RELAÇÕES INTERNACIONAIS NO MUNDO ATUAL
CENTRO UNIVERSITÁRIO CURITIBA - UNICURITIBA - VOLUME 2 - NÚMERO 3/2021 CURITIBA/PARANÁ/BRASIL - PÁGINAS 44 A 59 - ISSN: 2316-2880

DECISION-MAKING MODELING IN THE CONTEXT OF RISK AND UNCERTAINTY CAUSED BY SOCIAL AND POLITICAL PROCESSES

MODELAGEM DA TOMADA DE DECISÃO NO CONTEXTO DO RISCO E INCERTEZA CAUSADOS POR PROCESSOS SOCIAIS E POLÍTICOS

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ABSTRACT

Objective: This article attempts to study and model the decision-making process under risk conditions caused by social and political shifts. The main purpose of the article is to identify the major patterns that determine the features of risk assessment in business as the main element contributing to the achievement of economic security of the organization, as well as to conduct a comparative analysis of methods for assessing and managing investment risks.

Methods: Methods of cognition, retrospective and documentary analysis, as well as synthesis, generalization, and systematization were used as methods in the performance of the work. In contemporary economic analysis, various methods of decision-making in risky situations are used.

Conclusion: The most effective ways to reduce risk in the context of instability of the economic and political situation in Russia are the scenarios based method and the hierarchy analysis method. Besides, the features of decision-making in Internet marketing are considered in the present article.

Revista Relações Internacionais do Mundo Atual Unicuritiba.
[Received/Recebido: Março 17, 2022; Accepted/Aceito Abril 01, 2022]

Keywords: model; decision-making; investment; risk; risk management.

RESUMO
Objetivo: Este artigo tenta estudar e modelar o processo de tomada de decisão em condições de risco causadas por mudanças sociais e políticas. O objetivo principal do artigo é identificar os principais padrões que determinam as características da avaliação de riscos nas empresas como o principal elemento que contribui para a conquista da segurança econômica da organização, bem como realizar uma análise comparativa dos métodos de avaliação e gestão riscos de investimento.

Métodos: Métodos de cognição, análise retrospectiva e documental, bem como síntese, generalização e sistematização foram utilizados como métodos na realização do trabalho. Na análise econômica contemporânea, são utilizados diversos métodos de tomada de decisão em situações de risco.

Conclusão: As formas mais eficazes de reduzir o risco no contexto de instabilidade da situação econômica e política na Rússia são o método baseado em cenários e o método de análise hierárquica. Além disso, as características da tomada de decisão em marketing na Internet são consideradas no presente artigo.

Palavras-chave: modelo; tomando uma decisão; investimento; risco; gerenciamento de riscos.

1 INTRODUCTION

The choice of a managerial decision directly depends on a variety of external and internal factors related to both the decision-maker (DM) and the specifics of the manager's project activity. The decision-making method can become more complicated, up to the point of non-fulfillment of an order under risk conditions. At that, the high risk does not indicate the exact failure of the decision made, and mainly depends on many factors taken into account when choosing alternative solutions (Andreeva, 1999).

[Received/Recebido: Março 17, 2022; Accepted/Aceito Abril 01, 2022]

In the context of the digital economy, quite a lot of actions and operations are carried out using computer modeling. Today, such methods of decision-making under risk conditions are used by almost all digital market players. The main problem of decision-making methods in risk conditions is that they are not universal. Each technique is most often suitable for a specific case, which is solved by trial and error. Managers try to find the optimal solution by going through alternative solutions using classical Pareto methods or using stochastic decision-making methods. In this case, the company may lose not only money from the failure of the project but also its reputation as a brand, which currently is one of the key problems of the company in contemporary business conditions. Thus, the article is of particular relevance for modern enterprises that operate almost always in high-risk environments.

Tasks to achieve the goal are as follows:

- Analyzing the concept of decision-making;
- Classifying decision-making models depending on the conditions;
- Analyzing the tools and the decision-making process;
- Highlighting the features of decision-making in the Internet marketing market.

