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EVALUATION OF LOGISTICS CENTRES ESTABLISHMENT: EXTERNAL AND INTERNAL FACTORS

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Abstract. One of the most important research objects in comprehensive theories of strategic management for theoreticians and representatives of logistics is making appropriate competitive strategic decisions and achieving a competitive advantage in dynamic and uncertain business environment. The aim of the topic is to create the conceptual model of evaluation of logistics centres establishment, which allows complex assessment of external and internal factors of competition of logistics centres. The proposed conceptual model of evaluation of logistics centres establishment consists of three main stages: identification of external and internal factors of logistics centre establishment; assessment of external and internal factors; estimation of external and internal factors. Different research methods were applied to reach the aim of the topic: analysis of scientific literature, comparative analysis, systems analysis, methods of conceptual synthesis, multiple criteria assessment, and expert evaluation.

Keywords: logistics centre, establishment, external and internal factors, evaluation, conceptual model.

JEL Classification: M00, M01.

LOGISTIKOS CENTRŲ KŪRIMO VERTINIMAS: IŠORINIAI IR VIDINIAI VEIKSNIAI

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Santrauka. Vienas iš pagrindinių šiuolaikinių strateginio valdymo mokslininkų ir verslo atstovų interesų objektų yra tinkamų konkuravimo strateginių sprendimų priėmimas bei konkurencinių pranašumų pasiekimas dinamiškoje ir neapibrėžtoje verslo aplinkoje. Probleminiai klausimai – ar organizacija pasirinks tinkamą konkuravimo strategiją ir dėl to sukurs konkurencinių pranašumų, priklauso nuo kompleksinio logistikos centro kūrimo išorinių ir vidinių veiksnių vertinimo. Šio straipsnio tikslas – sukurti koncepcinį logistikos centro kūrimo vertinimo modelį, kuris sudarytų prielaidas kompleksiškai įvertinti išorinius ir vidinius logistikos centro kūrimo veiksnius. Šio tyrimo rezultatas – koncepcinis logistikos centro kūrimo vertinimo modelis, kuris pasižymi integruotu logistikos centro kūrimo veiksnių (išorinių ir vidinių) vertinimu. Šio vertinimo rezultatai sudaro prielaidas formuoti, vertinti ir parinkti strateginius konkuravimo sprendimus. Tyrimo tikslui įgyvendinti taikyta mokslinės literatūros analizė, lyginamoji analizė, sisteminė analizė, sintezės metodai, daugiakriterinio vertinimo metodai, ekspertinis vertinimas.

Reikšminiai žodžiai: logistikos centras, steigimas, išoriniai ir vidiniai veiksniai, vertinimas, koncepcinis modelis.

1. Introduction

Dynamic changes intrinsic to the age of information have the decisive influence on competitiveness of logistics business and time has become one of the key factors in competitive struggle. Logistics business has to adjust quickly to the changed conditions of environment and use their potential more efficiently – these issues are related to formation, evaluation and selection of competitive strategic decisions.

Inappropriately formed competitive strategic decisions might have destructive consequences for an organisation. Therefore, one of the most important research objects in comprehensive theories of strategic management for theoreticians and representatives of business is making appropriate competitive strategic decisions and achieving competitive advantage in dynamic and uncertain business environment.

The choice of appropriate competitive strategy and consequently creation of competitive advantages is dependent upon complex assessment of internal and external factors of Logistics centre establishment. At this stage organisations face the problems of complex assessment of external and internal factors of Logistics centre establishment. To solve this problem, methodical instruments are needed which would lead to formation of quality competitive strategic decisions, taking into consideration the ratio of utility and costs for a business unit.

The Logistics centres establishment evaluation process is starting from formation of establishment need until estimates of the external and internal factors of Logistics centres for formation, evaluation and selection of strategic decisions. The process of formation of competitive strategic decisions consists of strategic analysis (from evaluation of external and internal factors until estimates of external and internal factors of competition) and strategy creation (from formation of the set of competitive strategic decisions until formation of the subset of competitive strategic decisions). The research object of this topic is evaluation of Logistics centres establishment: from identification of external and internal factors of competition until estimates of external and internal factors of competition.

