MOTIVI POSETILACA ZA POSETU HIBRIDNOM DOGAĐAJU: PRIMER POLJOPRIVREDNOG SAJMA

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Rezime

Upravljanje složenim događajima, kao što su hibridni, počiva na razumevanju savremenih tržišnih trendova. Cilj rada je da prikaže motive posetilaca za posetu hibridnom događaju, da identifikuje klaster na osnovu motiva posete i da pomogne organizatorima i izlagačima da zadovolje očekivanja posetilaca. Stoga, sprovedena je analiza ANOVA, faktorksa analiza i hijerarhijska klaster analiza. Rezultati jasno prikazuju elemente sajmova i prodajnih izložbi integrisanih u hibridni događaj, te su neki od glavnih motiva za posetu ovim događajima prisutni i kod posetilaca hibridnog događaja. Hibridni događaj je više od mesta za poslovne susrete. On je takođe mesto za edukaciju i zabavu. Stoga, organizatori događaja i izlagači treba da posvete više pažnje strateškom upravljanju aktivnostima. Rad, na osnovu izdvojenih motiva, sugeriše da organizatori događaja treba da se fokusiraju na komunikaciju sa izlagačima i posetiocima.

Ključne reči: *hibridni događaj, motivi posetilaca, izložba, sajam.*

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THE SELECTION OF ACQUISITION STRATEGY AND SOLVING TRADE SURPLUSES OF FOOD PRODUCTS BY USING THE SIMULATION

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Summary

Real business environment opens up many possibilities of business conduct, so that appropriate strategies, compatible with multicriteria requirements of the environment, potentially lead to the realization of the set goal. Adequate schedule and the optimal combination of available resources are possible to establish by a mathematical formalization in terms of the theoretical model that connects business outcomes with a cause or a probability of their occurrence.

Exactly research of the possibility of using and applying the results of theoretical models in solving the specific tasks in regard to expressing relations of initial assumptions related to selection of the optimal operating strategy, is the initial motive of this paper.

The theoretical models, which describe the real problem, can be analysed analytically or by simulation, depending on its complexity and the variables type, which describe it.

The model should provide achieving the managing balance through the model correction of the available operational resources, increasing in that way also the capacity of decision-making system in terms of futuristic knowledge insufficiency. The research results should show that the simulation model apply, in this particular example, enables to a company significant increase of business efficiency level, more complex utilization of the capacities, increase of the competitiveness, etc.

Key words: *model, simulation, strategy, selection skills, efficiency, decision.*

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Introduction

Strategic management represents a process by which a company's activity directs toward the defined goal, which implies, in the first place, over viewing chances and priorities which appear in the environment, and based on the profiled managerial vision, articulates a developmental strategy.

The development strategy of the observed enterprise is a category which derives from the managerial vision, so it requires a careful approach and subtle exploring of the strategic management role in the process of a business policy creation. In regard to it was made numerous theoretical models, as a regression analysis of economic functions, mathematical programming, competitive models and models of simulation which provide a calculation of investments effects, before the system become operational.

By formulating the managerial vision, with ability to adapt to the business environment changes, and by reasoning and experience of a strategist, keeps and permanently raise a level of the business system efficiency as a whole.

In terms of ambiguous determined future permanently intrudes the problem questions of future sources anticipation and changes rate, i.e. establishment of the system state changes equation in accordance with the set goal.

Continuous development of a company implies a constant need for making the business system vitality strategy, i.e. the strategy of raising the functional potency aiming to make the managerial capacity. However, once established relation disturbs, so a short-term imbalance in supply and demand of products, directly replicates, as on loss of some form of resources, as well as on insufficient capacities utilization. Such deviations, which manifest through a dysfunctional relation, require a refined scientific analysis of input – output variable systems management. That is why research on supply chain risk management has been very popular in recent years (Juttner et al., 2003). Understand the nature of supply chain risks while building resilient supply chain networks is of the great importance (Christopher, Peck, 2004). Supply chains are affected by many factors, including the uncertain changes in business strategies. It is easier to mitigate the supply chain risks with more information (Christopher, Lee, 2004). Separating the recurrent supply risk and disruption risk for appropriate mitigation mechanisms is of the great importance (Chopra et al., 2007). It is also significant to mention the study on how companies perceive, predict, and assess the risks in order to protect their supply chains accordingly (Sheffi et al., 2003).

