USE OF "KNOWLEDGE HOUSE", DWS, DMS AND DSS METHODOLOGY BY COMPLETING A COMPETITORS' ANALYSIS IN THE RAILWAY SECTOR

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Abstract. In completing a competitors' analysis in the railway sector by using the "Knowledge House" method, there is frequently a problem of data and information accessibility. The quality of primary information has direct influence on the quality of analytical conclusions. One more condition for the qualitative application of this method is the intellectual capital and experience of the analyst. One should note that in this regard we face another problem, that of selection of proper personnel, on the qualification of whom depends the accuracy of the evaluation and final results, on the basis of which strategic decisions are taken. The main aim of the paper is to assess the opportunities for applications of competitive intelligence methods in the railway sector. The study is using "Knowledge House", DWS, DMS, DSS methodologies.

Having analysed the scientific works the direct scientific sources of information, which are oriented to the application of the methods of competitive intelligence to the railway sector, have not been identified. The paper is absolutely original in that until now the competitive intelligence techniques have not been applied for the railway sector companies.

Considering the fact that foreign companies, which compete for freighting at the international level, are regarded as the main competitors of the railway sector, the use of the methods of the competitive intelligence becomes more important while fighting for the part of the market. The competitive intelligence methods and their application to the railway sector companies are little studied. In accordance with application of the relevant methods in other sectors, it can be assumed that these innovative approaches could have a positive impact on the competitiveness of companies in the railway sector and their income.

Keywords: "Knowledge House", DWS, DMS, DSS, TOWS methodologies, railway sector, competitor analysis.

JEL Classification: F23, F02, P21.

Introduction

Aiming at gaining of competitive advantages the companies choose various technologies to achieve their goals. Being provided with the correct and valuable information is considered to be the one of the most important factors in such fight. The more ac-

curate information is the more correct and effective the decisions towards the rivals are taken. The choice of the methods, which are used in order to obtain the competitive advantage, is quite wide so this publication presents the analysis of the "Knowledge House" method, which, in our opinion, is among the most effective ones, but has not been studied thoroughly. The method, which is selected to make a study, is applied by the largest companies in the world; it is also usually used by former specialists of secret service. The method has such special feature as flexibility i.e. the capability of adapting for the mutability of competitive conditions. On the other side, this method is suitable for the companies of almost all the sectors, though it is necessary to update the database and to keep a watch on the changes in the market.

Purpose: perspectives of competitive intelligence methods utilisation for competitors' analysis in the railway sector.

Methodology: "Knowledge House", DWS, DMS, DSS methodologies.

Findings:
– The "Knowledge House" method is a component part of the body of methods which are called competitive intelligence, and which may be used both with other methodologies and individually;
– The "Knowledge House" method is meant for collecting the information from external information sources. The method is distinguished for its adaptability, however, to apply this method to railway sector companies, qualified personnel is needed;
– The results of method application are possible where it is used together with DMS, DWS and DSS methodologies; in this way, the methods complement each other and practical results are achieved, the application of which is defined having applied DSS methodology;
– Having applied the "Knowledge House" method, large flows of information are received, which must be stored in special data bases DWS, in this way analysts have an opportunity to trace the sequence of events and to carry out more accurate forecasts;
– DMS is the process of finding meaningful regularities, models and trends in large amounts of information by using model recognition, statistical and mathematical methods;
– To evaluate the potential opportunities of the competitors, it is expedient to make a summary of the methods used by the railway sector companies and competitor companies;
– To evaluate the potential of the company operation and information, it is expedient to make an analytical table of the data compiled in information systems.

The competitive intelligence methods and their application to the rail sector companies are little studied. In accordance with application of the relevant methods in other sectors, it can be assumed that these innovative approaches could have a positive impact on the competitiveness of companies in the railway sector and their income.

The mentioned publication is absolutely original in that until now the competitive intelligence techniques have not been applied for the railway sector companies. The publication is new in both scientific and practical terms.

1. The role of information and the sources in the business models intelligence

The process of the intelligence of business models is grounded on searching, obtaining and analyzing of information. The information is defined as the data, which contains significant facts, actions, processes, which are connected with individuals, organizations, events etc. The modern dictionary of Lithuanian language presents the meaning of the term "information", which is as follows: the knowledge, which is accumulated, stored and reported in a special way (Teece 2010).

The information enables:
  – to orient oneself in the current situation, which means that the initial data is necessary for an organization to realize the present situation and react to it adequately;
  – to make accurate plans of the actions, which enable to seek the goals, which are set by the company;
  – to record and evaluate the results of the promotion activities and the whole performance, which took place;
  – to avoid unexpected situations, which means that having assessed the information and its trustworthiness it is possible to forecast the further events also predict the probabilities of the final results;
  – to manipulate and control the separate individuals or group.

The effectiveness of such work with the information as collecting, processing and applying is determined by the following factors:
  – the accurate selection of the object of the research;
  – defining of the correct tasks;
  – selecting of the specialists or the company, which are supposed to carry out the task;
  – available methods;
  – the capabilities of exploiting of the information.

The information is classified according to the following criteria;
  – the source and the origin (internal, external, primary, secondary, governmental etc);
  – the meaning (quantitative, qualitative, formal, informal etc.);
  – the level (strategic, tactic, operational etc.);
  – the time (historic, recent, future etc.);
  – the frequency (currently, constantly, daily, monthly, annually etc.);
  – the use (planning, control, taking decisions etc.);
  – the form (written, audio, visual, sensual etc.);
  – the type (detailed, synthesized, complete, abstract etc.).

Aiming at obtaining the required information and using of it comprehensively, the specialists, which have the necessary competence, can work with the information and are capable of doing that, are completely important. The trustworthiness of he specialists is considered to be the factor, which determines a lot. The installation for obtaining and accumulating of information is required in order to systematize and process the facts and the data, which were collected. The capability to use the collected information with

the maximum result, which would enable to complete the tasks, which were set and achieve the goals, which were designed, is treated as an especially important moment.

The information, which is related to financial and economical performance, is collected using the following channels of communication (Negash 2004):
– the communication "face-to-face" (conversations, official meetings, films, telephones etc.);
– written communication (the mail, booklets, reports, fax etc.);
– visual communication (various films, advertisements, presentations etc.);
– e-communication (e – mail, electronic ways of exchanging of information, internet etc.).

The information about organizations is defined as follows:
– the internal data, which exists, operates and is used inside the company;
– the external data, which exists outside the company and is obtained while watching and collecting the information about other organizations as well as watching the market. The information is also grouped as official and unofficial one.

The official information (Boncella 2003):
– the reports, publications, editions, staff of the company;
– publications in the press;
– the official events, which are organized by the company (exhibitions, seminars, presentations);
– the production and services;
– official telephone conversations with the representatives of the company;
– publicity and the materials, which are delivered;
– commercial offers;
– the information, which is put in the Internet;
– statistical information;
– technical transmitters of the information, information technologies and their equipments (TV, the radio);
– the materials of the exhibitions etc.

The unofficial information (Chin 2001):
– industrial wastes;
– various documents, rubbish;
– technical transmitters of the information, information technologies and their equipments;
– other sources (the members of the employees' families, their friends, former employees;
– imitation of customers/sellers (imitative models);
– use of the "conspiratorial client" method;
– other sources of unofficial information.

A lot of information can be possibly found even in the sources, which are open for public approach. Approximately 90% of the whole information, which is useful for the business, is printed onto paper and is found in electronic media. Who is known as one

of the specialists in information and analysis, maintains that a lot of confidential information, which is treated by the companies as commercial and technological secrets, can be found in the sources, which are open for the public approach. The scientist suggests performing of the analysis of all the documents and facts, which seem to be worthless at first glance, thus real informational "pearls" may be found. The sources of information are divided into such two main categories as primary and secondary (Cody *et al.* 2002).