The aim of the topic is to create the conceptual model of evaluation of Logistics centres establishment, which allows complex assessment of external and internal factors of competition of Logistics centres.

To reach the aim of the topic, the methodological triangulation – the use of different research methods and analysis of different types of data – is employed: analysis of scientific literature, comparative analysis, systems analysis, methods of conceptual synthesis, multiple criteria assessment, and expert evaluation.

The research result will be the conceptual model of evaluation of Logistics centres establishment, which is based on the synthesis of the following elements: external and internal factors of Logistics centres establishment.

2. Theoretical assumptions for conceptual model of evaluation of Logistics centres establishment

Researchers and business practitioners with the goal of finding universal, specific and practically applicable schemes for complex assessment of internal and external factors of competition continue the scientific discussion on formation of competitive strategic decisions. The questions on formation and selection of strategies are investigated by the researchers in Lithuania and abroad, e.g. Bivainis *et al.* (2009), Chlivickas *et al.* (2007, 2008), Ginevičius (2009, 2010), Ginevičius *et al.* (2010), Išoraitė (2005 2006), Raudeliūnienė (2007), Raudeliūnienė *et al.* (2007), Simongati (2010), Stein *et al.* (2010).

Comprehensive management theories give different interpretations and assessments of an enterprise, its environment and factors influencing the formation of competitive strategic decisions, therefore the researcher faces the problem of which view reflects the reality more correctly and completely (Pace, Stephan 1996; Raudeliūnienė 2007; Raudeliūnienė, Zinkevičiūtė 2007; Chlivickas, Raudeliūnienė 2007; Davidavičienė (Elskytė), Raudeliūnienė 2008; Rutkauskas 2008; Bivainis, Tunčikienė 2009; Ginevičius 2009, 2010; Ginevičius *et al.* 2010; Stein, Ginevičius 2010; Tvaronavičienė *et al.* 2008, 2010).

In the process of creation the conceptual model of evaluation of Logistics centres establishment the following scientific and practical assumptions were identified (Ye, Tiong 2000; Išoraitė 2005, 2006; Raudeliūnienė 2007; Raudeliūnienė, Zinkevičiūtė 2007; Chlivickas, Raudeliūnienė 2007, 2008; Kiisler 2008; Davidavičienė (Elskytė), Raudeliūnienė 2008; Davidavičienė (Elskytė) 2008; Bivainis, Tunčikienė 2009; Snieška *et al.* 2009; Ginevičius 2008; 2009; 2010; Ginevičius *et al.* 2010; Navickas, Malakauskaitė 2010):

- the analysis of the process of the formation of competitive strategic decisions has revealed that the major parts of this process are strategic analysis and the stages of strategy creation;
- the analysis of the process of strategic analysis revealed that the major parts of this process are evaluation of external and internal factors of competition, SWOT analysis;
- of all the elements of strategic management process, the evaluation of external and internal factors of competition is methodologically difficult to substantiate and to complete although there are quite a lot of broad models conceptualizing this process;
- the models of assessment of internal and external factors of competition are characterised by relating characteristics of the market and the resources of an

organisation and by proving the causal relationships among them;

- these models of the assessment of the competition factors lack consistent conception of how to form competitive strategic decisions and to apply them in the business practice after having assessed internal and external factors of competition;
- based on the analysis of conceptions of competitive strategies, the competitive strategy is treated as a whole competition of decisions of organization emphasizing aspects of the behaviour of the competitors, the use of internal resources and the competitive position held;
- factors of competition are defined as resources of an enterprise and opportunities in the market that create grounds for achieving a competitive advantage for an enterprise against other enterprises.

In order to assess complexly the external and internal factors of competition, structural and resource-based views on competitive advantage are applied (Raudeliūnienė 2007; Raudeliūnienė, Zinkevičiūtė 2007; Davidavičienė (Elskytė), Raudeliūnienė 2008).