The management has a dilemma of selecting the theoretical model, which represents the approximation of a part of the real world, and which results can be used in purpose of increasing the efficiency of operating and vitality of the observed business system conduct. The mentioned one can refer to an integral business, but also to some segments of the business system, in order to use a synergetic effect of a subsystem composition.

The business problems of the enterprise are contained, primarily, in insufficient business efficiency which surely comes out from costs burden of trade surpluses (providing stocks). In

case when the service quality is directly expressed by „freshness "of the production program, the market opportunities give signals to unused potentials of production possibilities.

In that sense is right that the selection of the appropriate theoretical model for the acquisition and the problem of efficient providing of the trade „surpluses", can represent the emerging strategy, necessary to check by the simulation experiments, by the Monte Carlo method.

Experience has shown that simulation is an extremely effective and efficient method that requires extensive knowledge of the dynamics of agriculture as a system (Šomodji, 2011). Over the past decade, the interest in Monte Carlo simulation has increased (e.g., Winston, 1996; Thompson, 2000; Vose, 2002; Aven, 2005; Richardson, 2006). Monte Carlo simulation offers business analysts and investors an economical means of conducting risk-based economic feasibility studies for new investments and a non-destructive means of stress testing existing businesses under risk (Richardson et al., 2007). The Monte Carlo methods are useful for modelling the phenomena with a significant input uncertainty and allow the effect of varying the level of inputs on the final output to be analyzed (Špička et al., 2009). It is a generally accepted method of modelling risks, which studies the probable outcome of an event characterized by any input parameters and described by well-known functions (Kovacs et al., 2007). The general conclusion which emerged from the analysis performed by Nikolić, 2009, is that to achieve greater accuracy of simulation output results a large number of independent simulation experiments has to be done.

Materials and Methods

There were two types of materials used for the purpose of this paper. First, the relevant books and scientific papers related to the topic. Second, the data records (accounting register) of the company "Šaran" from Prijedor city.

Several methods were used during preparation of this paper. Content analysis were used to study the literature (books, scientific papers, etc.), and also data records (accounting register) of the company "Šaran". Methods of modelling and simulation were also used, with special emphasis on the Monte Carlo technique.

The Simulation Model

Improvement of business efficiency of an economic entity requires reaching the decision-making model by a symbolic description, and to include the modelled management information into a process of operational decision-making.

The operational efficiency was determined by a realized profit, which represents a monetary term of an operational realization quality, as a relation between input and output values in which dominates the stock costs, which in this context, represent a criterion variable. The research process of mutual correlation between the variables in the model and quantity identification of the criterion variable probability distribution enables a decision-maker to understand the complexity of the problem in the context of the project evaluation.

The simulation model must be constructed purposefully for every decision-making situation, and by its nature, it requires a specification of variables and parameters in the model, while the conditions under which the system is observed must be adjusted to the conventional rules of decision-making. For these models analysis is not possible or it is very complicated to apply the analytical methods.

The Monte Carlo technique consists of the experiments simulation, where a decision-maker plays with the system built to fix to a man, researching the effects of the selected alternative in compliance with the selected options in the appropriate time interval. Therefore, a basic task is to anticipate the sequence of new events by making an auxiliary construction, in order to come to a transparent process and, with such creative visualization, feature a part of reality suitable for checking the strategic plans, but also gaining personal experience (Vujošević, 2004).

The essence of the Monte Carlo technique consists of series of simulations in order to determine a characteristic of the analyzed system operating, according to the selected parameters or distribution law of the observed variables. The analysis procedure by this technique provides a precise logical procedure of modelling a criterion variable (y) through the following phases:

- Identification of criterion and relevant random variables,
- Quantification of variables,
- Mutual relations among variables,
- Evaluation of probability distribution for input variables and their connections,
- Using the Monte Carlo simulation for the experiments, aiming to get satisfactory distribution of output variable probability or calculation of the average value of defined indicators,
- Evaluation of a project using a part or all information contained in the evaluated distribution (Čupić, 2001).