2 LITERATURE REVIEW

Theorists and practitioners of economic modeling came to decision-making technologies back in the 18th and 19th centuries with the appearance of the first machine-based processes at the enterprise, where the transparency of information on the market was increased, and entrepreneurs had access to data for the primary analysis of the risk occurrence probabilities and a favorable decision (Traviny Magura y Kurbatova, 2014). The very concept of decision-making was formulated in management later after practitioners introduced it in professional psychology. According to some scientists,

[Received/Recebido: Março 17, 2022; Accepted/Aceito Abril 01, 2022]

decision-making is a cognitive process, as a result of which the DM chooses the best solution depending on external and internal conditions (Vinarsky y Gutgarts¸ 2015).

The object of decision-making is considered to be a certain business process or the value of the company. In financial management, securities or even a single transaction of a company can act as an object. In the decision-making process, the manager forms criteria for assessment and then determines alternative solutions.

According to practitioners, in management, the concept of decision-making means a systematic choice of alternatives that solves the task, set by management. As a rule, decisions can be made under conditions of certainty, uncertainty, and risk. In the first case, the manager has the necessary information about the market and the company and can choose more likely a favorable solution for the management and the company in general. Everything is much more complicated in the context of uncertainty. In the second case, the manager does not have any data or their amount is too small for correctly evaluating alternatives. In this case, there is a high probability of making a mistake and losing money, reputation, and, as a result, customers and market share. In the third case associated with the risk, the manager has insufficient data, but still, taking into account the already available information, he can form criteria and evaluate each event based on its probability. As a result, it all comes down to the fact that the manager chooses either a less risky option or a more risky option depending on the decision-making model and willingness to take risks. Practice shows that the tendency to increased risk brings more results to managers at the stage of company growth than gradually investing in less risky projects (Tebekin, 2014).

Risk is any probability that arises as a result of any activity. The risk may be relatively large and small, but at the same time, it may be absent, depending on the company's chosen alternatives. The higher the risk, the higher are the consequences of

[Received/Recebido: Março 17, 2022; Accepted/Aceito Abril 01, 2022]

the failure or misfortune of the company, but the higher is the effectiveness in case of a positive outcome (Adizes, 2014; Tambovtsev, 2010; Trofimov y Trofimova, 2013).

A typical situation that needs to be resolved in economic or any other case is also considered a risk. When making a decision, the risk increases for reasons of rapid changes in external or internal conditions. In management theory, it is determined that in most cases managers tend not to take risks due to the rapidly changing business environment. The more technologically advanced the industry, the more volatile and changeable is the risk. Hence, even with full knowledge of the market, the company has a high risk.

The decision-making process looks quite simple. Classical theory determines only five steps towards making a decision:

1. Assessing the problem;
2. Considering alternatives;
3. Evaluating alternatives;
4. Announcing about the selected decision;
5. Making a decision (Urubkov y Fedotov, 2011; Firsova y Melnik, 2015).

The modified theoretical foundations include additional steps, such as risk assessment and building alternatives separately for risks, if it is a question of decision-making in a risk environment. With a large number of reduced risks, the decision-making process can occur in the classical form without taking into account risks.

[Received/Recebido: Março 17, 2022; Accepted/Aceito Abril 01, 2022]

3 DECISION-MAKING MODELS AND METHODS

In contemporary management practice, there are a large number of decision-making models that are not always suitable for modern economic realities. Nevertheless, in the classical theory of management, several decision-making models are distinguished which are considered below.

- Game theory

Game theory is a model in the form of a game, which is used to predict the response of competitors to the chosen strategy of the company in a playful way. This model is infinitely improved and modified since it has certain difficulties and subtleties in determining probabilities. The problem also lies in the absence of cause-and-effect relationships during the choice of a particular behavior strategy, since some entrepreneurs tend to act stochastically (Frager y Fadiman, 2004; Hanson, 2001).

