desired and/or future state indicates the need for timely financial transactions (rated 4.69), unified methodology for logistics management (rated 4.47), on-going cooperation (rated 4.22), etc. The analysis showed that out of 17 items in this part of the questionnaire, all but two were rated higher than 3.0, which indicates the urgent

need for changes and for more inter-organizational co-operation.

The comparison of rates from both parts of the questionnaire reveals certain discrepancies between the perception of the actual state and some aspects, estimated as important for the success and efficacy of organization. The biggest discrepancy is seen between the existing business models and the need for expertise and implementation of new, better business models. The need and the desire for changes and implementations of suitable business models, which would result in higher success and efficiency of the organization was clearly expressed by the respondents. At the same time, the respondents professed very low level of knowledge about the models being implemented by other organizations, like Toyota or General Motors. In any case, it is neither sensible nor beneficial to directly implement foreign models into Slovenian organizations. Because of this, one of the goals of the present research was to develop a new model that could satisfy specific needs of Slovenian transport organizations and facilitate the realization of their economic and business goals.

The respondents on the whole agree that the unified methodology in the field of transport would impact their business (rated 4.47). Their clearly expressed need for a useful model (rated 4.19) which would benefit their organization is of high importance. Despite their awareness of the need for business models, their actual knowledge of the already existing models is surprisingly low (Figure 1). It indicates that while they expect or desire implementation of new business models, they are at the same time reluctant to familiarize themselves with the existing foreign models. Their

knowledge of Ford Motors Company or Toyota Company models was rated with mere 2.08. Consequently, the impact of these two models on inter-organizational linkages was similarly lowly rated, with 2.31, CAT (operates as an automotive logistics company that provides cargo and vehicle logistics services) was rated with 3.32, Walter (BMW) was rated with 1.18 and Transporium with 2.11. According to data, their knowledge of the European model of division of logistics is a little better (rated 3.57), which probably results from their experiences in their everyday businesses. However, considering that many Slovenian transport organizations execute transportation in other European countries and beyond, it was expected that the knowledge or usage of the existing, albeit unnamed models, would be higher.

Unsurprisingly, respondents confirmed that the economic crisis affected negatively their business (rated 4.32). One of the biggest problems is their business partners' negligence of payment deadlines (60.7%). This poses a serious problem, as, according to the respondents, timely payments would enable successful business performance (rated 4.69).

The desire and the need for unified business model was clearly expressed by the respondents. Another important aspect of inter-organizational logistics management are interpersonal relationships between the employees within the individual organization as well as relationships between various organizations (Figure 2). Data show that much could and should be improved in that area. The respondents regarded positively the following (Figure 2): trust in employees (rated 4.14), honest discussions with employees (rated 4.06), satisfaction of employees (rated 4.02), and kind leader-

