Wyższa Szkoła Zarządzania
i Administracji w Opolu

Sustainable Development: Social and Economic Changes

Edited by dr Wojciech Duczmal
dr Tadeusz Pokusa
dr Larysa Stepanenko

Opole 2016

THE ACADEMY OF MANAGEMENT
AND ADMINISTRATION IN OPOLE

SUSTAINABLE DEVELOPMENT:

SOCIAL AND ECONOMIC CHANGES

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Monograph

Publishing House WSZiA

Opole 2016

Sustainable Development: Social and Economic Changes. *Monograph.* Opole: The Academy of Management and Administration in Opole, 2016; ISBN 978 – 83 – 62683 – 85 – 7 (Paper); pp.436, illus., tabs., bibls.

Publishing House:
Wyższa Szkoła Zarządzania i Administracji w Opolu
45-085 Polska, Opole, ul. Niedziałkowskego 18
tel. 77 402-19-00/01

300 copies

ISBN 978 – 83 – 62683 – 85 – 7

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The activities of domestic enterprises is influenced by many factors that determine the uncertainty of characteristics of the future state of the external and internal environment. In this regard, providing of prospects of their existence stipulates to use the strategic management, a critical component of which are processes of formation and implementation of financial decisions. Their importance is determined by the essence of the main economic categories – finance, money and credit, which are the foundation of its construction. The adoption of effective financial decisions in conditions of the high variability of the environment contributes for the formation of well-grounded development's strategy, and this in turn will ensure the creation and implementation of the competitive advantages of the company, its steady operation according to the concept of sustainable development. It necessitates to use scientific methods of decision making which use appropriate mathematical tools.

Formalization's problems of analysis of implications of adopting alternative financial decisions can't yet considered as sufficiently developed. In particular, approaches for assessment of financial decision's effectiveness don't exist in common formulation. Furthermore, the defect of most approaches for solving optimization challenges in finance is that they do not take into account parameter of time. They are based on the single-stage models that help to analyze the non-time-dependent conditions and effectively used when we can neglected by changes over time without distorting model [1-4].

The optimal solution for this simulation makes sense in the stability conditions of activity, or for a short period in the future. But the practice of management often requires solving such problems that should take into account possible changes in the market in time under the control of the course of the process for certain periods of time. Such processes are called as a multistage.

Solving multistage tasks is carried out within the theory of dynamic programming [5]. In our opinion, in the implementation of financial solutions such problems arise when selecting the optimal allocation of resources in the implementation of optimal strategy. It is assumed that the management can be implemented discretely with T stages. Identifying the stages control can be either natural or artificially created. Optimal control is achieved in stages by determining the best solution of the problem at each stage separately. Typically, this optimization is easier to implement than global, especially when there is a a large number of stages and controlled parameters.

Consider the task of managing in which the formed financial decision is implemented over some period of time. Manager monitors the implementation of decisions at specific time points and makes adjustments as necessary in the course of its implementation in one or more areas of activities. The effectiveness of the decision depends from the state of the environment. It is necessary to choose such decision of management, when at the end of the period will be obtained maximum of effect. In order to solve this problem we propose to apply the tools of dynamic programming.

Carry out the mathematical formalization of the problem. Let the environment defined by a set of *n* states $C = \{S_1, S_2, ..., S_n\}$. Changing conditions described by such probability matrix: $P^{(0)} = \left(p_{ij}^{(0)}\right)$, $i = 1..n, j = 1..n$, where $p_{ij}^{(0)}$ is a probability of changing the state of the environment from S_i to S_j,

The effectiveness of the solution according to the changes of environment described by a matrix of performance: $E^{(0)} = \left(e_{ij}^{(0)}\right)$, $i = 1..n, j = 1..n$

As a result of external factors actions, the environment may change its situation, which will require an appropriate action of decision-maker. As a result of external factors actions, the environment may change its situation, which will require an appropriate action of decision-maker. Transition matrix and the effectiveness of the decision in this case will take the form: $P^{(i)} = \left(p_{ij}^{(i)}\right)$, $E^{(i)} = \left(e_{ij}^{(i)}\right)$, $i = 0..n, j = 1..n$, where i = 0 – refusal to implement the control action due to a satisfactory outcome of the implementation of decisions.