- Queue theory models

The queue theory model is a classic model of a service business which takes into account the number of visitors and the waiting time for receiving an order or service. This model is actively used in delivery services, household businesses, and the automotive market. The applicability of the model is quite high and accessible to any entrepreneur who does not have special knowledge in mathematical modeling. Therefore this model is very popular among most entrepreneurs.

- Inventory management models

The inventory management model is a classic model for manufacturing and logistics companies. Employing this model, entrepreneurs determine the optimal amount

[Received/Recebido: Março 17, 2022; Accepted/Aceito Abril 01, 2022]

of manufactured goods and distribute the remnants of finished products for repeated overproduction or disposal. However, the efficiency of the model is not proven with a high probability, since it was possible to determine the full efficiency only in artificially prepared conditions. The model did not take root well in practice, since it was replaced by more universal decision-making models, which also touch upon the time interval, and more accurate probability scales (Cherednichenko, 2013; Exler, 2010; Khokhlov, 2003).

- Linear programming model

This model was widely used since it is sensitive to nuances of business with unused materials and unrealized goods or services. The linear programming model allows assessing the economic situation on the market and, depending on the company's capabilities, choosing the optimal strategy to increase business efficiency at constant losses.

- Transport tasks

These tasks are associated with classical problems involving the optimization of resources delivered from point A to point B. It is used in conjunction with the inventory management model. The model in its perfect form can take into account the cost of materials and estimate the total cost of delivering goods from one point to another. As a rule, companies in the Russian market do not evaluate transport tasks, preferring to raise the price of goods above the market.

- Simulation modeling

The simulation model allows creating a unique experiment that demonstrates the forecast based on the selected solution of the company. The model is very effective if information about the market and competitors is reliable. This model has been widely used in the digital economy with increased transparency of information (Algin, 1991; Kiseleva y Simonovich, 2014; Redhead y Hughes, 2005).

[Received/Recebido: Março 17, 2022; Accepted/Aceito Abril 01, 2022]

- Network analysis

The standard graph theory is embedded in the model, which implies the calculation of the optimal path from the development to the sale of goods to the end consumer. The model represents a graphical method, in which the company's actions can be divided into alternative strategies, and evaluated visually using graphs and calculations,

- Economic analysis

Economic analysis is the most popular decision-making model, used almost everywhere. The model touches upon all the financial and economic resources of the company, using basic analysis tools to assess the economic status of the company. The model allows determining profitability indicators, break-even points, and possible exit from the profitability threshold (Vlasov, 2013; Kiseleva, 2002; Khokhlov, 2003).

The basic economic and mathematical theory employs the following decision-making methods:

1. Maximax – a solution during which the maximum is selected from all maximum values.

2. Maximin – a solution in which the maximum is selected from the minimum values.

3. Minimax – a solution that represents minimization at maximum losses.

4. Hurwitz criterion is an intermediate method representing the solution between maximax and maximin for choosing the optimal solution.

[Received/Recebido: Março 17, 2022; Accepted/Aceito Abril 01, 2022]

Some other decision-making methods, described below, should also be taken into account.

• Decision tree;

The decision tree represents a unique illustrative solution that uses branches to illustrate possible alternatives. It integrates perfectly with probabilistic methods and the payment matrix (Dosugova, 2011; Avdiysky, 2012).

• Payment matrix

Payment matrix is a method taken from the statistical theory of solutions. It involves creating a probability matrix with the prices of goods or services. Next, several options for the outcome are considered. As a result of calculating the mathematical expectation and deviation, the manager gets the opportunity to choose the most relevant strategy.

• Forecasting

Forecasting is a simple technique involving informal, quantitative, and qualitative assessment values for selecting the optimal solution. Forecasting is used perfectly in combination with the payment matrix and the decision tree, without ignoring the data obtained from other methods.