The multiple criteria assessment models that allow the formation of the competition factors assessment system, the use of simple procedures, and provide more objective and flexible analysis of the competition factors are analysed. The formation of evaluation criteria system, weighting of criteria scores are treated by Lithuanian researchers like Zavadskas, Kaklauskas (1994), Ginevičius (Ginevičius 2008; 2009; 2010), Bivainis *et al.* (2009), etc.

3. Empirical assumptions of assessment of external and internal factors of Logistics centre establishment

The main external factors of Logistics centre establishment are investments in object's construction, sources and alternatives of investments, transport means, good flows influence to size of Logistics centres. All these factors are directly related to cost of establishment and also to evaluation of establishers (Meidutė 2007; Vasilis Vasiliauskas, Jakubauskas 2007).

Usually, if a Logistics centre confirms to be viable for private investments, a legal entity is formed (with private and/or public funds of the joint venture type Public Private Partnerships (PPP) scheme) that acquires the necessary land, constructs, operates and manages the Logistics centre. Also, it is charged with the negotiations and agreements with the companies, which are interested in their eventual establishment of the Logistics centre.

Therefore, the financial evaluation of a new Logistics centre is mainly performed based on the viewpoint (and interests) of the private investor. The return on the private sector investment is the major criterion for assessing the feasibility of a project financed by private and possibly public limited companies, provided that the projects are beneficial for the society (Ye, Tiong 2000; Kiisler 2008).

Generally, investment decisions on infrastructure projects are made by the public sector based on socio-economic evaluation (Tsamboulas, Kapros 2003; Schieg 2009). As the practice shows (Report of Public Private Partnerships 1997), PPP type projects need financial evaluation that takes into account uncertainties and the resulting risks.

The common methods of incorporating risk in capital investment decisions are the dual risk-return and the risk adjusted discount methods. However, most methods assume that the cash flows of the project are certain, although it is well known that actual cash flows could differ substantially from the forecasted ones (Moles, Wiliams 1995). Some have introduced methods to overcome this drawback, like the value at risk systems that comprise the Adjusted Present Value (APV) and Net Present Value (NVP) at risk (Ye, Tiong 2000; Išoraitė 2005).

This process is done in two steps: one at a macro-level and the other at the micro-level. The site identification at the macro-level is the choice of a location with no specific land boundaries, but only a broad area, usually identified with a name of a nearby locality (Baublys 2009; Mačiulis *et al.* 2009). This is necessary for the estimation of traffic to be attracted by the Logistics centre. Once the traffic forecasting is done, and then the site selection at the micro-level follows. It is concerned with the determination of the land boundaries of the Logistics centre and it is usually done with well-established methods of site selection, employing in some cases multicriteria analysis.

As for the forecasted traffic to be attracted by the Logistics centre, this is estimated with the application of appropriate models (Ye, Tiong 2000; Išoraitė 2006; Simongati 2010). However, in order to apply these models, an assumption about the costs of the services provided by the Logistics centre is needed.

Once the commodity type's volumes to be attracted by the Logistics centre are estimated, the various services to be offered can be determined. They are related to warehousing and storage, parking areas, rail / road terminal and needed equipment, loading / unloading, administration, customs, medical services, banking, food and lodging, gas refuelling, vehicle maintenance, container maintenance, security, etc. There are numerous European projects that determine such needs (TERMINET 1997; EUNET 1998; TRI 2003), whereas the IQ (1998) research project provides a good overview.

Hence, based on values provided by the above studies / research, the required services and the corresponding size of the areas and the dimensioning of buildings, equipment and other items can be determined. Hence a model is developed that combines the estimated traffic with the needed

surface and the required services. To determine the latter, assumptions about the following parameters are needed:

- ratio weight / volume for each goods type (this parameter can be provided by relevant studies (EUPOPROGRESS 1996));
- accepted minimum height of storage for each goods / transport unit (this parameter is dependent on the type of loading unit used (swap bodies that cannot be stacked, containers that can be stacked) or bulk goods that need other types of storage facilities);
- average of time that the various goods categories remain in the Logistics centre;

Finally, the last parameter can be accessed from other Logistics centre performances (Tsamboulas, Kapros 2003) or derived from short and simple market surveys.

