



RISKS IN THE SHIPBUILDING AND SHIP REPAIR INDUSTRY IN LATVIA

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Annotation

It is impossible to run business without facing any risk. Improper attitude by the senior management of a company to risks may lead to serious consequences: financial losses, decline in stock prices, and loss of business reputation or even bankruptcy. The task of the research is to assess the situation of risks in the industry of shipbuilding and ship repair in Latvia. The novelty of the research is determined by the fact that for the first time the main risks have been identified and analysed in the industry of shipbuilding and ship repair in Latvia. The object of the research is the most important risks in the shipbuilding industry in Latvia. The goal of the research is to identify, analyse and rank the main risks in the shipbuilding industry in Latvia by the probability of undesirable results and the extent of possible damage. Methods of the research are the analysis of statistical data, systems analysis of shipbuilding industry and its environment. Within the framework of the research, it was found out that most risks in the shipbuilding and ship repair industry in Latvia could be attributed to very small, small and medium risks. There are virtually no risks of a magnitude of 0.6 to 1.0. By the extent of possible losses, risks occupy the entire range of values starting from negligible to catastrophic damage. The final decision on the adoption and optimisation of risks at the companies of the industry should be the prerogative of the senior management of a particular company. Senior management of companies of the industry should devote particular attention to the operation of marketing departments, as their responsibilities include commercial and financial risks. Commercial risks are very small in magnitude, but can have a very large extent of possible damage. Financial risks are large enough in magnitude – to 0.6 and have a great extent of possible damage. It is necessary to devote constant attention to political risks, especially at the international scale, as well as to monitor changes in the tax legislation of Latvia.

KEY WORDS: shipbuilding branch, risk; matrix of risks; tolerance zone; risk appetite.

Introduction

In a market economy, companies operate under conditions of uncertainty. At the beginning of the 20th century, these uncertainties have increased significantly, as apart from economic crisis, political ones appear; the world economy has become global, and there has been much more competition nowadays. Any organisation, regardless of products it manufactures, is constantly exposed to risks. It is impossible to run business without facing any risk (Boulton 2000). The risk is introduced to the business by uncertainties. The term “risk” refers to an event or action that may adversely affect the company’s ability to achieve its objectives and may also prevent the successful implementation of its strategy (The Economist ...1995). Risk is one of the important concepts, which is always associated with the vigorous activity of people in all walks of life. Improper attitude by the senior management of a company to risks may lead to serious consequences: financial losses, decline in stock prices, and loss of business reputation or even bankruptcy.

When the senior management of a company decides to invest in a particular project, it is always the task of choosing the most optimal and best solution out of many options under given circumstances. Generally, in the simplest case, each solution has two main characteristics: the average expected return and the average expected risk. Thus, a two-criterion optimisation problem is solved in order to choose the best solution (Малыхин 1999). When choosing the best variant of solution, one should strive to ensure the effectiveness of solution, i.e. income should exceed potential risks that may arise. There are different ways of setting these optimisation problems. For

example, the company has an opportunity to implement several projects. Each project, for example α , has its own two characteristics: $E(\alpha)$ – efficiency and $R(\alpha)$ – risk. Projects differ from each other by at least one characteristic. It is assumed that project α is dominated by project β , if $E(\alpha) \geq E(\beta)$ and $R(\alpha) \leq R(\beta)$. α – a dominant project, and β – a dominated project. The best project should be found among non-dominated projects. The set of non-dominated projects is called the Pareto optimal set. If the project belongs to the Pareto set, then by any of its characteristics it is always possible to find the other characteristic.

Subject and relevance, theoretical basis. Modern investment theory studies sets of projects, i.e. “portfolios” taking into account both the returns and the risks of individual projects and the portfolio as a whole. The probabilistic non-deterministic nature of the variables under consideration is also taken into account. Different models of portfolios are developed, such as the Markowitz model, Black model, Tobin model etc. (Малыхин 1999). These models allow reducing the risk of portfolio as a whole compared with the risks of projects included in it. It is possible to set and solve the problem of portfolio optimisation. This optimisation problem has multiple criteria. Different approaches are used to solve these problems. The three most common methods are as follows:

1. As it is almost impossible to find the best solution taking into account all criteria at once, the most effective solution is found in the given situation.

2. One of the criteria is assumed to be the main one, the rest of the criteria are used to set critical values. For

example, the risk should be minimal, and the income should not be below a certain value.