Domain of the model application and the simulation method is practically without limitations in the context of its practical application possibility for making business decisions, aiming to increase a level of business efficiency, especially in the procedure of setting the optimal strategic orientations.

The accelerated development of information technologies, as well as developing the program of common and special purpose provides creating also apply of the simulation models on numerous problems of business decision-making.

Simulation, as a methodological tool for the preparation and decision making in food production is gaining in importance. It is especially rampant in the USA and later in Western Europe and less developed countries (Šomođi, 1997).

Implementation of the simulation model for managing the purchasing department in the company "Šaran" from Prijedor

The company „Šaran" from Prijedor has, in its assortment, the products which characteristics are such, that the opportunity of sale has been dominantly determined by the „freshness" in the moment of exchange realization. Such products are prevalently a fresh fish, and in the assortment dominate a carp from ecological breeding. It is important to emphasize that such products lose their usability features by storing, so, in the process of stock optimization, they require careful management, as a framework of sustainable development of the parent company.

In the observed example, it is well known that demand of products ranges from 20 to 80 kg per a working day. Based on the existing accounting register, in the previous period was determined an empirical distribution of daily demand (QT) and an adequate relative frequency ($p[QT]$), as it was shown in the Table 1. It is important to emphasize that the business dynamics enables that the product orders at the end of the working day, to deliver promptly on the beginning of the following working day, and all to be realized in the moment, when demand for the product is unknown.

Table 1. Empirical law of daily demand distribution for fresh carp

QT	20	30	40	50	60	70	80	Σ
$p[QT]$	12/240	24/240	48/240	72/240	48/240	24/240	12/240	1

Source: Authors' calculation based on data from Šaran Company, 2013.

A fact that the product is purchased in the moment in which the information on demand is unknown, a decision is made in terms of uncertainty. A valid rule is to purchase the amount required the day before, so the trade costs (stocks) do by selling at a lower cost PC_1=5KM/kg. The management insists on reassessment of this rule. A decision-maker considers that it is necessary to reassess a new rule, and this is to purchase the expected value of demand (in this example is 50 kg). A key problem which determines the economic efficiency and sustainable development is the purchase optimization, along with ecologically acceptable care of purchased, not realized products. It is well-known that the product purchases at a cost NC=7 KM/kg, and sell at a cost PC=14 KM/kg. In that sense was done the comparative analysis of the offered options (strategies):

- Valid rule is to purchase the amount required the day before, along with assigning the unsold amount to other legal entity. All these should mean that the stocks in the future period sell to a company which deals with products processing in animal food after a lower price PC_1 = 5 KM/kg. In the implemented analysis, we mark this option as a RULE 1,
- New rule of ordering is to purchase the expected value of demand along with the same order of stocks taking care of, as in the previous rule. In the implemented analysis, we mark this option as a RULE 2,
- New management option which refers to processing of the unsold quantity into a new trade-acceptable form, where economic effects of processing and market realization

are possible along with a lower unit profit PF_1=0,5 KM/kg. This option signifies drying fish, where by drying 1 kg of carp gets 0.5 kg of dried fish which sells at a cost PC_2=15 KM/kg, and the costs of drying (processing) amount TP=1 KM/kg. This production option is followed by two acquisition regulations:

- Production processing of trade costs, along with the acquisition regulations according to demand from a day before. In the implemented analysis, we designate this option as a RULE 3,
- Production processing of trade costs, along with the acquisition regulations according to the expected value of demand. In the implemented analysis, we designate this option as a RULE 4.

In order that the comparison of the offered options be adequately implemented, it is necessary to develop a method of demand generation, which suits to a defined time period of the product's usability. There the empirical law on demand distribution and a fixed time interval were used. Thereby creates and prepares a platform for the simulation experiments application by using the Monte Carlo method.

Table 2. Distribution of relative frequencies and adequate random numbers

QT	p(QT)	Cumulative	Random numbers interval
20	0.05	0.05	00 – 04
30	0.10	0.15	05 – 14
40	0.20	0.35	15 – 34
50	0.30	0.65	35 – 64
60	0.20	0.85	65 – 84
70	0.10	0.95	85 – 94
80	0.05	1.00	95 – 99
Σ	1.00		

Source: Authors' calculation based on data from Šaran Company, 2013.