The type of primary sources includes the contacts with the individuals, who hold the information about the organization, which is watched and analyzed. Besides suppliers, the marketing and survey agencies, which work or worked formerly with the organization, which is watched and studied, and the company's production distributors can also act as the sources of the primary information. The regular reports, which are presented by the managers, who are responsible for sales and work with suppliers and distributors, belong to the same category. The friends, familiar persons, family members of the employees, who work for the company, which is watched and studied, are supposed to be valuable sources of information.

The category of secondary sources includes all the approachable sources of information. They are specialized press, reports of the companies, various exhibitions, presentations, the editions, which represent the organization and its performance, official statistics, marketing surveys, web pages, internet libraries

2. The logic of the process of the analysis

The main goals of a business organization are mostly oriented to the steady performance, the guarantee of getting profit and long-term domination in the market. According to American business specialists an organization has competitive ability if in the situation of the open and fair market it is capable of producing goods and providing services, which answer the requirements of the market, and at the same time it guarantees getting and successful growth of real incomes and profit during a long period of time. The world experience showed that if the company's performance is supported only by internal information, which is generated by the company's specialists, completing the tasks, which are oriented towards diminishing of the impact of the rivals and creating of new products or services, can often become very difficult. The solution can be found in the sphere of creating of new products or services and the development of the company while applying the experience of the rivals and implementing advanced technologies and systems of organization, logistics, production, sales and marketing, which are used by the strongest companies in the world. However, to achieve such goals it is necessary to watch constantly the market, the changes and processes, which takes place there, to study and analyze available and potential rivals, collect the information, which influences or may influence the performance of the company at present and in future. Business models intelligence is considered to be the one of very important mechanisms aiming to achieve such goals (Cody *et al.* 2002).

Business models intelligence is defined as a complex of actions, on which ground the organization collects information about other business organizations for the purpose

of applying or adapting it to their organization in order to improve its performance on the whole or the separate parts. Miller defines the models intelligence as "a constant measurement of somebody's products, services and practice and making a comparison with the best world models and use of the information, which was obtained like so, for the purpose to improve planning and stimulate the performance" (Miller *et al.* 2006). Hequet remarks that the models intelligence more clearly shows the differences between various companies, which perform the similar tasks (Hequet *et al.* 2013). At the same time the process, which is connected with the intelligence, is the instrument, which helps the organizations to achieve the better results of their performance. Wiesendanger and Storchi remarks that the models intelligence should not be grounded on the comparison with the nearest competitors only (Wiesendanger, Storchi 2005). On its ground it is necessary to have a look at the one's own organization to find out how it seems on the outside and thus to identify the best achievements in the performance of the other organizations. The international bureau (IBC), which operates in the USA as one of the centers of the growth and improvement of labor productivity and quality, propagates and stimulates business models intelligence. This bureau presents business models intelligence as "the process, during which the companies design the main spheres, which should be improved in their firms, select and study the best practical modes related to the spheres of their performance, which are used by other organizations, for the purpose to apply them to their own organization aiming at increasing of their labor productivity and quality". "Xerox Corporation" defines the models intelligence as "a constant measurement of the current level of the company's products, services and practice and comparison with the relative achievements of the strongest rivals or the leader companies for the purpose to find out what factors they are caused by" (Darrow 2003).

In order to comprehend the stuff of the business models intelligence completely it is necessary to understand the components of this term correctly. In the dictionary the word "intelligence" is explained as:

- "collecting of information about foreign and home enemies secretly;
- exploration of something, watching, collecting of information;
- collecting of military, political, economical knowledge and information about any hostile country, bloc, organization or enemy".

The meaning of the word "intelligence", which dominates in the public mind, is usually related to military actions, that is why this term is often associated with negative aspects and illegal activities. However, the intelligence actions are not taken for military purposes only. For example, from the viewpoint of business there are geological, woodland intelligence. At present the business uses the term "intelligence" to define the most advanced form of the work with information, which includes identification, collecting, obtaining, accumulating, analysis, generating and effective employment, as exactly as it possible. The term "model" (in French modele, in Italian modello) is explained as:

- an example or a dummy of any article;
- a schematic, abstract or theoretical description of the stuff of any article or phenomenon (Hall 2000).

The business models intelligence treats the term "model" as the components and elements of an object (it can be on the ground of one or several organizations), which are analyzed and assessed separately, various resources, systems, structures and processes or their summation, which are studied, measured, examined, assessed and analyzed for the purpose to get the necessary information about the performance of the object, internal processes, the factors, which cause the effect, organizational, technical and technological achievements and methods, which are applied and exploited.

Due to the ambiguities, which take place, when some terms are translated from English, there are also the certain inaccuracies connected with the terms, which define the business models intelligence. Some of the authors tend to treat the terms "business models intelligence" and "competitive intelligence" like the same. For example, the organization SCIP uses the term "competitive intelligence" and gives the definition, that the operations of the competitive intelligence are executed in well-known competitive environment. The English term "competitive intelligence" is treated differently all over the world. For example, in the USA "competitive intelligence" is used for a long time, whereas in Europe it sounds more often as "business intelligence" (in Lithuania – "business exploration"), though "competitive intelligence" and "business intelligence" are the same essentially (Pilinkienė *et al.* 2016). On the ground of theory and practical experience Hall maintains that the term "business intelligence" is better to use, because it includes not only watching the rivals but also the other fields and environments, which are connected with business (for example, economical, political, juridical aspects as well as the changes in various resources and business tendencies), which are considered to be the integral parts of the modern business organization and performance. Also to assess the best business models and performance the term "benchmarking", which means comparison, measurement and comparing with the leaders is used. The term "benchmarking" is widely used by such specialists as Hequet, Miller and Andrew Grave also "Agile ConstructionInitiative" (Hannula, Pirttimaki 2003; Miller *et al.* 2006).

For the recent decade the competitive intelligence has become a very popular activity among the largest and thousands little-known companies all over the world. IBM, "Motorola", "Intel", "Microsoft" are only several transnational corporations, where the competitive intelligence is developed very well.

The origin of the conception of the competitive intelligence is connected with the works written by Prof. M. Porter from Harvard University, who maintained that "every company should have a good marketing intelligence" (Porter 1990). The marketing intelligence is defined as collecting, obtaining, accumulating and processing of information about the competitive environment and competitors also their activity in the sphere of marketing. Unfortunately, the competitive intelligence is often treated as the analogue of the industrial espionage, which is a great mistake. The industrial espionage is the process, which is very familiar to the military and political intelligence for the reason that the illegal modes of collecting of information are known as the prior forms of their performance, whereas the competitive intelligence has nothing in common (at least formally) with the "knights of the cloak and sword-bayonet".

With reference to the official definition given by the international "Society of Competitive Intelligence Professionals" (SCIP) "the competitive intelligence is legal collecting and analysis of information about strengths, weaknesses and intentions of the rivals" (Miller 2000). A famous specialist in the Western business John E. Prescott (The University of Pittsburgh) defines the competitive intelligence as "the constant forecasting of the dynamic of the competition" (considering the actions in the market and outside the market, the real and potential rivals, the potential of the development of the company), which can be used in order to gain the competitive advantages (McEvily *et al.* 2004). The society SCIP unites several thousand members, among which there are top-management of the companies, managers, who collect the information about rival firms. In the official SCIP website the statistic information about the documents of registered organizations, which are usually studied, is presented (Table 1).

Table 1.The SCIP database of the documents, which are usually studied (100%)

	Studied documents			
Information about the clients	88.9			
Financial analysis	72.1			
SWOT analysis	55.2			
Projects on development	53.8			
The analysis of the winnings/failures, loss	40.4			
The analysis of the competition	27.5			
The analysis of the partner organizations	25.5			
Simulating	25			

The Western corporations more often appreciate the business models intelligence and the competitive intelligence and treat them as a very important part of their strategy. The models intelligence is important for the reason that on its ground it is possible to answer the following essential questions:
- How successful is our work? Is it effective or not effective enough? Do any mistakes take place? If the mistakes are made in what production, management or other processes are they made?
- How do they (rival companies and the companies, which do not fight) work? Why do they work like so? What factors determine the good results of their performance?
- How do they succeed? What is the difference between the organization and performance in their company and the same processes in ours?
- What actions do we have to take in order to gain the competitive ability of our organization? What spheres do we have to improve and what modes to use in order to achieve the better and desirable results?