4 RESULTS AND DISCUSSION

DECISION-MAKING IN THE INTERNET MARKETING MARKET

In the contemporary world, digital technologies do not bypass business. Due to the large-scale digitalization of the economy, the level of competition in most markets has

[Received/Recebido: Março 17, 2022; Accepted/Aceito Abril 01, 2022]

increased significantly. Today, to properly position the product on the market, companies need to master new communication channels with consumers and use customary marketing tools in new market environments, transforming and adapting them to the changing economy. Due to the above, Internet marketing seems to be a fairly effective method of contacting the buyer.

There are not much qualified specialists who are deeply versed in the peculiarities of conducting a marketing campaign on the Internet. Therefore, many companies prefer to outsource this process, resorting to the assistance of professional Internet marketing studios.

The Internet marketing studio develops a marketing strategy from scratch, affecting all aspects of promotion in the digital space, and also makes adjustments to the existing strategy to modernize it.

When it comes to decision-making in the Internet marketing market, the main focus is on consumer behavior. The dynamics of content produced by companies with similar business cases but different positioning in the online environment can provoke ambiguous responses from consumers. Therefore, when building a mathematical model, it is worth making allowances for the error due to the so-called emotional demand (Chernova y Kudryavtsev, 2003; Shapkin y Shapkin, 2014; Morrow, et al., 2007).

DEVELOPMENT OF A SOLUTION FOR A COMPANY INVOLVED IN THE INTERNET MARKETING

The main area of the firm’s activity is creating detailed selling content for companies. In other words, the company is engaged in the production of content. At the recent meeting, the company's management analyzed the content marketing market.

[Received/Recebido: Março 17, 2022; Accepted/Aceito Abril 01, 2022]

When expanding the staff, the company can increase the number of text materials to maximize profit.

It is worth noting that with a favorable market situation and an increase in the amount of content, the company will be able to earn 502,000 rubles, while in case of an unfavorable situation, the loss from the increased content will be 306,000 rubles since such texts will not be needed by customers and will cause an unpleasant response. If not expanding the amount of content, then with a favorable market condition, in the event of a change in the interests of readers, the company will be able to earn 412,000 rubles, while with an unfavorable situation and a small amount of content, the loss will be only 203,000 rubles. It is necessary to make a decision in risk conditions, where the probabilities of occurrence of a favorable and unfavorable situation are estimated similar, which is equal to 0.5.

First of all, a table of outcomes with probabilities is created (Table 1).

Table 1. Source data table

The company's decision / Market condition	Favorable condition	Unfavorable condition
Increase in content	502,000 rubles	- 412,000 rubles
A small batch of texts	306,000 rubles	-203,000 rubles
Probability of occurrence	0.5	0.5

Further, to determine the optimal decision method, it is proposed to use the decision tree method based on theoretical foundations. The primary tree is shown in Figure 1.

[Received/Recebido: Março 17, 2022; Accepted/Aceito Abril 01, 2022]