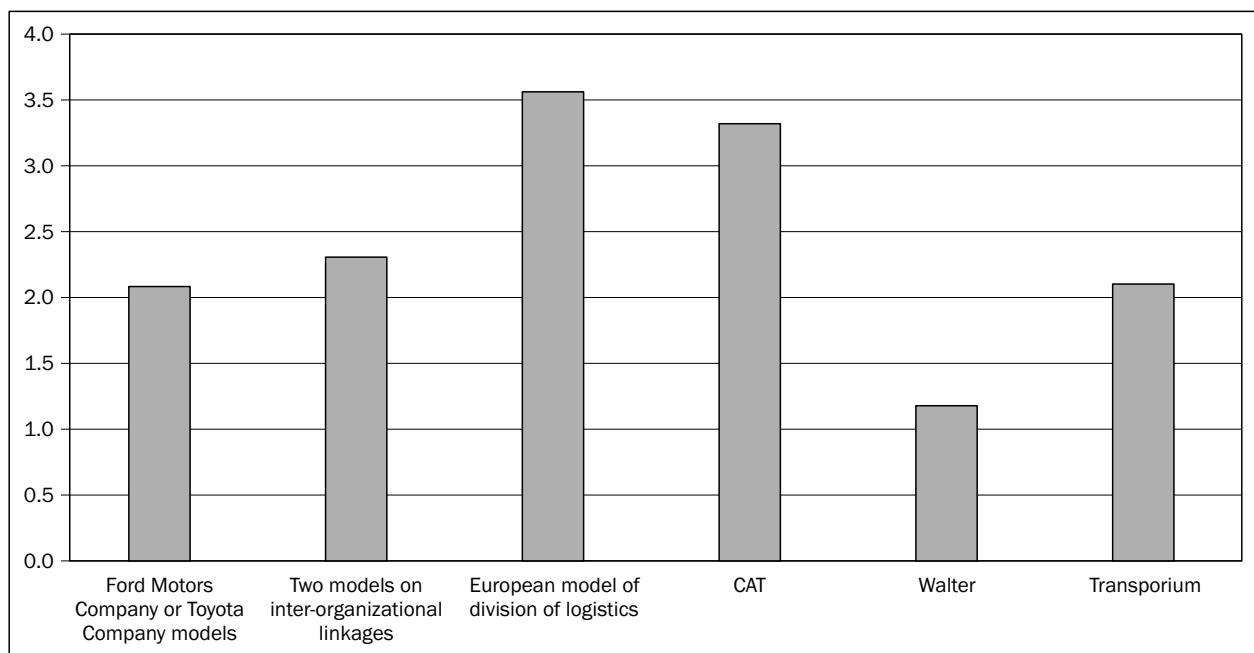


Figure 1 - Knowledge of existing models



Figure 2 - Interpersonal relationships

ship (rated 3.84). Good interpersonal relations were regarded as enabling better connectedness inter- and intra-organizations.

However, despite values expressed above, the rates of actual situation with regard to interpersonal relationships are not as high and beg for improvements; especially in the field of inter-organizational logistics management (Figure 2). The need for improvement is pronounced especially in harmonising the work rules (rated 3.4) and to a slightly lesser degree in democratic and network management of organization (rated 3.52), positive atmosphere and satisfaction (rated 3.62), understanding management (rated 3.64), honest discussions between management and workers (rated 3.66), polite resolving of conflicts (rated 3.68) and evaluation and rewards (rated 3.71).

Discrepancy between the opinion that timely financial transactions are of crucial meaning for the success of the company (rated 4.69) and between actual (un)timely payments of these same organizations of the respondents (respect of payment deadlines rated 3.80) is also quite interesting and telling. Especially in the light of the fact, that the majority of respondents (60.7%) listed financial indiscipline as one of the burning problems.

The knowledge of regulations and legislation is another area showing the need for changes and improvements. The respondents were of the opinion that adequate cooperation between transport organizations and law-makers would have an impact on the efficacy, successfulness and development of the transportation sector (rated 4.09). At the same time,

their level of knowledge about regulations is quite low (rated 3.39). They are a little better at regular checking of official journals and announcements, but not much (rated 3.79). It is probable that the respondents leave such tasks to professional bodies and legal services or external contractors who provide regular monitoring of regulations, appropriate notifying and adapting to changing rules.

The inter-organizational cooperation presents a more varied situation. The respondents largely agree that long-term inter-organizational cooperation has beneficial impact on the success (rated 4.22). There is much less agreement about the organization operating within big associations, as a condition for success and helping in providing work (rated 3.75). The actual state in the respondents' organizations does show certain forms of inter-organizational linkages and cooperation within the frames of associations, but not on a high enough level.

The rates of success in various fields show a solid situation, which could be interpreted as certain form of inter-organizational linking, but still, the situation could be improved further. The level of education of managers was rated 3.74, successfulness of organization in establishing new contacts was rated 3.81 and the quality team work was rated 3.88.

The analysis further showed that transport organizations more or less consider and adapt to the demands of the clients (rated 4.07). At the same time, the form of the organization is less adapted to the demands of the market (rated 3.37), as clients do not care about the form itself. The main goal of the client

is to get suitable, safe and quality transport service for the cheapest possible price.

Financial indiscipline and too long payment deadlines (60.7% of respondents), unfair competition (29.2%), disorderly legislation (14.3%), too high costs (11.4%) and the presence of foreign providers on the Slovenian market (10%) were listed as the most burning problems. One of the causes for financial indiscipline could be the world economic crisis. Unfair competition, disorderly legislation and the presence of foreign companies are caused by disorganization of transport organization and by the failure to control logistics.

The data were also subjected to factor analysis, mathematical method where seemingly disordered data are grouped on the basis of individual factors. This procedure reveals certain connections or deviations. Factor analysis showed that certain items (questions or statements in the questionnaire) coincide with certain factors. The strength of correlation was revealed by factor loading, which is in fact a measure of strength of correlation between certain variables and certain factors. Values of factor loading lie in the interval of -1 to +1. Values between -0.5 and 0.5 indicate that there is no correlation. Values from 0.5 to 0.7 indicate sufficient correlation; values from 0.7 to 0.8 indicate good correlation, and values above 0.8 indicate very good linear correlation (following the principle that if there is more A, then there is also more B). Negative values indicate negative linear correlation (if there is more A, then there is less B). Interpretation of individual factor is subjected to the judgement about which items coincide with a certain factor.