Aiming at getting the answers to the questions, which are presented above, it is necessary to apply the business models intelligence to all the stages of the company's performance, which are as follows (Hoblitzell 2003):
- creating, generating of ideas;

– projecting, expertise;
– making arrangements for production (services);
– operating the production (providing the services);
– marketing;
– development, renovations;
– searching for new ideas;
– occupying of the market and searching for new markets and all other stages.

The companies, which apply the business models intelligence has greater potential for achieving better results. While operating the business models intelligence the program is an important component of work as well as the plan of its realization and methods. Existence of these two elements is the important factor aiming to improve the performance of the company.

One of the specialists in the business models intelligence maintains that the business models intelligence can help the organization to complete the following tasks:
– To reveal the differences between the supposed and factual levels of the competitive retardation. While comparing the indexes of their performance and technological ones with the indexes of the best world organizations the firm can find the main differences and see how great their retardation is comparing with the leaders. It enables the organization to understand and evaluate their level much better.
– To disclose the incorrect comprehension of the rivals' capacity, weaknesses and the current and future strategies. Having analyzed the behavior and performance of the rival companies it is possible to penetrate the motivation of the actions, which were taken by the rivals, and explain one or another moment in their performance, for example, increase in prices or the peculiarity of the release of the new product in the market.
– To stimulate the changes in the culture of the company, to motivate the staff to concentrate on the structure of the constant productivity, development and real expenditure, the requirements of the consumers, the technologies of business processes. The quality can not be improved only in a one separate unit, the company as a whole must pursue this goal.
– To improve the performance of the company, advance the standards of productivity and effectiveness and tell the top management of the company about long-lasting consequences of the predatory behavior. "Blind" liquidating of rivals leads to the degradation of the organization, because without the natural competition the company fails to understand the requirements and requests of the consumers. Their potentials for effective improvement of technologies and implementing of innovations in the organization are also lost.
– To define the criteria, according to which the tasks related to the measurement of improvements in the company's performance are set. If the company is oriented towards the experts in the sphere of its performance it can find what instruments should be used in order to improve the work in the particular moments of the performance. The business models intelligence certainly helps the management of the company to complete the tasks connected with defining of the quality criteria easier (Houdeshel, Watson 1987).

Aiming at further success in their work the companies must watch and study the external and internal environments of the company, accumulate information about all the facts, which may be important for the company's successful performance or its development. Before the observation of the external organizations and their performance gets start it is recommended to observe and analyze how the own company works. It can be carried out using such mode as a complex internal audit, when the economical activity and commercial operations of the company are audited also the systems of planning, management, administering and organization of the work as well as their current level are examined at the same time. Thereby internal audit must help to disclose the business inaccuracies, deviations from the goals, which were set, also to help avoid the mistakes or diminish their effect at least. While applying the internal audit it becomes easier to assess on the whole the level of the performance and management of the company and its branches, which is considered to be the basis, when the external advantages of the organization are studied, also to find and recognize the internal problems of the company, which are connected with the particularity of the performance of the branches, and to solve them (Imhoff 2003).

According to some of the authors, with reference to the system of methodological principles the specialists of competitive intelligence define the following items (Pilinkienė *et al.* 2016):

- the object and the subject of the competitive intelligence research;
- the subject of the object of the competitive intelligence research and the sequence of the solution;
- the methods, which are used by the competitive intelligence.

With reference to the above-mentioned points it is possible to emphasize the two following typical levels of the study:

- empirical;
- theoretical.

The empirical level of the study is related to the primary obtaining and processing of factual information. The researchers usually accentuate factual actions and scientific facts. *The facts if the action* include the events and phenomena, which have taken place up to now, they are different sides, features and the ratio of the objects of the study.

The scientific facts are defined as the facts, which are presented for the analysis in the form of logical consideration and have been examined, comprehended and recorded.

According to another author, the sources of the methods of the study are defined as the main idea, which unites all the structural elements of the methods, sets the order of the research and its steps (Prescot *et al.* 2004).

All the methodical sources have the logical sequence, which is as follows:

- the aim, the tasks, the hypothesis of the study;
- the criteria, the indexes of the development of the particular phenomenon are directly connected with the particular methods of the study;
- the sequence of the use of the methods, the order of the control of the experiment, the order of recording, deviations and summarizing of the materials of the experiments are defined.

According to the other authors, before the methods of the competitive intelligence research are selected it is necessary to regard to the object, which will be studied (Rudowski 2014).

The relevant methods of the study are selected subject to the aims and the tasks, which are set by the competitive intelligence specialists.

3. The content of the competitive environment valuation method "Knowledge House"

Many a specialist of competitive intelligence treats collecting of the required and important information, which would help to take correct decisions, as the basis of the work of the competitive intelligence. Since such methods as financial forecasting, the analysis of the budget, the analysis of expenditure are traditionally used by the business they are very important to assess the performance of the companies but insufficient aiming at assessing of the strategy of the rivals. As a result the opportunities, which spring up, are not used properly or, on the contrary, unexpected problems are not solved and the threats are not eliminated timely and with the appropriate reaction to the actions of the rivals.

The top management often does not accept the necessity of the use of the special methods of competitive intelligence and it is difficult to persuade them, because the business subjects usually do not know the advantages, which are given by the competitive intelligence, and expect to assess the actions and strategies of the rivals using traditional modes, which often do not give the expected result but disappoint. However, it is necessary to remark that the traditional business analysis is not included into the methods, which are used by the competitive intelligence, so, it fails to work effectively enough. According to the competitive intelligence specialists traditional methods will not help to react to the rival, which has come unexpectedly and uses aggressive tactics, appropriately, because the traditional methods do not assess the influence of the external factors on the successful performance of the corporation. There are various types of such factors from personal contacts to the political relations, which are followed by the certain actions.

Some of the authors express the opinion that the intelligence- type methods of analysis, which were specially created and piloted, provide the opportunities to assess the external environment of the corporation or the company accurately, which helps to take effective strategic decisions (Hilmola, Henttu 2015). In order to apply the competitive intelligence methods of analysis not only it is necessary to collect and interpret the non-quantitative indexes and the information about the financial situation of the corporation, the sales and the situation in the market but also to get the information about the actions of the rivals, the actions of the supervisory institutions, technologies and other factors, which would help the specialists of the competitive intelligence to analyze and assess thoroughly the data, which is required for the competitive intelligence analysis. The answer to such question as what is going on in the business environment of the corporation and how it may influence the performance of the corporation must be the final product.

The work of the specialists of the competitive intelligence usually begins with collecting of information. In order to complete such task it is necessary to mobilize the available resources of information. The more specialists of the competitive intelligence collect and analyze the information the stronger probability of obtaining the more correct and thorough information about the objects, which are being analyzed, is. The large corporations often engage the specialists, who have different experience and use different methods while working. In this case there is a certain risk that the conclusions may be grounded on the different methods of analysis and sometimes are not grounded on any methods but on the personal experience of the separate specialists. It is especially reflected in the competitive intelligence evaluations, which are carried out by the former specialists of the secret service. For example, the methods of the analysis of information, which are applied by the competitive intelligence specialist, who worked for the police, are usually very different from the analysis, which is performed by the former specialist of the intelligence service. It is explained by the reason that the experience of such employees is very different and the methods, which they use, disagree as well.