In regard of using the Monte Carlo method, it is inevitable to establish the connection between the relative frequencies (probabilities) and evenly distributed numbers on an interval [0.100], as shown in the Table 2.

With the available information groundwork have been acquired the conditions for running the simulations, aiming to make an adequate selection of the offered management options. It is important to emphasize that, in the implemented simulation, the designations have the following meanings:

- Simulation bases on repeating the experiments to 200 times, for every decision-making rule, according to randomly chosen time intervals, by using the programmatically determined random numbers from Excel, designated with RAND,
- We assign an adequate demand (QT) to the observed ordering interval, in accordance to the random numbers interval,
- The ordering rule directly corresponds with demand from a day before in the RULE 1 and the RULE 3, i.e. $QN_i = QT_{(i-1)}$

- The ordering rule directly corresponds with the expected value of demand in the RULE 2 and the RULE 4, so the ordered amount (*QN*) matches to the previously determined value of demand, i.e. $QN = 50$ kg for all days ($i=1,2,...,n$),
- The sold quantity (*QP*) calculates by respecting the following terms:
  - o If $QT = QN \rightarrow QP = QT$
  - o If $QT \neq QN \rightarrow QP = \min(QT, QN)$
- The remaining quantities (stocks, *QZ*) calculates by respecting the following terms:
  - o If $QN > QP \rightarrow QZ = QN - QP$
  - o If $QN \leq QP \rightarrow QZ = 0$
- Profit (*PF*) calculates by respecting the following terms:
  - o Regarding the Rule 1 and the Rule 2: $QP \cdot PC - QN \cdot NC + QZ \cdot PC_1$
  - o Regarding the Rule 3 and the Rule 4: $PF = QP \cdot PC - QN \cdot NC + QZ \cdot 7.5$, where $(7.5 = \frac{PC_2 - TP}{2})$,
- Such described procedure was repeated for all 200 time intervals (working days) within which was implemented the simulation procedure.

The collective results of the simulation experiments are shown in the Table 3.

Table 3. Collective results of defined rules simulation experiments

Rule of ordering/care	QT		QN		QP		QZ		PF	
	Σ	DN. PR.	Σ	DN. PR.	Σ	DN. PR.	Σ	DN. PR.	Σ	DN. PR.
RULE 1	9850	49.25	9,810	49.05	8,140	40.70	1,670	8.35	53,640	268.20
RULE 2			10,000	50.00	8,710	43.55	1,290	6.45	58,390	291.95
RULE 3			9,810	49.05	8,140	40.70	1,670	8.35	57,815	289.08
RULE 4			10,000	50.00	8,710	43.55	1,290	6.45	61,615	308.08

Source: Authors' calculation based on data from Šaran Company, 2013.

Analyzing the results in the previous table, especially according to the criterion of profit realization, it can be easily concluded that it is necessary the advantage of the Rule 4 in regard to other rules in determining the dynamics of ordering and a way of ecologically acceptable rule of the trade costs providing.

The purchase department of the trading company „Šaran" from Prijedor should adopt some developmental directions, came out from the results of simulation experiments for the observed models of ordering rules and ecologically acceptable way of taking care of the stocks, in a way that:

- Daily purchases the amount of carp which matches to the expected value of demand (in the observed example it is the amount of 50 kg daily),
- Unsold quantity (stocks) should be taken care by the production acceptable processing, which in the observed case refers to drying the unsold quantity and including it in the new product – dried carp assortment. The costs of processing (drying) refer to service engagement of a person trained for this working task,

- The increased profit, the company can direct to new developmental projects, as well as training of the company for providing the service to other companies of similar business orientation,
- Increasing the level of existing business efficiency reflects also in acquiring the competitive advantage in regard to innovations in the assortment, because this product offers rarely in points of sale of similar type, as well as in other companies of trade-orientation. This product can also be offered to the trading companies, and especially hyper-markets,
- Increasing the business efficiency contributes to increased employees satisfaction, while opens a real possibility that a part of newly-made profit directs to increase of employees' salaries, but also to acquire the real psychological indicators of job security, which represents to many employees in economic recession a motivation for the partnership with an employer,
- Creating a partnership with suppliers regarding the safety of sale, where opens a possibility of purchase prices correction, aiming to get a quantity discounts in accordance with sale of larger amounts of products,
- Laying the foundation for greater sympathy of social community regarding a new possibility for employment and getting incentives from the local authorities, etc.