We define an effective behavioral strategy of manager for which we can expect maximum effect from the decision. Assume that the decision is performed during the T of periods. We need to define a strategy of behavior to affect on the progress of the decision for each time period. It is believed that the process is a system which is a subject of manager's actions.

We introduce the following notation:

S_t – state of the system (controlled process) at step t;

u_t – control action, which manager implemented at step t;

U - set of control action: $U=\{u_t\}$;

$f_t(S_{t\text{-}1},u_t)$ – target function, which determines the efficiency of u_t at stage number t, if the system is in a state $S_{t\text{-}1}$;

$f_t^*(S_{t\text{-}1})$ – the optimal value of the target function, which corresponds to the optimal management at all stages, starting from stage t to T; t=2, 3, …, T.

Then, in accordance with the R. Bellman's principle of optimal control [6], we have:

$$f_t^*(S_{t-1}) = \max_{u_t \in U} \{f_t(S_{t-1}, u_t) + f_{t+1}^*(S_t)\}, \qquad (1)$$

t=2, 3, …, T–1.

Thus, according to (1), for each step t control action u_t need to choose so that with the given optimal control at all subsequent stages we obtained the best results.

Relative to the task $f_t(S_{t\text{-}1},u_t)$ will be as follows :

$$f_t(S_{t-1}, u_t) = f_{t,i}(k) = \sum_{j=1}^{n} p_{kj}^{(i)} \left[e_{kj}^{(i)} + f_{t+1}^{*}(j) \right] \quad , \qquad (2)$$

where $S_{t\text{-}1}$ – one of the state of set C, which labeled in further calculations by index k, $k = 1, 2, ..., n$;

$f_{t+1}^{*}(j)$ – optimal control at all stages, starting from $t+1$- th stage;

u_t – type of control which also marked for ease of calculation by index i, $i = 0, 1, ..., 4$.

Denote as $E_k^{(i)} = \sum_{j=1}^{n} p_{kj}^{(i)} e_{kj}^{(i)}$ the expected effect when the environment stay in the state k. Then recursive equation that connects f_t^{*} and f_{t+1}^{*} with into account expression (2) has the form:

$$\begin{cases} f_T^{*}(k) = \max\limits_{i} \left(E_k^{(i)} \right), \\ f_t^{*}(k) = \max\limits_{k} \left(E_k^{(i)} + \sum_{j=1}^{n} p_{kj}^{(i)} f_{t+1}^{*}(j) \right); \end{cases} \qquad (3)$$

Expression (3) actually defines the procedure for finding the optimal control. First determined the maximum effect for the last step control. Then, following the recurrence relation is determined optimum control on T-1-th step, and so on to the first step. Proposed by (3) solution supposes that during the period T matrix efficiency is constant for all stages of management. This deficiency can be corrected if we take into account for each stage the discount rate $r < 1$, which has a constant value for all stages. Then the expression (3) takes the form:

$$\begin{cases} f_T^{*}(k) = \max\limits_{i} \left(E_k^{(i)} \right), \\ f_t^{*}(k) = \max\limits_{k} \left(E_k^{(i)} + r \sum_{j=1}^{n} p_{kj}^{(i)} f_{t+1}^{*}(j) \right); \end{cases} \qquad (4)$$

t=1, 2, …, T–1; k=1, 2, …, n.

Therefore, this amendment only affects the total value obtained effect, but does not change the structure of the impacts of the decision. Assuming that the discount rate also changes its value depending on the stage of control (r=r_k), then in the expression (4) the corresponding value r_k expression will under the sign of the sum.

If we assume that for each step t=1, 2, …, T performance matrix changes their values depending on the conditions for the functioning of the company at this stage, the expression (3) takes the form:

$$\begin{cases} f_T^{*}(k) = \max\limits_{i} \left(E_k^{(i,T)} \right), \\ f_t^{*}(k) = \max\limits_{k} \left(E_k^{(i,t)} + \sum_{j=1}^{n} p_{kj}^{(i)} f_{t+1}^{*}(j) \right); \end{cases} \qquad (5)$$

t=1, 2, …, T –1; k=1, 2, …, n.