It is necessary to remark that the method is rarely applied by small and middle companies in Europe whereas the large international corporations of the USA usually use the method. In our opinion, despite the fact that a lot of the methods, which are used to analyze the competitive surroundings, take place the methods of the competitive intellgence are more relevant considering practical applications, because they enable to assess the competitive surroundings of the sector much more thoroughly. The competitive environment valuation method "Knowledge House" may be associated with the methods of logical analysis and mathematical statistics method, however, only to the extent that it helps to achieve the objectives. Its function is to collect the data about the situation in the market and to control them. This is important for planning the retaliation measures of the company against the behaviour of the competitors. The information about the competitors' production or the services they provide, their strengths and weaknesses, the priorities, sales tactics, etc., which is necessary for taking these actions, the application of the process of the "Knowledge House" method may be depicted in the following way (Fig. 1):

The sequence of the process:

1. The meetings of the competitive intelligence analyst and the consumers of the information, which is presented by the competitive intelligence in order to define the needs and the resource of the consumer and the importance of the information.
2. The assessment of the potentials of obtaining of the necessary competitive information, i.e. the identification of the potential sources of the information, dissemination of intelligence knowledge, etc.
3. The analysis of the collected relevant information considering the tasks, which were set.
4. The collaboration with the client (clients), who requested the analytical stuff and set the tasks, aiming at the more effective result and performing of the more thorough analysis.
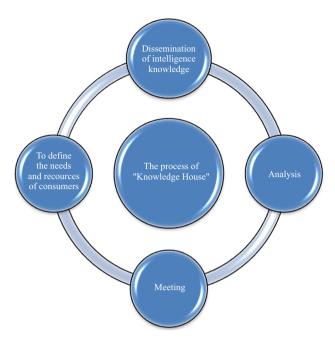
Fig. 1. The process of application of the method "Knowledge House"
Source: created by authors according to Polak (2015).

The main advantage of the method is that it can be effectively used by the persons who take important decisions in the company. The necessary condition is that they have to be trained to use the information of this system; this is the only way in which the decisions may be taken faster, more precisely and more effectively.

Having received the information about the competitive environment, which is obtained and processed by using the method of "Knowledge House", the company will take retaliatory steps. The result of them is a prepared counter-strategy (Fig. 2). The competitive intelligence analysis applying the "Knowledge House" method is performed by the following the steps, which are presented below.

It is necessary to remark that when the method "Knowledge House"is used the sources of the information directly depends from the markets or the particular subjects of the economy as well as from the goals, which are to be potentially achieved due to the application of this competitive intelligence method.

To effectively apply the method of "Knowledge House" in practice, its essence should be analysed, that is the content, the opportunities to use it by forming a competitive strategy, and so on.

The method of "Knowledge House" consists of three main levels (McEvily *et al.* 2004):
1. standard components;
2. researched components;
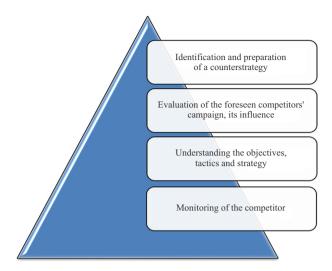3. knowledge management components.

Fig. 2. The stages of preparation of the counter-strategy
Source: Lisitsa (2014).

All of these levels consist of modules. They form the basis of the table describing the information on competitiveness.

The first level, "the standard components" include the following modules (Gasparėnienė *et al.* 2013):

1. The module "Knowledge Broker". This is a set of instruments that are used for competitive "intelligence". It comprises the so-called "electronic news agency", in which the main sources of collecting information are indicated, including web-pages (Polak 2015).

2. The model "Best practice" describes the main lines of action of the company, including the sequence of actions and tasks that are most frequently implemented by analysts. Thanks to this, new analysts of competitive intelligence are faster trained to use competitive intelligence methods even in that case where they are far away from the company's head office, and therefore may not participate in the training programme along with the main group of competitive intelligence Information management for international freight trains (Dailydka, Gaidelys 2013).

3. The module "Manual" includes all the conceptions and terms of the system. It joins three main aspects: firstly, it provides the features for classifying market participants; secondly, it explains the essential components the "Knowledge House" method of this level; thirdly, it provides information about the market and its participants.

The market participants are grouped into the "first level competitors", "new competitors", "regional competitors" and "segment competitors". This module is also divided into chapters "Strategy", "Scenario", "Proactive and retroactive research", "Topics for managers", "The yellow file" and explication of its content. For example, the chapter "Yellow file" stores the information about market participants, cases of not satisfying

the consumers' needs and so on. The information about the markets and their participants' positions with regard to the company is provided in the chapter "Themes for managers" and so on (Hilmola, Henttu 2015).

The second level of "Knowledge House", "The components researched" includes the following models: "Data for managers", "The news", "Description of competitors", "The yellow file" and "Personnel management" (Gaidelys, Meidutė 2012).

The module "Data management" defines the market participants on the basis of the situation in the market, their competitive positions and so on.

The module "The news" evaluates the entire information which was meant for the main users in weekly news.

The module "The description of the competitors" informs how market participants organize their marketing communication. In this way, an opportunity is created to find out concrete marketing actions of the market participants and to suggest counteractions on the basis of the former (Musiał 2013).

The module "The yellow file" extends the content of the first level "Yellow file" and supplements the module "Data for managers". A special attention is given to the behaviour of market participants and the shortcomings of their activity. Knowing their weaknesses also forms the content of the retaliatory actions (Jao 2011).

The module "Personnel management" takes into consideration the information about market participants from a different perspective,that provides practical information about employment of personnel, providing them with resources, training and other issues of management (Demidovs 2006).

The objective of the third level of "Knowledge House", that of "The components of knowledge management", is to collect new opportunities for the users of methodology. This may be achieved due to such modules as: "Practitioners of competitive intelligence", "Fight for contracts/ contracts tactics", "Research", "Events and occurrences", "Requests" and "Transmission of information" (Development of Mobility Plan and Action Programme for Riga and Pieriga 2009).

The module "Practitioners of competitive intelligence" includes the staff members of the company who in one way or another contribute to the application of the methodology of competitive intelligence (for example, it disposes the necessary information).

The module "Fight for contracts/ the contract tactics" takes into consideration the tactics and strategy used by the market participants.

The module "Comparison with competitors" is meant for essential comparisons.

The module "Environment" includes private discussions of staff members about the problems they face when implementing their tasks.

The module "Research" includes the evaluation of information about potential clients and market participants working with potential clients.

The module "Events" analyses and evaluates the information about conferences and

other events which may be interesting to potential clients (Scientific Research Analytic Center of Russian Railways Ministry 2015).

The module "Request" evaluates all the projects implemented and the reasons why the projects have not been fully implemented or have not been successfully implemented.

The module "Transmission of information" provides a detailed evaluation of the information about the companies collecting and analyzing the information in the market (Dailydka, Gaidelys 2014a).

The main objective of the method "Knowledge House" is to help prepare an effective competitiveness strategy of the companies. In the first stage of preparation of it, preparatory works are carried out: setting object-orientation of the strategy, the objectives, the tasks, resources, risk, opportunities and so on.

The procedure of formation of the competitive strategy of the company largely depends on its object-orientation – that is the vision, the mission and the objectives (Klinkevičiūtė 2014).

Setting of the objectives. The objectives transform the general provisions of the mission formulation to more precisely defined obligations which indicate what has to be done and when the objective has to be achieved. In this way, one should put emphasis on the dual function of the company objectives. First of all, they formulate the tasks for the company administration apparatus, to define as precisely as possible the expected final result. Secondly, on the basis of the company objectives measures are prepared allowing evaluation whether the foreseen result has been achieved before the deadlines indicated.

It is recommended to provide the quantitative definitions of as many company objectives as possible. However, to provide a quantitative definition of some of the objectives is very complicated or even impossible (Deutsche Bahn stops short of service 2015).