3. Convolution of all criteria in one is used.

As a measure for the formalisation of the concept “expected return”, the mathematical expectation of income M is used, around which the random values of income are scattered. A measure of risk is assumed to be the degree of dispersion of project results – the variance of income σ^2 . These measures were proposed by G. Markowitz in the middle of the 20th century. At present, instead of variance σ^2 the standard deviation of random income σ is commonly used since it has the same dimension as the income. The analytical solution to a multi-criteria optimisation problem, for example, by using the second or third method requires a large amount of statistical data that are almost impossible to obtain under the present conditions of the shipbuilding industry in Latvia, as well as demands complicated calculations. Similar calculations are performed by the world’s largest companies that have a long experience and well-functioning system of risk management: E.I. Du Pont de Nemours and Co, United Grain Growers Limited etc. (Barton 2002). For companies operating in the shipbuilding and ship repair industry in Latvia, it is more appropriate to use the system of assessment of risk-to-revenue ratio by leading experts of companies, perhaps, also by attracted external experts in order to make decisions regarding investment in projects.

The process of finding the optimal solution to invest in projects can be represented graphically in the criterion plane M, σ (Fig. 1) (Трояновский 2002).

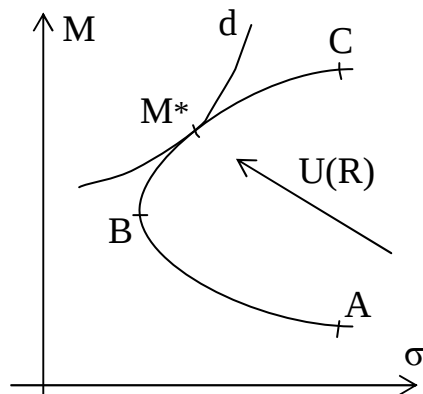


Fig. 1. Determination of the point of optimal solution M^* to the problem of selecting the best project geometrically.

Figure 1 depicts a typical curve ABC – the set of efficient portfolios of projects. The region BC is the Pareto optimal set, the region AB is the set of dominant projects. $U(R)$ is a vector of the utility function, which is represented by the indifference curve d . The investor’s indifference curve d represents a set of equivalent portfolios. The higher the indifference curve d , the greater the utility function. When the curve d approaches the vector $U(R)$, the last tangency point of the curve d and the region BC of the Pareto optimal set is M^* . This will be the point of optimal solution to the project selection problem.

The task of the research is to assess the situation of risks in the industry of shipbuilding and ship repair in Latvia. *The novelty of the research* is determined by the fact that for the first time the main risks have been identified and analysed in the industry of shipbuilding and ship repair in Latvia. *The object of the research* is the most important risks in the shipbuilding industry in Latvia, which can occur with a certain probability and result in significant losses of companies. *The goal of the research* is to identify, analyse and rank the main risks in the shipbuilding industry in Latvia by the probability of undesirable results and the extent of possible damage. *Methods of the research* are the analysis of statistical data, systems analysis of shipbuilding industry and its environment.

Main risks of companies of the industry and their ranking

Companies of the shipbuilding industry in Latvia, likewise firms of other sectors of national economy, are constantly exposed to numerous risks. So far, the issues of comprehensive and integrated approach to risk management in the industry have been given little attention; however, there have been cases when companies suffered very heavy losses. For example, at Liepaja shipyard a customer suddenly refused to accept and pay for the order already made – the yacht worth about 1.5 million €. At the beginning of the 21st century, the issues of risk management are no longer only the concern of the company financial experts. Previously, it was believed that negative consequences of unforeseen events were limited to a certain area, for example, administrative or financial. But in fact, they affect several different areas of business. Therefore, an integral approach to risks that takes into account all the relationships and mutual interaction is considered to be more appropriate and accurate.

In accordance with a new paradigm of risk management, companies are beginning to use the integrated rather than fragmented approach to risk. It should be noted that in the world’s leading companies (Microsoft Corporation, Du Pont de Nemours and Co, UGG, etc.) the analysis of risks and their ranking have become the responsibility of top managers – president, vice-president of a company, etc. (Stewart 2000). Microsoft is a “pioneer” in a comprehensive integrated approach to risk management (Teach 1999, Moules 1999). All the work with risks is coordinated and controlled by the top executive management of company; it becomes a continuous process, involving almost all the top and mid-level employees of companies. Both internal and external risks faced by the company are considered and controlled to the extent possible. The approach to risk management should be structured and consistent. It should combine strategy, processes, people, technologies for the assessment and management of uncertainty factors that may affect the achievement of objectives both negatively and positively (De Loach 2000).