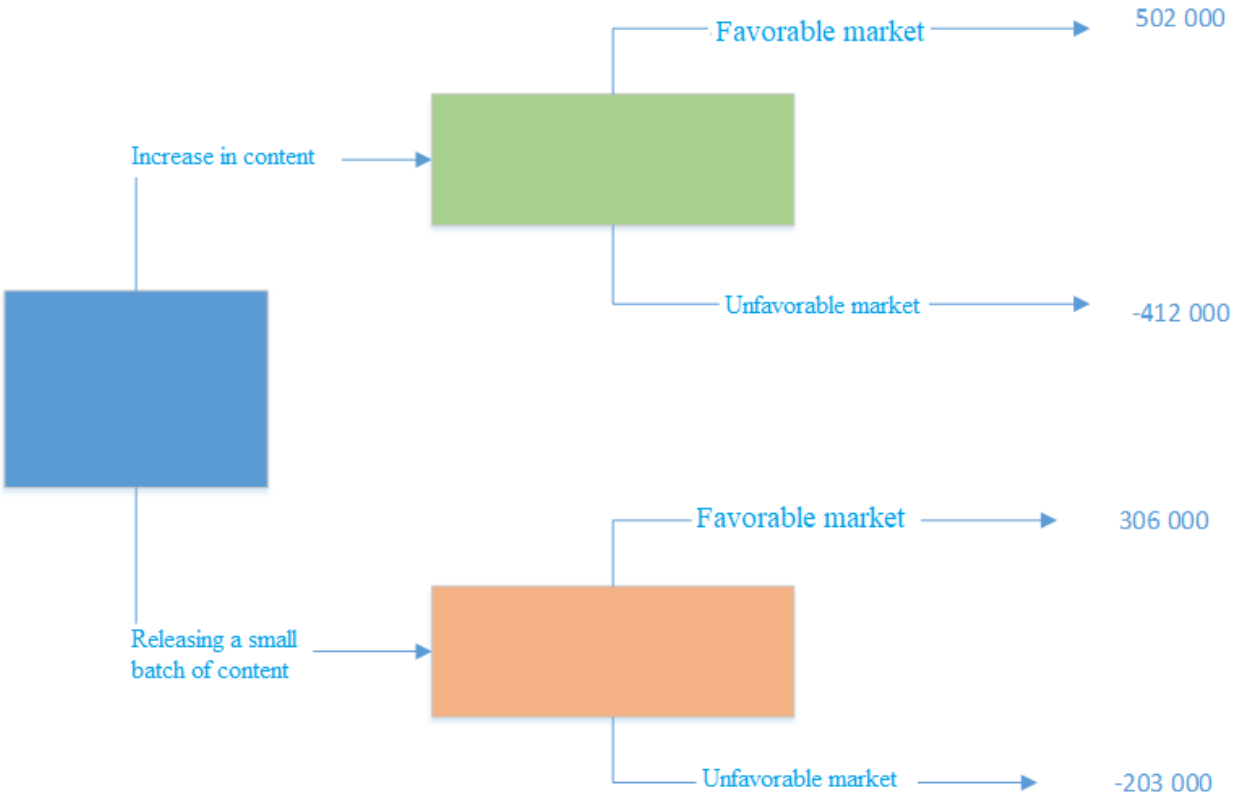

Figure 1. The decision tree for the content studio

Next, the expected gain from each strategy is calculated. In this case, there are only two company strategies.

In the first case:

502,000*0.5+0.5*(-412,000) = 251,000 – 206.000 = 45,000 rubles,

while in the second case:

306,000*0.5+0.5*(-203,000) = 153,000 – 101,500 = 51,500 rubles.

As a result, the final decision tree will look like shown in Figure 2.