Factor analysis showed that 69.3% of variations of estimations of the actual situation in the organization are explained by seven components. However, these components are not equivalent, because the first component explains 18.8% of variance, the second one explains 14.48% of variance, the third one explains 8.14% of variance.

The items measured seven aspects of actual situation in transport organizations:

- factor "relationships in the company" is associated with nine items, whose factor loadings range from 0.779 to 0.510;

- factor "familiarity with models and partners" is associated with four items, whose factor loadings range from 0.695 to 0.495;
- factor "successfulness" (of management, team work, establishing contacts) is associated with three items, whose factor loadings range from 0.667 to 0.460;
- factor "transport" is associated with three items, whose factor loadings range from 0.853 to 0.615;
- factor "regulations" is associated with three items, whose factor loadings range from 0.756 to 0.512;
- last factor "cooperation with new organizations" is associated with two items, whose factor loadings are 0.728 and -0.537.

In the set of items, measuring the ideal or desired state, three components explain 61% of the variance. Components are quite balanced, as the first component explains 25.8% of variance, the second component explains 17.8% of variance and the third component explains 17.55% of variance.

Three aspects of the desired situation, as expressed by respondents, were measured (those same aspects were also partially incorporated in the items, measuring the actual situation):

- factor "relationship in the company" is associated with four items, whose factor loadings range from 0.886 to 0.718;
- factor "familiarity with models" is associated with three items, whose factor loadings range from 0.822 to 0.570;
- factor "inter-organizational cooperation" is associated with four items, whose factor loadings range from 0.809 to 0.471.

The deviance from or confirmation of individual factors or groups of factors, which explain the causes of deviation from or confirmation of individual items, pertaining to actual and desired state in inter-organizational logistics management, were used as a mean to find key factors that variably change the situation.

Table 1 presents a sample of regression analysis of dependent and independent variables, in which the causative factors were searched for. In the relationship between ascertained variances of actual and desired state it was reasonable to search for those variances that indicate the causes of deviation or unity of individual variances in regard to the causative factor. Complete regression analysis would not be appropriate, as causes for actual state were continually

Table 1 - Variance inflation factor is within acceptable ranges: 1.40, 1.88, 1.95

	Tolerance	Variance-Inf fac	R square	f1 income-Beta in	f1 income-Partial	f1 income-Semi	f1 income-t	f1 income-p
f5	0.881405	1.134552	0.118595	-0.553224	-0.53907	-0.519385	-6.8933	0
f6	0.824241	1.213237	0.175759	0.307124	0.324951	0.278831	3.70066	0.00033
f7	0.772162	1.295065	0.227838	0.19867	0.210316	0.174577	2.31699	0.022259

changing, which was consequently continually changing the research data. The sample of *regression analysis*, performed on the data from a limited time period, revealed independent and dependent variables in regard to variance inflation factor, which presented itself within acceptable ranges - 1.40, 1.88, 1.95. Independent variables are presented by f1-f7, latent factor from factor analysis and dependent variables are presented by f1 income,  $R^2 = 0.32$ ,  $p = 0.00000***$ , f5, f6, f7 are statistically significantly correlated to f1 income, partial coefficients, which is expressed in -0.468,  $p = 0.000000$ , 0.343  $p = 0.00018$  and 0.260  $p = 0.00050$ . This information shows that variance inflation factor is within acceptable range: 1.40, 1.88, 1.95. Prediction equation for "f1 income" "f1 income" = -39039126, -87010536, \*f5 + 66251209,8 \*f6 + 39473037,2 \*f7".

#### 4. FINAL ANALYSIS

The results of quantitative, factor and causal regression analyses indicate that while certain linkages between transport organizations, which enable the performance of transportation, do exist, these linkages are also very narrowly linked only to transportation itself and not to other logistic processes. The majority of variances confirmed the hypothesis that one cannot speak about unified model of inter-organizational logistics management in Slovenia, as such model simply does not exist. This confirms the opinion that the majority of inter-organizational linkages runs through the system of mutual acquaintances, which enables the conduction of transportation affairs. Only a smaller part of transport organizations is included into international organizations that actually take over and organize the transportation.