It is known that there is no single universal approach to the organisation and implementation of risk management in different companies of the same industry. Much depends on the attitude towards it by the senior management of a company and the level of cultural

environment of a company. In general, the primary responsibility for the identification and monitoring of risks should be assigned to the senior management of a company, as eventually the entire responsibility for the unfavourable impact on the company due to consequences of risks unaccounted and not taken into account lies exactly on the senior management of a company. In today's rapidly changing international business, risk is not always obvious. Therefore, almost all the management staff of a company should always be engaged in risk identification. For this reason, the world's leading companies often use the scenario analysis and self-assessment. Identification of risks is carried out on a regular basis; risks are also correlated with real events at the related enterprises in a home country and abroad. In some foreign companies, leading specialists use the method of brainstorming. To identify the risks, leading foreign companies often attract external consultants as the so-called "fresh mind" for the impartial view of the situation. Identified risks should be ranked taking into account their importance, severity of consequences and their probability. Experts of Microsoft Corporation consider that more information is usually available about repetitive events and risks associated with smaller extent of possible negative consequences. At the same time, there is less information about infrequent events but with serious consequences (Callinicos 1999, Microsoft 2000).

In the present research, in order to identify, analyse and rank the main risks by the possibility of undesirable effects on companies operating in the shipbuilding and ship repair industry in Latvia, a group of senior specialists of a number of leading industry companies was gathered. The external consultant of RTU was also interviewed to found out the viewpoint on the risks and their possible negative impact. The final decision on the ranking of risks was entrusted to chief executives of certain enterprises by analogy with Microsoft Corporation (Callinicos 1999, Microsoft 2000). The scenario analysis method was used, including a study of long-term perspectives, as well as the procedure of individual assessments. In the process of scenario analysis, not only possible scenarios of development of situations associated with risks and their negative effects were considered, but also the real events and their negative effects on other companies in Latvia and abroad were taken into account. It is almost impossible to forecast situations and be ready to face all possible business risks (McCarthy 2004). The study identified and analysed only the following main risks.

1. Political risks: various economic sanctions; upheaval, terrorist attacks in countries where there are ordering companies (customers). The magnitude of the risk (probability of an undesirable outcome) is 0.3–0.4.

2. Social risks: the possibility of strike of workers at a particular company or in solidarity with other organisations. The magnitude of the risk is 0.05–0.1.

3. Commercial risks: refusal of customers from already finished products and to pay for all work performed. The magnitude of the risk is 0.05–0.1.

4. Financial risks: partial or total refusal of customers to pay in time for the work carried out due to various reasons; currency risks due to changes in exchange rates. The magnitude of the risk is 0.4–0.5.

5. Production risks: the inability to execute the order in time due to various reasons (project documentation is not ready; raw materials are not received in the required time frame, lack of specialists, etc.). The magnitude of the risk is 0.2–0.3.

6. Risks of innovation: refusal to perform initiated projects due to various reasons (lack of money, suppliers failed, defects revealed in new equipment, etc.). In this group of risks, it is taken into account that innovations are always associated with an increased risk of 15–20% (Fathutdinov 2000). The magnitude of the risk is 0.3–0.35.

7. Technical risks: violation of technology, defect, failure to comply with safety regulations, technological accidents, the effect of weather conditions (low air temperature). The magnitude of the risk is 0.05–0.1.

8. Transportation risks: damage occurred to units and materials as a result of transportation, transportation delays, loss or theft of cargo, etc. The magnitude of the risk is 0.1–0.2.

9. Ecological risks: technogenic accidents; fuel, lubricant spills, etc. The magnitude of the risk is 0.1–0.15.

10. Risks of changes in legislation: changes in the tax system may reduce the competitiveness of companies, lead to direct financial losses. The magnitude of the risk is 0.1–0.2.