The major internal factors of Logistics centre establishment were analysed by following scientists Tsamboulas, Kapros (2003), Meidutė (2007), Kiisler (2008):

- total surface and height of storage and warehousing covered areas;
- total surface of open air areas;
- total surface of parking areas;
- size of administrative buildings;
- surface of rail / road terminal and transhipment area;
- number and capacity of various loading / unloading equipment;
- total length of internal road network and connection to the main road network;
- total length of internal rail network and connection to the main rail network;
- total length of other technical infrastructure (electricity, telecommunications, sewage).
- The following investment cost items are estimated:
- land acquisition cost;
- total construction cost;
- the equipment acquisition costs.

These cost categories are classified as fixed costs in the evaluation methodology.

The real estate cost is defined according to the current market unit prices (€/square meter).

The estimation of construction costs is based on observed unit prices in other similar construction projects and they are grouped into construction costs for land development, buildings, transhipment terminal, acquisition of equipment, etc.

In addition to these fixed costs, there are the variably costs that are related to the operating expenses of the several facilities in the Logistics centre. They are termed 'variable', since they are dependent on the volumes using the facilities/ services.

These assumptions enabled to create the conceptual model of evaluation of Logistics centres establishment, which makes the process of forming decisions much easier. Referring to the results of conducted empirical survey on Logistics centres (Meidutė 2007), content of evaluation of external and internal factors is specified and adapted, and in the third part of article they are more detailed.

4. The conceptual model of evaluation of Logistics centres establishment

The conceptual model of evaluation of Logistics centres establishment consists of three main stages: identification of external and internal factors of Logistics centre establishment; assessment of external and internal factors; estimation of external and internal factors (adapted by Raudeliūnienė 2007) (Fig. 1).

To provide basis for the assessment of the competition factors, the methodologies of assessing competition at macro and micro levels proposed by World Economic Forum (2010) and other international institutions are analysed and adapted. Referring to the results of conducted empirical survey on Lithuanian small and medium sized enterprises and logistics expert opinion, the lists of typical external and internal competition factors and their assessment criteria are proposed.

The major external factors of Logistics centre establishment are (Fig. 2):

- the attractiveness of business conditions: technological preparation; quality of public institutions management activity; macro economic environment stability; conditions of competition; changes of price increase;
- the increase of market: total market demand; market growth rate; market profitability; cost growth of the market; average profitability of companies in the market.

The major internal factors of Logistics centre establishment are (Fig. 3):

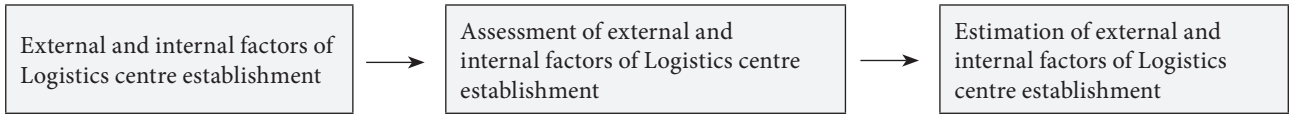

Fig. 1. The conceptual model of evaluation of Logistics centres establishment

– Logistics management centre: professional experience; professional competence to manage complex projects; innovative decisions implementation; leadership skills;
– Logistics centre infrastructure: total surface (and / or height) of Logistics centre (storage and warehousing covered; open air areas; parking area; surface of rail / road terminal and transshipment area) areas ; size of administrative buildings; number and capacity of various loading / unloading equipment and other technical (electricity, telecommunications, sewage) infrastructure; total length of internal road (road network and connection to the main road network) infrastructure; total length of internal rail network and connection to the main rail network;
– Logistics centre investments and risk management: funding; acquisition of land value; total construction cost; total purchase price of equipment; return on investment, risk assessment system.

The assessment procedure is set as follows: the group of experts is assembled, the list of primary assessment criteria is revised, weights of assessment criteria are determined, the values of criteria are assessed and normalised, the values of integrated criteria are calculated and the results of assessment are presented (Ginevičius 2008, 2009, 2010; Chlivickas, Raudeliūnienė 2008, 2007). The multiple stage system of criteria assessing external and internal competition factors is formed, which is characterised by objective and precise assessment of the competition factors and allows assessment of the main aspects of industry structure and internal resources of an enterprise.