The proposed approach to solving the above problem is not only permit to evaluate the expected control effectiveness, but also to determine the required direction control actions at each management stage. By the generalization of the proposed approach is the inclusion of the effectiveness matrix of the decision for the combined control actions, such as both price and financial policy. This will increase the overall effectiveness of financial activities and positive impact on the effectiveness of taken decisions.

Consider the case when management is performed with uncertain number of forward steps. In this case we can talk about solving the problem of dynamic programming with infinite number of stages. The exhaustive algorithms can be used for this.

Let the results of the analysis of the environment define a set Q of inpatient behavioral strategies manager, each of which is described by the transition matrix $P^{(q)}$ and the matrix of effectiveness $E^{(q)}$, $q \in Q$. Denote as the $E_k^{(q)} = \sum_{j=1}^{n} p_{kj}^{(q)} e_{kj}^{(q)}$ expected efficiency of q-th strategy for the state k, k, $q \in Q$; $k=1, 2, \ldots, n$. Stationary probabilities $\beta^{(q)} = \left(\beta_1^{(q)}, \beta_2^{(q)}, \ldots, \beta_n^{(q)}\right)$ of transition matrix $P^{(q)}$ are found from the equation: $\beta^{(q)} \cdot P^{(q)} = \beta^{(q)}$. Expected results $V^{(q)}$ from the implementation of q-th strategy for one step of control calculated by the formula:

$$V^{(q)} = \sum_{k=1}^{n} \beta_k^{(q)} E_k^{(q)} . \qquad (6)$$

Optimal strategy in this case will be the one for which there will be a maximum of (6).

The presented approach to the selection of the optimal management strategy has several drawbacks. First, manager can't pre-determine your behavior strategies, since they depend strongly from the state of the environment. Second, provided taking into account all possible behavioral strategies, their number is too large, therefore the search of these strategies requires considerable time. In this case using of iterative procedures for selecting optimal behavioral strategies is advisable. For any strategy manager's total results on the t-th stage is expressed by relationship:

$f_t^*(k) = E_k + \sum_{j=1}^{n} p_{kj} f_{t+1}^*(j)$, $t=1, 2, \ldots, -1$; $k=1, 2, \ldots, n$.

Let τ – the number of steps that remain to be controlled. Then:

$$f_\tau^*(k) = E_k + \sum_{j=1}^{n} p_{kj} f_{\tau-1}^*(j) \quad , \qquad (7)$$

where $f_\tau^*(k)$ – the total value of the desired effect; $k = 1, 2, \ldots, n$.

If $\tau \to \infty$, we have the management of the infinite number of stages. Let $\beta = (\beta_1, \beta_2, \ldots, \beta_n)$ – vector of stationary probabilities of states of the environment, and

$V = \beta \cdot E = \sum_{k=1}^{n} \beta_k E_k$ – the expected proceeds on a single stage process. Then the total effectiveness for the sufficiently large values of τ has the form: $f_{\tau}^{*}(k) = \tau \cdot V + c_k$, where c_k is a constant that depends on the state k. Then the expression (7) takes the form:

$$V + c_k - \sum_{j=1}^{n} p_{kj} c_j = E_k . \tag{8}$$

The last relationship consist of k equations and (k +1) unknown V, c_1, c_2, …, c_n.. Therefore, in order to find its solution we applies this procedure.

First, we select an arbitrary initial strategy of manager's behavior $q_0 \in Q$.. Using its corresponding matrix P^{q_0}, E^{q_0} and choosing one of the values c_k, for example c_1 equal to zero, solve the system of equations (8) relatively unknown V and c_k, k=2, 3, …, n, which takes the form:

$$V^{(q_0)} + c_k^{(q_0)} - \sum_{j=1}^{n} p_{kj}^{(q_0)} c_j^{(q_0)} = E_k^{(q_0)} . \tag{9}$$

Next, define a strategy $q_1 \in Q$, which consists of those alternatives that for each system state k = 1, 2, ..., n maximize the value of V:

$$V^{(q_1)} = \max_{q \in Q} \left(E_k^{(q)} + \sum_{j=1}^{n} p_{kj}^{(q)} c_j^{(q)} - c_k^{q_0} \right). \tag{10}$$

Since the value of the last expression does not affect the optimization process, then (10) takes the form:

$$V^{(q_1)} = \max_{q \in Q} \left(E_k^{(q)} + \sum_{j=1}^{n} p_{kj}^{(q)} c_j^{(q)} \right). \tag{11}$$

If q_0 and q_1 coincide, the optimal strategy is found. Otherwise take as a q_0 strategy q_1 and search for a new strategy q_1 by the formulas (9) and (11).