After identifying the main risks and determining their magnitude, ranking of risks, depending on the extent of possible damage, was performed. Based on the assessment results, the authors built the matrix of risks, which were classified according to the probability of their occurrence and severity, i.e. the extent of possible damage (Preston 2002). To construct the matrix, the author used a 6-point empirical scale of probability of risks and their ranking, as well as a 6-point scale of severity of possible damage (Waring 1998, Williams 1998). In accordance with the ranking results, the matrix cells demonstrate risk numbers from the given list (Table 1). The ranking shows that the greatest (catastrophic) extent of potential damage is characteristic of commercial risks (3) and risks associated with changes in legislation (10). However, the magnitude of these risks is very small and small, respectively. By the magnitude of risks, the most serious risks are financial risks (4) – "a large risk" and political risks (1), as well as the risks of innovation (6) – "medium risks". By their magnitude, most risks refer to the group of "small" and "very small risks", and by the possible damage they do not exceed the medium extent.

Based on the experience of successful companies of the world, it is possible to state using the matrix of risks that risks of innovation (6) and commercial risks (3) are in the so-called "tolerance" zone – it is the diagonal of the matrix of risks coming from cell a6 to cell f1 (Table 1) (Borge 2001). Tolerance or propensity for risk is a concept that is associated with people, decision-making and characterises the severity of risks the senior management of a company is able to adopt, sustain and successfully optimise. These risks are most acceptable to a company; in case of these risks profit will be the greatest possible under the given conditions. The desire to

obtain even more profit will increase risks to the extent unacceptable to the senior management of a company.

Optimisation of risks being outside the tolerance zone, in principle, should be performed as follows (Preston 2002, McCarthy 2004). From the zone of the most dangerous critical risks that can lead to considerable losses of a company and are concentrated in the corner cell f6 of the matrix and around it, it is necessary to move to the tolerance zone in the direction of the second diagonal a1–f6 of the matrix of risks. This would correspond to a shift on the curve of Pareto set from point C to point B on the criterion plane (M, σ)(Fig. 1). Thanks to the activities providing such a shift, the risk will reduce, and the amount of potential revenue will also

decrease. From the zone of very small risks and negligible possible damage that is around the cell a1 of matrix of risks, for the purpose of optimisation it is necessary to move in the same direction to the diagonal a1–f6 approaching the tolerance zone. This would correspond to the movement along the Pareto curve from point B to point C. For these risks, their magnitude will increase, and the expected returns will also increase. Ideally, in both situations with very low and critically high risks, the displacement on the Pareto optimal set should be terminated in the zone of point M* corresponding to the optimal value of the utility function for a given set of project portfolios.

Table 1. Matrix of risks in the shipbuilding and ship repair industry in Latvia

№	Probability of undesirable outcome	Gradation of risks	Extent of possible damage					
			negligible	small	medium	large	very significant	catastrophic
			a	b	c	d	e	f
1	0.0 – 0.1	very small		2; 7				3
2	>0.1 – 0.3	small	9	8	5			10
3	>0.3 – 0.4	medium				6	1	
4	>0.4 – 0.6	large					4	
5	>0.6 – 0.8	maximum permissible						
6	>0.8 – 1.0	critical						

For each particular company of the shipbuilding and ship repair industry in Latvia, the process of risk optimisation, of course, will have its own individual character depending on the existing circumstances and the risk appetite of the senior management of a company. Among the dangerous risks mentioned above, it is necessary to highlight the external risks associated with changes in legislation as in Latvia these changes occur very often and need to be constantly monitored. Commercial and financial risks, work with clients, as well as political risks deserve permanent attention. These risks should be thoroughly monitored, first of all, by employees of marketing departments.

Conclusions

Within the framework of the research, it was found out that most risks in the shipbuilding and ship repair industry in Latvia could be attributed to very small, small and medium risks. There are virtually no risks of a magnitude of 0.6 to 1.0. By the extent of possible losses, risks occupy the entire range of values starting from negligible to catastrophic damage. Each company of the industry should establish its own level of risk tolerance in accordance with its own characteristics of risk perception and risk appetite of the senior management of a company. The final decision on the adoption and optimisation of risks at the companies of the industry should be the prerogative of the senior management of a particular company. Senior management of companies of the

industry should devote particular attention to the operation of marketing departments, as their responsibilities include commercial and financial risks. Commercial risks are very small in magnitude, but can have a very large extent of possible damage. Financial risks are large enough in magnitude – to 0.6 and have a great extent of possible damage. It is necessary to devote constant attention to political risks, especially at the international scale, as well as to monitor changes in the tax legislation of Latvia. The latter risks are small in magnitude, but the extent of possible damage can be very considerable.

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Summary

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