

**Management of
innovative development
the economic entities**

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**TECHNOLOGIES
OF DEVELOPMENT
AND
IMPLEMENTATION
OF SYSTEMS OF
INTERNAL
MANAGERIAL
INFORMATION**

Introduction. The process of improving the corporate governance is intended to solve the main task – to create an adequate research and information basis for making managerial decisions. To form such a base is possible only when constructing an effective system of internal managerial information (SIMI) at enterprises (Golov S.F., 2003) [1]. Therefore, the launching (development and implementation) of SIMI is very important and relevant in modern context. Such systems allow us to determine the business development strategy and develop roads of its achievement, to organize an effective multistage system of internal control at the enterprise, to create an expenditure management system aiming to optimize them and to make sound managerial decisions (strategic and operational) (Abramova I., 2003; P. Rikhardssona, O. Yigitbasioglu, 2018; MJ Turner et al 2017; D. Prajogo et al 2018; O.

Ponisciakova et al. 2015) [2-6].

Currently, there is no generally accepted standardized procedure for the development and implementation of SIMI, so there many mistakes happen which lead to a project failure.

Examples of unsuccessful implementations of managerial information systems at enterprises are discussed quite widely (Fedoseev A., Rochkus Ja., 2002; Josie McLarena et al., 2016; Tyler F. Thomas, 2016) [7-9]. The same applies to SIMI (Apple Consulting, 2002; Tacis, 2002) [10, 11], since SIMI is a part of the business management system.

Therefore, it is necessary, on the basis of the current experience in the process of setting up the SIMI, to provide recommendations in the form of the General plan (method) for setting up systems to avoid mistakes and increase the effectiveness of implementation projects.

This work is devoted to the development of practical recommendations as for the implementation of SIMI at food industry enterprises.

Materials and methods. In order to specify the structure of SIMI and determine the methodological principles for the formation of SIMI, it is necessary to highlight the following questions:

- application of expenditure account methods and calculation of production prime cost in SIMI;
- principles of construction of the management accounts plan;
- development of classifiers and codifiers;
- organization of accounting procedures;
- composition of the subsystem of management accounts and subsystem of performance indicators;
- place and role of normals and standards;
- interconnection of the budgeting system, the decision-making system of the SIMI;
- methods of constructing of SIMI.

Description of the main stages of the setting up of SIMI was attended by the number of domestic and foreign experts, specialists, and scientists. Thus, in (O.P. Sanchez et al, 2017; Kolesnykov S., 2003) [12, 13], the problems of the implementation of automated SIMI according to the landmark moment of their occurrence were classified, as well as the key success factors were determined. In such a manner, attention is devoted to two important aspects: organizational measures and directly to implementation of automated SIMI.

There are cases when the management has not yet chosen an automated system and setting of SIMI requires a preliminary business

diagnosis, a description of business processes and business process modeling. After that you can already go to the stage of decision making to adapt the existing system or select the finished software product.

There are several stages determined in the literature: business diagnostics; development of company strategy and system of balanced indicators; description of business processes; improvement of organizational structure; development of financial structure; creation of data base; construction of a system of management reporting; construction of spending management system and cost calculation; construction of a budgeting system.

Further, in (Abramova I., 2003) [2], the stages related to the process automation and personnel motivation were defined, but the automation plan is not detailed, it was described in the general terms.

In [14], the focus was on organizational and regulatory measures. After completion of the preparation of regulations, according to experts, the implementation phase begins which consists of the following: training of workers, testing of management information procedures on real data of one accounting cycle with the participation of developers, adjusting of regulations according to the results of their trial usage, approval of regulations, adaptation of existing or introduction of new automation systems.

According to experts [15]: the stages of successful implementation of management information systems (MIS) include the following: search for a defender among the management; rapid development of the easy prototype (the best MIS implementation projects begin with simple prototypes that can be quickly implemented and provide data for at least one of the key issues); connection of information systems (Kuzmin O. et al 2017, 2018) [16, 17], technologies (Dietrich I., 2017, Niemirich O. et al, 2018) [18, 19] trainings, overcoming resistance from employees.

Experts proceed from the assumption that the construction of the SIMI is based on current managerial needs and may change over time, depending on the specific situation at the enterprise – “the following recommendations of the management as for implementation and expansion of functions are the best means for planning of MIS.” It means the attention is not being paid to the construction of an all-embracing SIMI model because experts believe that each enterprise has its own standard (model).