While forming the set of criteria for the assessment of competition factors, the principle of many-sidedness of the phenomenon is observed and both qualitative and quantitative criteria are included. In order to enhance the flexibility of the assessment system for use in different market segments, the weights of the criteria and the values of primary criteria are estimated by experts, taking into consideration the particularities of a given business and a market segment.

The integrated criterion of the external factors of Logistics centre establishment E' is the weighted sum of primary (the first stage) and partial integrated (the second) criterion of external factors of Logistics centre establishment:

$$E' = \sum_i \omega_i \sum_j \omega_{ij} \cdot E_{ij} , \quad (1)$$

where ω_i – weight of the partial integrated (the second stage) criterion; ω_{ij} – weight of the primary criterion; E_{ij} – value of the primary criterion; *i, j* – index of the criterion.

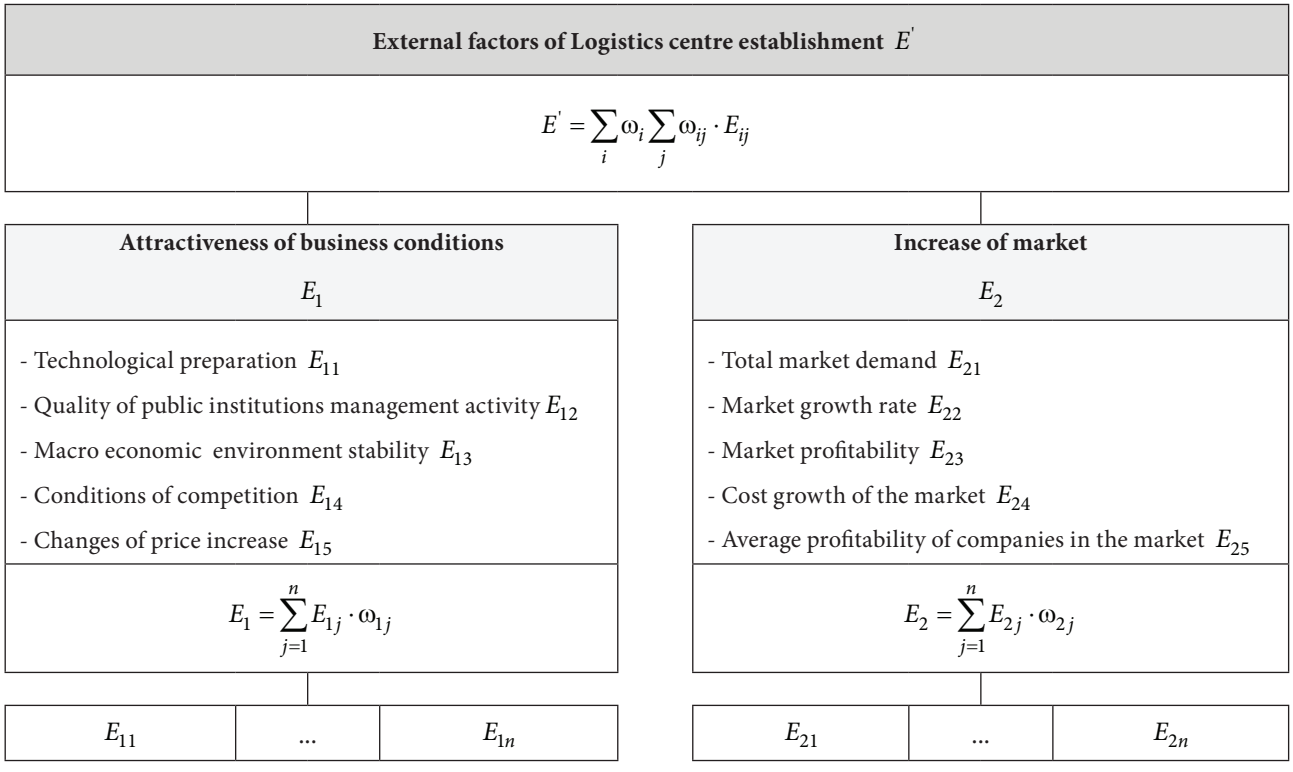

Fig. 2. Composition and consistency of the calculation of the integrated criterion of external factors of Logistics centre establishment