The above procedure is also quite laborious and time-consuming, but it allows you to discard obviously inefficient decision options.

This work describes the approach to modeling of multistage problems financial decisions acceptance using tools of dynamic programming. Investigated cases of finding the optimal solution as a finite and infinite number of stages. The resulting solution allows to evaluate not only the expected effectiveness of management, but also to determine the required direction of control action at every stage.

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3.10. The functioning logistics information systems of management business processes

3.10. Функціонування логістичних інформаційних систем менеджменту бізнес-процесів

В основі процесу управління лежить обробка господарської інформації, що циркулює в логістичних системах. Необхідною умовою ефективності бізнес-процесів є наявність інформаційних систем, які подібно центральній нервовій системі здатні оперативно підвести інформаційний сигнал до потрібної точці у певний момент. Одним з найважливіших умов успішного функціонування підприємства в цілому є наявність такої системи інформації, яка дозволила б пов'язати воєдино всю господарську діяльність (постачання, виробництво, транспорт, складське господарство, збут) і керувати нею виходячи з принципів єдиного цілого.

Ефективність бізнес-процесів впливає на стан та динаміку активів підприємства, їх оборотність і рентабельність, а структура джерел та умови фінансування запасів – на рівень фінансової стійкості підприємства.

Логістична інформаційна система (ЛІС) – це певним чином організована структура взаємопов’язаних засобів і факторів, що забезпечує вирішення тих або інших функціональних завдань з управління матеріальними потоками.

Для здійснення безперервного процесу товарного обігу в переробному підприємстві необхідні певні логістичні методи менеджменту. Ефективний товарообіг потребує використання досконалих механізмів, що оптимально поєднують процеси постачання, виробництва і реалізації. З цією метою актуальною є розробка і впровадження економічних чинників і інформаційних механізмів менеджменту бізнес-процесів підприємства з використанням нових європейських стандартів, більш ефективних з точки зору економії і оптимальних з точки зору логістики.

Уперше на можливість використання положень військової логістики в економіці вказав у 1951 р. фахівець у сфері системного аналізу О. Моргенштерн, який зазначив, що існує абсолютна подібність між управлінням забезпеченням військ і управлінням матеріальними ресурсами у промисловості [6].

Сучасні теоретико-методологічні засади функціонування бізнес-процесів підприємств досліджені такими вітчизняними економістами як the hotel and restaurant industry, assess its level of safety products and services according to established standards. The following sequence of operations with the introduction of HACCP system in enterprises of hospitality. Developed the life cycle the implementation of the principles of HACCP system and the scheme of its implementation in the enterprises of hotel and restaurant management. Defined the basic advantages and possible causes of inefficient action of HACCP system. It is proved that the implementation of HACCP system provides the enterprise hotel-restaurant business of providing safe, high quality and competitive services.

3.6. Volokhova Liudmyla, Ievsieienko Olga. Innovative methods of strategic management research.
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Today, the unique methodology for determining the sustainability of the economic system does not exist. So the company's sustainability research algorithm is proposed. In this case becomes important to identify factors that affect financial stability. However, to assess the level of sustainability of the company, the choice of financial strategy is required is not a static but dynamic model of the company stability, describing the development in time. Thus, the optimal management of company stability is reduced to solving problems of selection minimum or maximum conditions in which the economic system is in a stable condition.

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The article is devoted to defining of major trends, issues and areas of improvement of the banks deposit policy. The volume of the deposits of individuals and legal entities and its dynamic in local and foreign currency are analysed in the article. The most reliable banks of Ukraine and the banks that are leaders in terms of deposits attraction are considered. The main problems faced by domestic banks in attracting deposits are designated, the recommendations of improvement the confidence of depositors in banks and improving the deposit policy of national banks are offered in the article.

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