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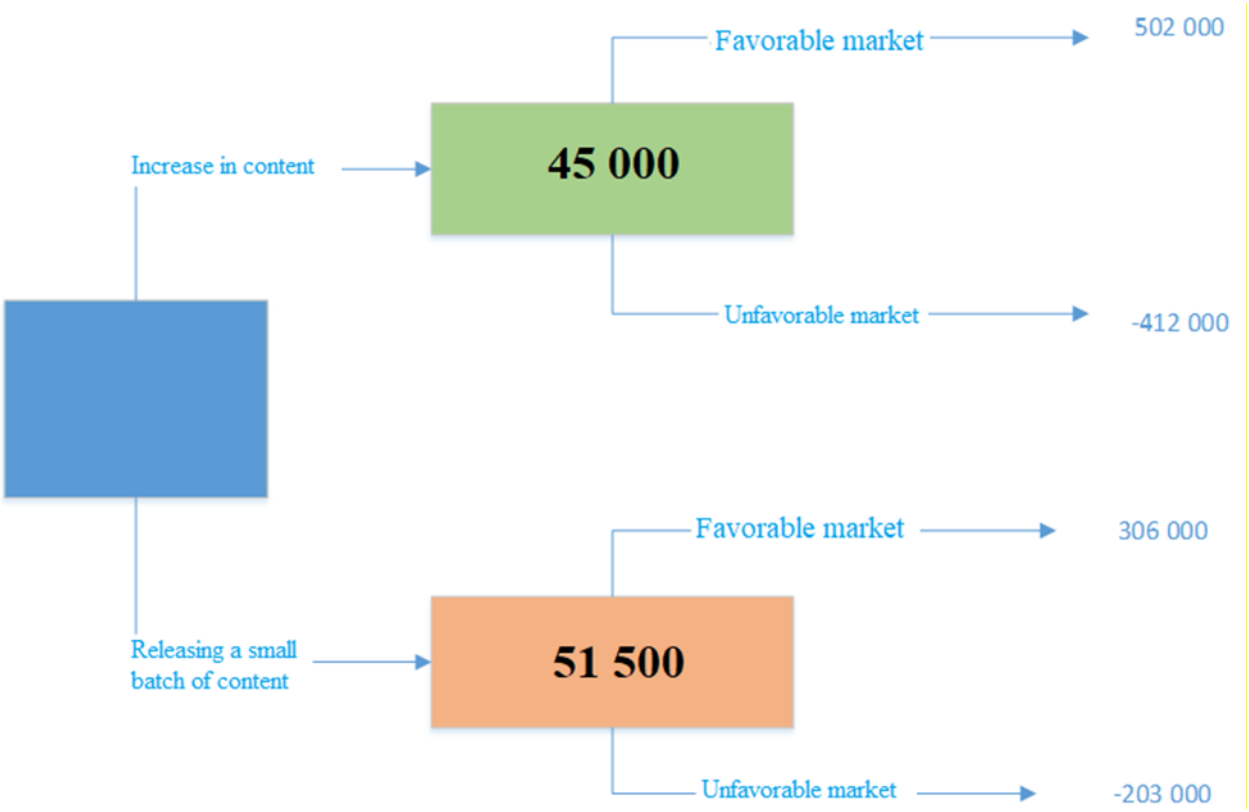

Figure 2. The final decision tree for the company

As a result, as can be seen from the presented decision, it is profitable for the company to release a small batch of content. In this case, when expanding the staff, it is recommended to take an employee on a part-time basis so that the amount of content is small for the company. In this case, even in an unfavorable market situation, the company's losses are not so large. Thus, the company is recommended not to increase the amount of content, since the losses for the business in an unfavorable situation are quite large.

5 CONCLUSION

[Received/Recebido: Março 17, 2022; Accepted/Aceito Abril 01, 2022]

In a conclusion, it is worth saying that decision-making models in the context of risk and uncertainty have very different applications depending on the environment in which the business operates. The more complex and technological a business is, the more difficult it is to determine the optimal behavior strategy. In this case, the company loses more on the services of external consultants than on the development of the in-house decision, which also takes a lot of time and does not allow decision-making in a risk environment. Summing up the results of the present work, it should be noted that for fast and optimal calculation, which requires quick decision-making due to constantly changing external market conditions, network graph models and decision tree methods with cost matrices are most suitable. With proper calculation, one can monitor the dynamics of expected winnings daily to change the company's strategy at least every day. As can be seen from the conducted analysis, it is quite easy to build a decision-making model under risk conditions, since management knows the probabilities and in the case of an equivalent outcome, the expected gain is almost similar even to a losing strategy.

The article presented the decision-making and risk concepts, as well as demonstrated decision-making methods and models depending on the conditions, as well as analyzed the features of decision-making models in the Internet marketing market. The authors developed a decision and employed a decision tree model that shows quite clearly a quick decision of the company, as well as analyzed the features of decision-making in the Internet marketing market and presented factors affecting the chosen alternative. As a rule, in most cases, the decision depends on the risk appetite of management, rather than just on the direct calculation of the initial data and the optimal strategy based on basic methods.

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[Received/Recebido: Março 17, 2022; Accepted/Aceito Abril 01, 2022]