It follows that the integrated criterion assessing external factors of Logistics centre establishment E' shows the total score of business conditions attractiveness E_1 and increase of market E_2, with the appropriate weights assigned:

$$E' = E_1 \cdot \omega_1 + E_2 \cdot \omega_2. \quad (2)$$

The integrated criterion I' assessing the internal factors of Logistics centre establishment is the weighted sum of primary (the first stage) and partial integrated (the second) criterion of internal factors of Logistics centre establishment:

$$I' = \sum_i \omega_i \sum_j \omega_{ij} \cdot I_{ij}, \quad (3)$$

where ω_i – weight of the partial integrated (the second stage) criterion; ω_{ij} – weight of the primary criterion; I_{ij} – value of the primary criterion; i, j – index of the criterion.

It follows that the integrated criterion assessing internal factors of Logistics centre establishment I' shows the total score of Logistics management centre I_1, Logistics centre infrastructure I_2, Logistics centre investments and risk management I_3, with the appropriate weights assigned:

$$I' = I_1 \cdot \omega_1 + I_2 \cdot \omega_2 + I_3 \cdot \omega_3. \quad (4)$$

The presented multiple stage system of criteria assessing external and internal factors of Logistics centre establishment is formed, which is characterised by objective and precise assessment of the competition factors and allows assessment of the main aspects of logistics industry structure and internal resources of logistics centre activities organisation. While forming the set of criteria for the assessment of competition factors, the principle of many-sidedness of the phenomenon is observed and both qualitative and quantitative criteria are included. In order to enhance the flexibility of the assessment system for use in different market, the weights of the criteria and the values of primary criteria are estimated by experts, taking into consideration the particularities of region.