The presented finding is based on the estimation that a unified model of inter-organizational logistics management would lead to the simplification of the procedures, organization and transport as a whole. Individual transport organizations would perform only those tasks within the transportation, for which they have suitable knowledge and means. All organizations should have equal chance to reach individual offers and individual transports. Perceiving certain organizations as better on the basis of acquired certificates of business excellence does not reflect the uniform state of business in the field of transportation, and business excellence of the entire transport sector in Slovenia is reflected even less. Business excellence can serve only as an example of good practice, which can be used and transferred to other organizations.

Throughout the research it became clear that the logistics management in transport is not an easy task; on the contrary, it demands expertise and management of inter-organizational, economic, interpersonal,

intercultural, linguistic, professional, educational and other differences, without which the organization of production, provision of materials or performance of other needed processes is not possible. Transport logistics in international industry, economy, trade and global society are without doubt the processes that are necessary for business in the modern world, for international linkages, for successful globalization, for integration and modernization of human environment [16].

The research data reveal the state which is unfavourable for the Slovenian transport organizations and confirms the hypothesis about the non-existence of a unified model. The respondents expressed the need for improvement and the readiness to accept the unified model, if such model would lead to the improvement of their business.

#### 5. CONCLUSION

The presented paper deals with models of inter-organizational logistics management and tries to place these models into the Slovenian environment. Within the frames of research, the review of inter-organizational logistics management in the field of transport in the USA (analysis of Ford Motors Company) and in Japan (analysis of Toyota Company) was made. In Europe there is hardly a form or model of inter-organizational logistics management, despite numerous organizations, whose primary activity is transportation.

The findings in the survey process were the basis for searching new building elements and the preparation of modern paradigm, which allows creation of a new suitable model. The wide accepted model could be offered to all the participant in traffic in a form of regulation, suitable education or as a model of successful practice. The government, especially, The Chamber of Industry and Commerce should create equal chances of inter-organizational logistic processes management in transport and for this purpose should prepare the location basis for logistic activities. The government can do this with a development plan by which it would locate the logistic centres that would support the transport activity. Slovenia could become a unique and whole logistic platform, which is enabled by its geographical location.

The determination of unsettled status is a suitable basis for reorganization and division of transport area as is the basis for the establishment of organization or association which would secure common inter-organizational logistic processes management. Statistic, factor and regression analysis of data provided enough basis and arguments for a new paradigm preparation, which would be a guidance to companies, individuals in inter-organizational logistics management. The model of inter-organizational logistics management is

a contribution of science in the field of traffic and logistics and will partially help to set the status in this area.

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## POVZETEK

### MODELI INTRA-ORGANIZACIJSKEGA LOGISTIČNEGA MANAGEMENTA V SLOVENIJI

*Skozi zgodovino je prevoz blaga in s tem v povezavi z logistiko igral pomembno vlogo v človeškem razvoju in obstoju. To se nanaša na številne medsebojno povezane procese, katerih upravljanje je pogosto povezano z družbenim sistemom, mednarodnimi povezavami, razvoju industrije, trga in specifične le tega. V sodobnem času, je obvladovanje teh procesov vse bolj vezano na globalizacijo proizvodnje in trga, ki se giblje od proizvodnje v države s cenejšo delovno silo z okoljskim protekcionizmom.*

*Slovensko gospodarstvo je v veliki meri odvisno od gospodarstva in korporativnih odnosov v Evropski uniji in svetu. Takšna medsebojna povezanost zahteva pogoste prevoze polizdelkov in končnih izdelkov. Z zagotavljanjem pravočasne dostave blaga, transport posledično omogoča medorganizacijske povezave in individualno proizvodnjo, gospodarstva, trga in druge postopke.*

*Organizacijsko in medorganizacijsko upravljanje logistike zahteva globoko razumevanje prometnih tokov, špedicijo in strokovnega znanja o prometu, davkih, okoljskih in drugih povezanih predpisov. Ustrezno znanje in obvladovanje kulturnih, jezikovnih, nacionalnih in drugih razlik, je ravno tako pomembno.*

*Predstavljena analiza in ocena je osnova za gradnjo medorganizacijskega modela logističnega upravljanja v Sloveniji.*

### KLJUČNE BESEDE

*Logistika; inter-organizacijske povezave; transport; zunanji transport;*

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