Setting of the tasks. The tasks for those responsible for the implementation of the company strategy are formed by indicating general strategic objectives and decisions. In the programme of the company strategy implementation one has to foresee a full complex of actions ensuring the implementation of the chosen strategy objectives and decisions. It is necessary to define the deadlines for completing each action and measure in the programme. The tasks are formed for those responsible for the implementation of the strategy by providing details and the common objectives and decisions. The overall objective of the company, or a strategic decision, is integrated into the specific objectives and decisions for each individual functional area: marketing, production, human resources, finances, research and projecting. The functional objectives and decisions must be such that the body of them ensure the implementation of the strategic objectives of the company. This is not an easy task and several iterations of analysis and decision alignment may be necessary so that a satisfactory result may be obtained. The process of aligning the iteration analysis and decisions becomes simpler where there is an opportunity to find a formal dependence (in the form of functions or equations) between the general strategic objectives and the functional objectives providing a detailed analysis of them. In this case, the decisions related to association of the strategic objective

and the functional objectives providing a detailed analysis of them may be based on calculations (Gaidelys 2010).

Establishing and distributing resources. To ensure successful implementation of this strategy, it is essential to distribute the limited resources of the company. In terms of the resource distribution, one always needs to distinguish between two things: objects distributed and distribution lines. In the preparation of the strategy and in the distribution of the resources foreseen for the implementation, the main role is played by the subjects, therefore, they should be given special attention (Yuanyun 2015).

The distribution of resources in the stage of implementation of the strategy embraces the distribution of human, financial and operational resources. On the other hand, the necessity for taking strategic decisions with regard to the distribution of human and material resources arises only in individual cases of implementing the strategy, therefore, as we continue talking about the distribution of the resources, we will limit ourselves to the distribution of the financial resources (Petukhova 2010).

Risk definition. The implementation of services is always related to certain risks. Therefore, to evaluate the alternatives of strategy preparation, it is important to pre-assess the degree of their risk, to analyse the potential dangers to foresee and reduce the difficulties of service implementation in the perspective. It is important to decide whether the risk (and to what extent) is acceptable (Kounaeva 2003).

Defining the opportunities, needs (for the project). The works of strategy formation and detalization have been provided above. This chapter defines the actions offered for the implementation of the measure (solution), that is there is a shift to the suggested actions (for example, development of the new services in new markets, hereinafter *"the Project"*). In the life cycle of this project this process is implemented in the following stages: the task is formed; ideas are sought; selection of ideas is carried out and the pre-assessment is carried out; a project proposal is formed; a comprehensive market analysis is carried out and a business plan is prepared; the project is implemented (*the service conception is developed, pilot marketing is completed and so on)* (Gaidelys, Dailydka 2014b).

Implementation processes follow after the preparatory works. *Preparation of project proposals.* A further step of strategy development is an analysis of the commercial success of the project conception. The sizes of the sales, market share and profit in the target market are taken into consideration in this stage. The conception of implementation of the strategy actions is developed by indicating the product features, by defining the demand and competitiveness. Future profitability is also defined for the service, service development programme is prepared. The result of the stage is a list of concrete product features, the information about the necessary resources and a marketing plan (Movchikov 2004).

Monitoring processes are an integral part of the strategy implementation. *Project implementation (product development and launching in the market).* These processes include the period from the implementation of the Service contract, however, they are described here only due to their importance in achieving the final objective.

In the context of implementation of the company project portfolio, an important project development stage is product development and launching in the market. In this stage of strategy preparation, the ideas turn into goods and services (Rudowski 2014).

The physical model of the merchandize, (service) creates conditions to touch the merchandize, to carry out various tests, which contribute to the evaluation of the real product features. This way the option of the merchandize is chosen, the features of which best describe the features defined in the conception. In this regard, it also turns out if the ideas foreseen in the conception may be implemented at all (Study on Strategic Evaluation on Transport Investment Priorities under Structural and Cohesion funds for the Programming Period 2007–2013, 2014).

Monitoring the status of project implementation. For effective control of the project, it is essential to know the actual status of its progress and on the basis of this to take the necessary decisions about further actions.

It is universally agreed that the main objective of the implementation of the strategy measure (project) progress control is to constantly compare the existing project implementation situation with the indicators in the project and where needed to actively correct the progress (World Bank Document 2015).

The principles of effective project control system formation should be the following ones:
  – concrete plans of the project progress;
  – information system of the accounts;
  – a system of an effective analysis of the factual indicators and trends;
  – subordinated and coordinated information collection and analysis;
  – an effective response system.

Monitoring of the status of the strategy implementation project portfolio. Where a company implements a number of projects at the same time, that is it has a project portfolio, it has to continuously rate it due to restricted resources: (1) it is expedient to continue some of the projects and to allocate funds for them; (2) it is expedient to slow down the implementation of some of the projects; (3) some of the projects have to be refused. Therefore, sticking to the control of the project portfolio is one of the most important conditions for the achievement of successful strategy implementation and to achieve the objectives (Gaidelys 2011).

The experience of using control methods of various projects allows choosing well known competitive intelligence methods. It is suggested using for the object analysis such techniques of the creative process as *brainstorming*, *system structurization* and so on.

To carry out individual actions it is suggested using project portfolio control methods: modelling; resource analysis; resource distribution; network planning and control; monitoring; expenditure planning and control; risk, quality, conflict, change, contract control methods and so on.

To implement the tasks and objectives, it is suggested in the first and second stages of the project life cycle to apply the adaptive methodology of competitive intelligence.

In this stage the system of "Knowledge House" is used, which is meant precisely for collecting and control of the data about competitors and the situation in the market. As it was mentioned, without detailed data about their production and services, the strengths and weaknesses, priorities in the market, the attitudes and sales tactics, the company management may not plan retaliatory actions (Movchikov 2006).

4. Receiving and storing information according to the method of "Knowledge House"

Information is the main element of application of the "Knowledge House" method. Approximately 80 per cent of it may be received from public sources. For example, to evaluate the level of taxation in the companies operating in the railway sector, one may provide a mathematical expression, which identifies the taxes paid by competitors for their infrastructure. In this way, the costs of competitors will be established allowing evaluating their opportunities and the perspectives of operation (Gaidelys, Valodkienė 2011).

This opportunity occurs upon completion of a corresponding analysis of railway transportation and also that of the procedures related to the taxes for transportation. Depending on the annual transportation volumes and the distance, the taxes for infrastructure are divided into three categories. Depending on the type of trains, the taxes are divided into three types also for passenger operators (Rudowski 2014).

The analysis may be based on the following tax for infrastructure calculation procedure (VAB Latvijas dzelzceļš Annual Report 2009–2014 (2014)):

$$C_{tot} = C_{maint} + C_{inves}t + T + M, \qquad (1)$$

where C_{tot} – total charges for railway infrastructure; C_{maint} – railway infrastructure maintenance charges; C_{invest} – investment into infrastructure renewal; T – charge for using infrastructure; M – mark-ups.

The charges for using infrastructure are calculated according to the following formula:

$$Charge = (C_{cat} / T_{km}) \times Mc, \qquad (2)$$

where C_{cat} – total annual price; T_{km} – planned amount for the kilometres run by the train, taking into consideration the certificates provided by the freight and passenger operators; Mc – demand correction module, which is meant for infrastructure operator and is used where there is too big or too small demand for infrastructure.

According to the formula, the following charges of AB "Lietuvos geležinkeliai" for using infrastructure have been established (Table 1).

An example of calculation of charges for using infrastructure for category 1 (EUR/ train km) has been provided in Table 2.

Summary of the charge system for using infrastructure has been provided in Table 3.

Table 1. Charges for using infrastructure (for 1 km, in EUR)

Charge	Category 1	Category 2	Category 3
Freight operators			
Irrespective of the train type	6.36	5.51	4.11
Passenger operators			
Electric trains	3.30	2.46	–
Diesel trains	2.65	1.98	4.41
International trains	0.07	0.07	–

Table 2**.** An example of calculation of charges for using infrastructure for category 1 (EUR/train km)

Indicator	km	Passengers of electric trains	Freights
Track maintenance costs	Train km	0.30	2.46
Costs of train control and operation	Train km	1.12	1.78
Costs of real estate maintenance	Specified according to the freight or passengers (train km)	0.28	0.18
Electric trains	Train km	0.58	–
Other	Train km	0.28	0.28
Cinv.	Train km	0.76	1.68
Total costs	Train km	3.30	6.36

Table 3. Summary of the charge system for using infrastructure

The main characteristics	Advantages	Difficulties
Failing to receive financing from the budget	Simple charge calculation methodology	Great variety of transport
Charges based on complete covering of costs	Encouraging effective use of infrastructure	Relatively high operators' costs

In our opinion, to evaluate the financial resources of the competitors, one may prepare the following money flow control model, according to the example of Latvian railways (Fig. 3).