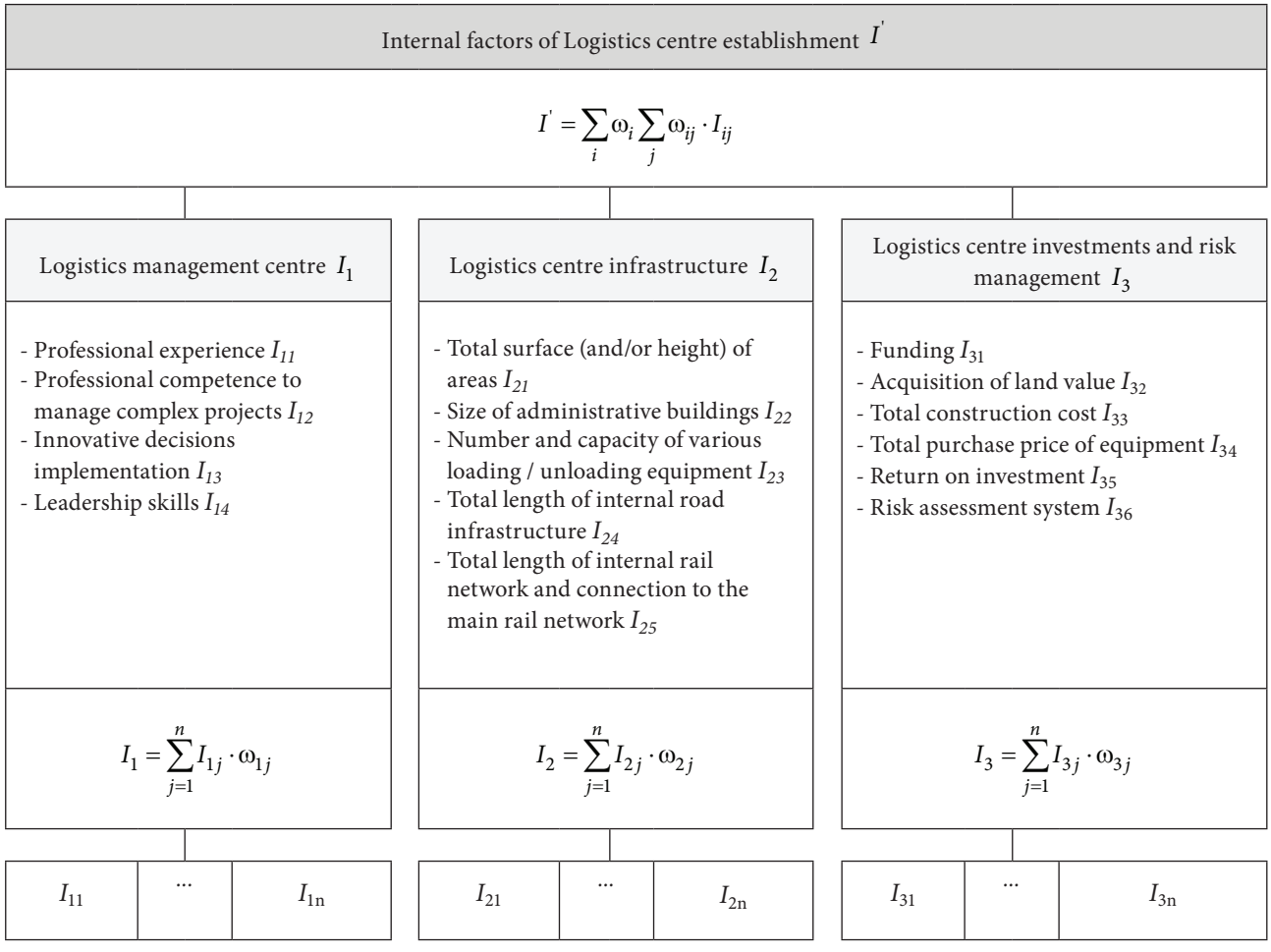

Fig. 3. Composition and consistency of the calculation of the integrated criterion of internal factors of Logistics centre establishment

6. Conclusions

Based on the conducted research the conceptual model of evaluation of Logistics centres establishment is proposed and provides means for business practitioners to form a set of competitive strategic decisions in efficient way. In the process of creation of the conceptual model the following scientific and practical conclusions are formulated.

The analysis of the process of the formation of competitive strategic decisions has revealed that the major parts of this process are strategic analysis and the stages of strategy creation. Of all the elements of strategic management process, the evaluation of external and internal factors is methodologically most difficult to substantiate and to complete although there are quite a lot of broad models conceptualizing formation of competitive strategic decisions.

The proposed conceptual model of evaluation of Logistics centres establishment consists of three main stages: identification of external and internal factors of Logistics centre establishment; assessment of external and internal factors; estimation of external and internal factors.

Having analysed external and internal factors of competition and their assessment criteria, typical lists of criteria, summing up the characteristics of industry structure and resources of an enterprise are presented. The assessment criteria are grouped by the contents and reflect the characteristics of logistics business environment and logistics expert's opinion.

Having analysed methods of multiple criteria assessment, the method of complex multiple criteria assessment is selected to assess the factors of establishment, allowing more objective and flexible analysis of external and internal factors of logistics business competition.

Based on the conducted research on empirical survey of Logistics centres, the list of dominant external and internal factors of competition and their assessment criteria is formed.

The major external factors of Logistics centre establishment are the attractiveness of business conditions (technological preparation; quality of public institutions management activity; macro economic environment stability; conditions of competition; changes of price increase) and the increase of market (total market demand; market growth rate; market profitability; cost growth of the market; average profitability of companies in the market).

The major internal factors of Logistics centre establishment are Logistics management centre (professional experience; professional competence to manage complex projects; innovative decisions implementation; leadership skills), Logistics centre infrastructure (total surface (and / or height) of Logistics centre (storage and warehousing covered; open air areas; parking; surface of rail / road terminal and transhipment area) areas; size of administrative buildings; number and capacity of various loading / unloading equipment and other technical (electricity, telecommunications, sewage) infrastructure; total length of internal road (road network and connection to the main road network) infrastructure; total length of internal rail network and connection to the main rail network; and Logistics centre investments and risk management: funding; acquisition of land value; total construction cost; total purchase price of equipment; return on investment, risk assessment system.

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