Analysis of suitability, representativeness and economic justifiability of the model

Real business environment opens numerous possibilities of business conduct, while some options enable the achievement of desired economic quality, expressed in the form of business goals, i.e. the efficient strategies. Many real factors express the adequate connection, which has been recognized, quantified and included in the adequate model, as a scientific platform of management conduct.

The selected model, through management actions, adjusted to circumstances in which exists the business system, becomes a powerful analytical tool for the scientific decision-making in terms of uncertainty. Following this train of thought, an economic entity successfully minimizes a difference between the existing and the desired state, along with optimal use of natural – technical goods, by which makes a control balance regarding sufficiency of the available operational resources, in direction of the sustainable development.

Determination of key factors of business success, the terms which determine its realization, hierarchical correlation of goals and sub-goals, and approximation of structure and conduct of a part of reality, is a meaning of forming and application of the decision-making model. In that sense, a key assumption of business success is included in the adequate selection of critical factors of business success of the economic entity, to this refers the exclusive model support.

Many real situations of a business portfolio programming require that the accent is put on the optimal management of the company's purchasing department, which is especially emphasized in turnover or production of products, regarding which the quality has been predominantly caused by the products „freshness". The economic effects of the modelled

results exceed the costs of modelling, which include relatively available software package and a person who is trained in the modelling methodology, by which affirms a discipline of scientific-intuitive decision-making.

Formulating the pro-active strategic directions enables to the modelled economic entity, by a set of planned actions cross the imaginary path from the current to the desired state, while at the same time adjust its organizational-technological platform and management style to the market, economic, legal-political, ecologically-natural and other factors which upset its business. Thereby, information basics of planning must be defined by the relevant information requirements and to represent the base from which the application of appropriate algorithms can get information that are necessary elements of planning for the development of plans and the necessary planning documents (Novković et al., 1997). A positive rate of a business result change, in which also participates the business environment, comes out from the system formalization by the model description of symbolic connection of a constant and variables in the model. The model selection of the management option adjusts to the concrete business system and their goals, by which enables judging on business chances and their alternatives, liberating the management from business illusions.

Conclusion

Barter in the process of social reproduction has been directly determined by relation between supply and demand on the market. It is not necessary to emphasize especially that the quantity of products, buyers are ready to buy, is caused by many factors among which there is a pattern in the conduct which has been successfully identified by the adequate model. The volume of demand on the market is a random variable, which causes the exchange dynamics, and thereby the production and turnover.

Over viewing the initial certainties, defining the real and adaptive goals, quantification and logical connection of some internal and external factors refined by the empirical stuff, leads to construction of an adequate simulation model. By its implementation, we reveal business sensitivity in the context of the set direct and global goals, directed to increase of the purchasing department's business efficiency level in the concrete business system:

- The previous practice of decision-making in regard to dynamics of acquisition and taking care of trade surpluses has not used the possibilities regarding exploitation of the simulation models results, which evidently increase the level of marginal efficiency. A basic reason are a traditional approach and insufficient initiative in regard to new knowledge implementation,
- Output data of the constructed model corroborate the set goal, which has been especially emphasized by the structure of output variables. In that sense, the management option provides increase of profit along with somewhat higher procurement, whereby the volume of stocks decrease, which is supplemented by the adequate approach while providing the trade surpluses.
- Exactness and wholeness of the modelled results is not limited by necessary investments, which refer to the available software and adequate consulting cooperation. Strategic objectives opens new business alternatives, which refers to possibility of the activity

diversification to production-serviceable drying of fresh fish, and new sources of business efficiency,

- In the analyzed business system, business optimization in terms of increasing the level of the purchasing department efficiency of the observed trading company has no adequate analytical substitution. Mapping of business conduct of the analyzed system in the model of mathematical simulation satisfies a homomorphine of the system and the model, quality, size and the structure of the modelled management information, while experiments with other theoretical models stays open for some other aspects of the observed problem.

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