Another important use of information according to the "Knowledge House" method is compiling and storing information (Gaidelys 2009; Shumanov 2014). This opportunity is offered by data bases (DWS). Large amount of information about macro and micro economic factors compiled in them may be used for modelling it and completing an analysis on various levels and on the basis of this to provide substantiated conclusions on the effect of various factors on the company activities. This it its turn will help taking effective decisions.
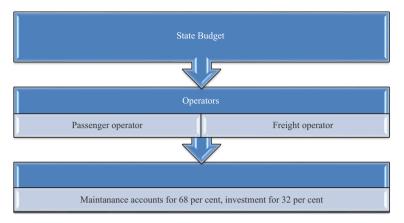
Fig 3. Money flow control
Source: prepared by authors.

Data warehouses, as they were in DWS, compile various organizational data. Usually that is changing information, which is used in business everyday; that is copies of transaction data and so on. This data is collected so that they are suitable for various requests, reports, analysis. They are virtually operative since they are recorded both daily and weekly and stored for several years. The function of DWS is to integrate this data depending on the area of the company activity. This helps to ensure that they are not duplicated, and especially an opportunity is created to carry out a wider and more profound analysis, to see the connections between the blocs of data (Gaidelys, Dailydka 2012).

The system of data storing DWS is usually used by large business organizations, banks, telecommunication companies, various research centres, state enterprises. For example, commercial organizations apply them for establishing their pricing policy; for advertising and clients maintaining programmes; market research; production – for the trends of production, lines of production, which is necessary for establishing certain level of quality; banks, insurance companies – for establishing client reliability, risk level and so on (Estonian Technical Surveillance Agency 2015).

Along with the data storage, for processing information the system of data analysis and data management system (DMS) is used. This is a process of finding regularities, models and trends according to large amounts of information. To this end, various statistical and mathematic methods of model recognition are used. The following models are most frequent: association, order or priority analysis; grouping; classification; forecasting (http://info.infobitas.lt/).

On the level of concepts, DSS is made of five main components:
- *Models (model-driven DSS),* that is model basis (mathematical, statistical, optimization, financial) and its management system;
- *Document (document-driven DSS)*, that is search for non-structured information and the use of it for various purposes and in various formats;

  – *Communication-driven DSS*, that is supporting the consumer group, who have a common task;
  – *Knowledge-driven DSS*, that is ensuring solution of tasks by providing the facts, rules, procedures;
  – *Data-driven DSS*, that is data bases and their management systems.

DSS is a method summarising and structurising the information from DWS data warehouses. The data in the warehouses are usually compiled to later analyse them, to get various reports and on the basis of them to decide whether the chosen line of action of the company is the right one; which decisions are effective, which ones are not; also to foresee further line of action of the organization; to search what changes might be made to improve the results. In these systems, data warehouses are used together with OLAP and DMS measures (Brandas 2011).

For effective DSS management and making decisions on the alternatives a TOWS analysis is used (Fig. 4).

To summarize, this example table of the application of the methods of competitive intelligence of the company of the railway company in question may be provided (Table 4). According to the information which is obtained during the TOWS analysis and having applied a DWS method, decision making alternatives are formed, which are provided for a certain level of managers (Gaidelys, Dailydka 2013). Summary of company information provision has been provided in Table 4.
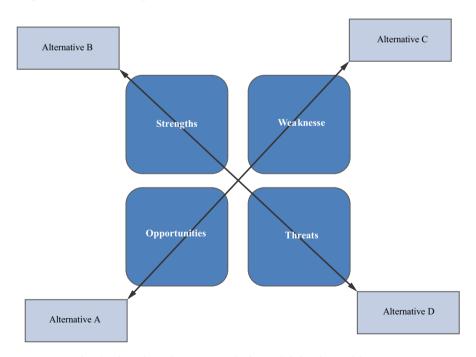

Fig. 4. The adapted TOWS analysis model that is used in DSS

Table 4. Summary of the method used and assessment of the situation in the railway company and competitor companies

Assessment of the situation	Railway sector company	
	Yes	No
Does the company have internal databases? Is the information segmented and structured and what is the consumer interface?	x	
How are the qualitative and quantitative indicators of the information disposed evaluated by branch consumers (positive or negative)?	T	
Are consumers informed about the opportunities in the market?		x
Are there single data bases in the company?		x
Are there established principles on the basis of which data selection is completed and the data adapted for company needs?	x	
Are you using data warehouses inside the company?	x	
Are you using data warehouses inside the company?	x	
Is the information in the company analysed according to CBOSSudr (AnalyticalReportingSystem), CBOSSdwh (Analytical Data Warehouse) systems?		x
Are competitors segmented?		x
Are wrong decisions and failures of the competitors analysed?		x
Do managers receive regular overviews about the situation in the market including competitor analysis?	x	
Are the most relevant markets for the activities of the operation of the company identified according to the method chosen?	x	
Are the decisions that have effect on the operation of the company taken on the basis of analytical information?	x	
Are you using IT automatic analytical systems?		x
Do you profile your competitors?		x
Do the analytical personnel take part in the professional forums?		x
Is there a comparative analysis of the competitors' contracts carried out by using all the available information resources?		x
Is a competitors' services sales strategy carried out?	x	
Are sector macro indicators analyzed?		x
Do you have a database about the companies trading in information in the market?		x
Is an internal analysis about information requests and their implementation quality and problems carried out?		x
Is there information collected about the competences and the potential of the company personnel?	x	
Is the information about potential clients and market participants working with potential clients analyzed?	x	
Is the information about conferences and other events, which may be interesting to potential clients analyzed?	x	
Does the company have a single analytical unit?		x
Are the actions of competitors, service providers, clients, partners analysed?	x	
Are publicly available databases used by analytical and other structural units of the company?	x	

End of Table 4

Assessment of the situation	Railway sector company	
	Yes	No
Is your company using information analysis methodologies?	x	
Does the company have a single data compiling and analysis system?		x
Are the data about the services provided by competitors and products sold by them compiled and analyzed?	x	
Are the data about the services purchased by the clients and their need for services compiled and analyzed?	x	
Are the competitors' and clients' divergence and convergence analysis carried out?		x
Does the company carry out an analysis according to: Customer relationship management (CRM) and Enterprise Resource Planning (ERP) sections, by using Extract, Transform and Load (ETL) tool to collect and analyze the data?		x
Is there a permanent Competitive environment monitoring carried out?	x	
Are competitive environment models created?		x
Are the management provided with regular reviews of relevant competition issues without additional instruction?	x	
Is there a constant monitoring of the competitive environment by using primary, secondary and tertiary data?	x	
Has a protection plan of the company's commercial interests been prepared according to the permanent data and information analysis?		x
Does the company carry out a regular analysis and evaluation of the factors making influence on the business environment?		x
Are there regular reports about the changes in the markets?		x
Is there a regular analysis of the objectives and results of the projects in progress?		x
Is there a business conditions analysis of the relevant regions carried out?	x	
Is there a permanent monitoring of the new competitor emergence?		x
Launching new services into the market in a ten year period, on annual basis.		x
Are data analysis systems used in the company?		x
Are tasks raised for data analysis systems?	x	
Do you get the result you expected?		x
Does the company use competitive intelligence methodology?		X

Upon completion of the analysis, we have established that the data bases provide summarized information about the data collected in information systems and the use of it. Having compared the information of AB "Lietuvos geležinkeliai" and that of its competitors, and the data bases, analytical systems, information technologies and so on that the competitors use, and having applied certain methods of analysis (correlation analysis, factor analysis, classification), one can establish which elements of competitive intelligence mostly determine the competitive advantage of the company, that is it will allow successful participation in the market. A detailed summary of the information provision of AB "Lietuvos geležinkeliai" and competitor companies has been provided in Table 5.

Table 5. The data collected in information systems

Information system	Data	Use of data
	Information data system	
Centralized classification and codification of railways (KLASIFIK) Hall	Names of train stations, cities, residential areas, states, railway station codes for several information systems, procedures at the railway stations, freight codes and names, railway lines and sectors, currency rates, lists of internal and external clients and external clients.	The data of various periods stored and accessible.
	Freight transportation	
Automatic control of the freight classification areas (ASUS).	Holding wagons and freights transported, railway system equipment, freight operations.	Station operation analysis; loading planning.
Information system of income from transportation registration (APIKS)	Planning transportation (IP).	Regulation according to railway sector weight, wagon weight - transportation possibilities, information data from KLASIFIK.	The data of various periods stored and accessible; information data used.
	Registration of service sales (PP).	Information data from KLASIFIK.	Information data used.
	Arranging banking documents (BD).	Information data from KLASIFIK.	Information data used.
	Processing of invoices (CP).	The main and specific tariffs, additional charges and discounts, transportation conditions, the terms and conditions for setting the payment for transportation, calculation algorithms, invoices, payment codes and permissions to use them in various documents, information data from KLASIFIK.	The data of various periods stored and accessible; information data used.
	Freight transportation analysis (AIS).	Freight movement, freight transportation income, Information data from KLASIFIK.	Information data used; synchronization of operation and analytical system data; data analysis (not using wagons, losses and currency corridor use).
	Registration of freight transportation process information data (NII).	Information data from KLASIFIK.	Information data used.

End of Table 5

Information system	Data	Use of data
Registration system of railway infrastructure use and decisions with the carriers (ADIIAS).	The state of infrastructure and property, tariffs of employment, information data from KLASIFIK.	The data of various periods stored and accessible; information data used.
Registration system of the train wagon arrangement (KVK).	physical condition, Train wagon arrangement and descriptions, information data from KLASIFIK.	Historic data about train wagon arrangement changes, change of the owner, wagon type, change of number, storage.
Passenger transportation		
Schedules of passenger trains (SAR – local routes, SAREX – international routes).	Schedules, prices, permits, permit deadlines, information data from KLASIFIK.	Information data used; storage of different time moment schedules, registration of operative long-term and short-term schedule changes.
The system of analysis of financial and statistical information about passenger transportation (APFIS).	Passenger transportation (flows), boarding in stations, operations of the ticket office, information data from KLASIFIK.	Information data used; analysis of the ticket sales at different time moments; „what if" data analysis.
Automatic system of the seats booked and train passenger transportation control (Express).	Passenger transportation (flows), schedules, train routes, prices, permits, stations (name, type, procedures).	Information data used; storage of the schedules in different periods, registration of operative long-term and short-term schedule changes.
Infrastructure		
Registration of equipment and software (APNIS).	Railway staff, the condition of the hardware and software in the workplace.	Automatic storage of the historic data about the personnel movement between different structural units; automatic storage of the historic data about the changes. of hardware an software;
The system of the databases of the station plans (SPED).	Documents of the technical descriptions of the stations: plans, schemes.	Automatic storage of previous version of documents where are modified or destructed.
Notification dissemination system (BUS-K).	List of notifications, list of railway sectors and tracks.	The data of various periods stored and accessible.

Conclusions

- The article is one of the initial scientific publications, which analyze the potentials and principles of the use of quite a rare method "Knowledge House", which is applied for assessing of the competitive advantage, on the theoretical as well as practical levels.
- The "Knowledge House" method is a component part of the body of methods, which are called competitive intelligence, and which may be used both with other methodologies and individually.
- The "Knowledge House" method is meant for collecting the information from external information sources. The method is distinguished for its adaptability, however, to apply this method to railway sector companies, qualified personnel is needed.
- With reference to the analyzed information the original table for collecting and analyzing of information has been created and the purposive questions, which are necessary for the analysis of information, have been formulated.
- The results of method application are possible where it is used together with DMS, DWS and DSS methodologies; in this way, the methods complement each other and a practical results are achieved, the application of which is defined having applied DSS methodology.
- Having applied the "Knowledge House" method, large flows of information are received, which must be stored in special data bases DWS, in this way analysts have an opportunity to trace the sequence of events and to carry out more accurate forecasts.
- DMS is the process of finding meaningful regularities, models and trends in large amounts of information by using model recognition, statistical and mathematical methods.
- To evaluate the potential opportunities of the competitors, it is expedient to make a summary of the methods used by the railway sector companies and competitor companies.
- To evaluate the potential of the company operation and information, it is expedient to make an analytical table of the data compiled in information systems.
- The methodologies, which are discussed, may be used for preparing and implementing individual projects, however, greater effectiveness is achieved by completing a constant data about the competitive situation in the market analysis.
- The performed analysis of the companies of the railway sector showed that the best result is achieved due to the constant process of monitoring of the relevant information and the structural and purposive analysis.
- The competition for freighting, which takes place in the international markets but not in the home ones, defines one of the general peculiarities of the companies of the railway sector especially considering the markets of the small countries.
- The method "Knowgledge House" is quite easy to adapt in order to assess the competitive position of the companies of the railway sector considering the rivals.

References

Boncella, R. 2003. Competitive intelligence and the web, *Communications of AIS* 12: 327–340.

Brandas, C. 2011. Decision support systems development: a methodological approach, *Journal of Applied Business Information Systems* 2(4): 151–157.

Chin, A. G. (Ed.). 2001. *Text databases and document management: theory and practice*. Hershey, PA: Idea Group Publishing.

Cody, W. F.; Kreulen, J. T.; Krishna, V.; Spangler, W. S. 2002. The integration of business intelligence and knowledge management, *IBM Systems Journal* 41(4): 697–713.
https://doi.org/10.1147/sj.414.0697

Darrow, B. 2003. Making the right choice-solution providers are evaluating a plethora of options as they puzzle over the future of business intelligence, *Computer Reseller News* 16–29.

Dailydka, S. 2013. *Passenger Transportation Strategy of SC Lithuanian Railways* [online], [cited 11 June 2016]. Available from Internet: http://dspace.vgtu.lt/bitstream/1/610/1/dailydka_33-41.pdf;

Dailydka, S.; Gaidelys, V. 2013. The systems of assessment of business surroundings in the companies of railways, in *2nd International Scientific Conference on Contemporary Issues in Business, Management and Education 2013*, 21 August, 2013, Amsterdam, the Netherlands.

Demidovs, V. 2006. *Development of models of the data ware of decision support systems at the railway*. Doctoral dissertation, Transport and Telecommunication Institute, Riga.

Deutsche Bahn stops short of service. 2015. [online], [cited 11 June 2016]. Available from internet: http://www.dw.de/deutsche-bahn-stops-short-of-service/a-17014566.

Development of Mobility Plan and Action Programme for Riga and Pieriga. 2009. *Analysis of the current situation*. First interim report. Ministry of Transport Republic of Latvia, Riga.

Estonian Technical Surveillance Agency. 2015. *Annual report of the Estonian technical surveillance authority* [online], [cited 11 June 2016]. Available from Internet: http://www.tja.ee/tja;

Gaidelys, V.; Valodkienė, G. 2011. The methods of selecting and assessing potential consumers used of by competitive intelligence, *Inzinerine Ekonomika – Engineering Economics* 22(2): 196–202 (in Lithuanian).

Gaidelys, V. 2009. Intelligence methods in order to gain competitive advantage, *Ekonomika ir vadyba* 14: 749–756.

Gaidelys, V. 2010. The role of competitive intelligence in the course of business process, *Ekonomika ir vadyba* 15: 1057–1064.

Gaidelys, V.; Meidutė, I. 2012. Instruments and methods of competitive intelligence, *Ekonomika ir vadyba* 17(3): 971–977.

Gaidelys, V.; Dailydka, S. 2013. The potentials for using of methods of competitive intelligence in the sector of railways, *Ekonomika ir vadyba* 18 (2): 256–262.

Gaidelys, V. 2011. *Konkurencinės žvalgybos panaudojimo problemos siekiant įgyti konkurencinį pranašumą* [Problems of the use of competitive intelligence in order to achieve a competitive advantage], in *International Conference "Contemporary Issues in Business, Management and Education' 2011"*, 17 November, 2011, Vilnius, Lithuania.

Gaidelys, V.; Dailydka, S. 2012. The potentials of use of competitive intelligence in strategic places, in *International Conference "Contemporary Issues in Business, Management and Education' 2012"*, 15 November, 2012, Vilnius, Lithuania.

Gaidelys, V. ; Dailydka, S. 2014a. The potentials of the use of instruments for the assessing of the business environment in the companies of the railway sector, in *8th International Scientific Conference "Business and management 2014"*, 15–16 May, 2014, Vilnius, Lithuania.

Gaidelys, V.; Dailydka, S. 2014b. Data transmission technology usage in the railway sector enterprises, economic assessment, in *International Conference on Contemporary Issues in Business, Management and Education*, 13–14 November, 2014, Vilnius, Lithuania.

Gasparėnienė, L.; Remeikienė, R.; Gaidelys, V. 2013. The opportunities of the use of competitive intelligence in business: literature review, *Journal of Small Business and Entrepreneurship Development* 1(2): 9–16.

Hall, H. 2000. Online information sources: tools of business intelligence?, *Journal of Information Science* 3(26): 139–152.

Hannula, M.; Pirttimaki, V. 2003. Business intelligence empirical study on the top 50. Finnish companies, *Journal of American Academy of Business* 2(2): 593–601.

Hequet, V.; Herrera, J. R.; Beushausen, H. N. 2013. *Identification of business opportunities within the solar industry for Saudi Arabian companies.* Berlin: Apricum GmbH.

Hilmola, O. P.; Henttu, V. 2015. Border-crossing constraints, railways and transit transports in Estonia, *Transportation Business & Management* 14: 72–79. https://doi.org/10.1016/j.rtbm.2014.10.010

Hoblitzell, T. 2003. Implementing best practices to drive ROI, *DM Review* 13(1): 40–59.

Houdeshel, G.; Watson, H. J. 1987. The management information and decision support systems (MIDS) at Lockheed-Georgia, *MIS Quarterly* 11(1): 127–141. https://doi.org/10.2307/248834

Imhoff, C. 2003. Keep your friends close, and your enemies closer, *DM Review* 13(4): 36–71.

Information Management for International Freight Trains. 2013. *Good practice.* DB Schenker Rail Romania SRL, 04/2013.

Jao, C. H. 2011. *Efficient decision support systems – practice and challenges from current to future.* Rijeka: Tech. https://doi.org/10.5772/682

Kestelyn, J. 2003. Intelligence, *Intelligent Enterprise* 6(2): 30–45.

Klinkevičiūtė, K. 2014. Duomenų saugyklos ir jų taikymai [Data warehouses and their application] [online], [cited 14 April 2016]. Available from Internet: https://fcis.vdu.lt/~k.klinkeviciute@infr.vdu.lt/duomenu_saugyklos_olap.htm

Kounaeva, E. 2003. *Short-term forecasts for freight transportation planning in the Ministry of Russian Railways.* SeUGI 21, Vienna.

Lisitsa, K. 2014. *Information-analytical system to monitor and provide forecasting for economics of the Russian railway industry* [online], [cited 12 May 2016]. Available from Internet: http://www.sascommunity.org/seugi/SEUGI2000/lisitsa_informationanalysis.pdf.

McEvily, S.; Eisenhardt, K.; Prescott, J. E. 2004. The global acquistion, leverage and protection of technological capabilities*, Strategic Management Journal* July.

Movchikov, I. 2004. *Evolution of the data warehouse at the Russian railways.* SEUGI 18 [online], [cited 15 May 2016]. Available from Internet: http://www.sascommunity.org/seugi/SEUGI2001/movchikow_evolution.pdf.

Movchikov, I. I. 2006. *The data warehouse at the Ministry of Russian Railways. SEUGI 18* [online], [cited 5 May 2016]. Available from Internet: http://www.sascommunity.org/seugi/SEUGI2000/movchikov_datawarehouse.pdf.

Miller, G.; Brautigam, D.; Gerlah, S. V. 2006. *Business intelligence: competency centers.* Cary: SAS Institute Inc.

Miller, J. P. (Ed.). 2000. *Millennium intelligence: understanding and conducting competitive intelligence in the digital age.* CyberAge Books, 27–30.

Musiał, M. 2013. *Transport and infrastructure in Poland: the current state and projects for the future.* Cracow: University of Economics [online], [cited 11 June 2016]. Available from Internet: http://info.infobitas.lt/.

Negash, S. 2004. Business intelligence, *Communications of the Association for Information Systems* 13(15): 120–132.

Petukhova, N. 2010. *Temporal data models in the information systems on the railway transport*. Transport and Telecommunication Institute: Riga.

Polak, K. 2015. *Polish companies face challenges with big data storage infrastructure* [online], [cited 11 June 2016]. Available from Internet: http://www.computerweekly.com/feature/Polish-companies-face-challenges-with-big-data-storage-infrastructure.

Porter, M. 1990. *Competitive advantage of nations*. London.
https://doi.org/10.1007/978-1-349-11336-1

Pilinkienė, V.; Deltuvaitė, V.; Daunorienė, A.; Gaidelys, V. 2016. *Competitiveness creation and maintenance in the postal services industry*. Springer International Publishing.
https://doi.org/10.1007/978-3-319-31906-3

Rudowski, M. H. 2014. Management information systems in Polish railway transport in the context of the technological and the organizational changes, *Information Systems in Management* 3(1): 32–48.

Scientific Research Analytic Center of Russian Railways Ministry. 2015. *Economical monitoring and forecasting system of Russian railways* [online], [cited 10 May 2016]. Available from Internet: http://cejsh.icm.edu.pl/cejsh/element/bwmeta1.element.desklight-e1d0c111-d60e-40ea-83f7-290a0eac57b9.

Study on Strategic Evaluation on Transport Investment Priorities under Structural and Cohesion Funds for the Programming Period 2007–2013. 2014. *Country report Latvia* [online], [cited 1 June 2016]. Available from Internet: http://www.londonpressservice.org.uk/haeu/20131031020146/http://ec.europa.eu/regional_policy/sources/docgener/evaluation/pdf/strategic_trans.pdf.

Teece, D. J. 2010. Business models, *Business Strategy and Innovation* 43(2–3): 172–194.

VAB Latvijas Dzelzceļš Annual Report (2009–2014). 2014. [online], [cited 04 April 2016]. Available from Internet: http://www.ldz.lv/en/annual-reports.

World Bank Document. 2015. *Urban Transport in Baltic States* [online], [cited 11 June 2016]. Available from Internet: http://lnweb90.worldbank.org/ECA/eca.nsf/Attachments/baltic11/$File/11urban.pdf.

Wiesendanger, R.; Storchi, M. 2005. *Zusammenfassung SLAM. Author: Marco Storchi & Roger Wiesendanger Version ZF SLAM/Benutzer* [online], [cited 19 May 2016]. Available from Internet: http://docplayer.org/472444-Zusammenfassung-slam-autor-marco-storchi-roger-wiesendanger-version-zf-slam-030405-benutzer.html.

Shumanov, P. S. 2014. Analiz prakticheskogo opyta zheleznich dorog po resheniju problem zheleznodorozhnyx pereezdov, *Molodoi Uchenii* 20: 231–233 (in Russian).

Yuanyun, S. 2015. *A study on architecture of railway transportation intelligent decision support system based on data warehouse technology*. Springer.

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