Automation goes through the adaptation of existing systems and the independent development of the information system. Covering the main stages of the implementation plan, experts provide clear explanations

but the stages are not itemized.

Thus, it is necessary to highlight the order and stages of the General Plan (method) of the setting SIMI taking into account the experience of managers, scientists and specialists in management accounting.

Results and discussions. In order to create the optimal General Plan of setting, the notion of an effective model of the SIMI setting plan was introduced. An effective model of this type involves a sequential list of stages of the implementation of the SIMI. The sequential and quality implementation of all stages of the effective plan determines the effectiveness and maximal efficiency of the implementation process.

The formation of an effective model takes place by separating the factors (measures) that result in the effectiveness of the process, ranking them according to the degree of import and setting out in a sequence of stages.

For the visual comparative analysis of the effective model and proposals of specialists the table was created where opposite each point of the General plan the proposals of specialists and authors are indicated (Table 4.1). By completing and adjusting the stages of SIMI setting proposed by the consultants, it is proposed our own General Plan of setting (see column “Authors” in table) that is close to the effective model.

Table 4.1

Comparative analysis of the proposed plans for the implementation of SIMI

No.	The stage name	Источник	Ссылки на источник	Источники	Ссылки на источник	Источники	Ссылки на источник	Ideal model	Murchiniv	Authors
		3	4	5	6	7	8			
1.	Organisational arrangements:	+	±	±	+	±	±	+	±	+
	– to formulate a project management committee that will make decisions on approval of corporate standards and changes in them, operational decisions in the process of performing of works, assess the activities of groups locally and if necessary make practical conclusions;	+		+	+	–	+			
	– to interest and attract to the project the key man of the company;	+	+	+	+	+	+			
	– to form a tactical response team for monitoring the process;	+		–	+	–	~			
1	2	3	4	5	6	7	8			

Table 4.1(continued)

1	2	3	4	5	6	7	8
	<ul style="list-style-type: none"> – to form a working (project) team for managing and controlling the process in general; – to form a support team of the functioning of the system within the department of the ACS and qualified users; – to form an advisory group for the analysis of the subject of completeness of corporate accounting standards of managerial information; – determine the powers and instructions for each team/group; – to involve remote branch offices in the process for testing data consolidation (managerial information); – to approve the list of documents regulating the process of setting up; – to approve the program of motivation and training of the personnel 	+		+	+	+	+
		+		+	+	–	+
		+		+	+	+	+
		+		+	–	+	
		+		+	–	+	
		–		+	+	+	
		–	+		+	–	+
2.	Setting up an economic model	–	+	±	+	–	+
2.1	Carrying out business diagnostics:	–	+	+	+	–	+
	<ul style="list-style-type: none"> – assessment of the management system of the company (analysis of the distribution of powers and responsibilities according to the levels of management, as well as the effectiveness of the work of structural units and their interaction); – verification of the accounting systems existing at the enterprise regarding the completeness, reliability and efficiency of providing information; – analysis of financial and economic indicators used at the enterprise; – assessment of the level of motivation of structural units and personnel in solving the tasks facing the company; – analysis of the existing planning and control system; – determination of the level of automation of information flows and processes of making managerial decisions 		+		+		+
			+		+		+
			+		+		+
			+		+		+
			+		+		+
			+		+		+
2.2	Development of the company's strategy and the system of balanced indicators, efficiency:	–	+	±	+	–	+
	<ul style="list-style-type: none"> – development of the mission of the company; – strategic analysis (selection of priority directions of development and definition of strategic goals from the point of view of customer and owner satisfaction, efficiency of business processes and personnel); 		+	–	+		+
			+	+	+		+

Table 4.1(continued)

1	2	3	4	5	6	7	8
	<ul style="list-style-type: none"> – construction of strategic maps at any level of management; – creation of a balanced system of indicators; – development of a data collection vehicle for calculating indicators 		+	+	+		+
2.3	Description of business processes	–	+	+	+	–	
	<ul style="list-style-type: none"> – assessment of business processes efficiency; – identification of weak pockets (duplication of responsibilities, documents, lack of necessary actions and documents); – construction of a business process improvement chart; – application of certain methods of business processes modeling and creation of software that supports them 		+		+		+
2.4	Improvement of organizational, functional structures of the company:	–	+	+	+	–	+
	<ul style="list-style-type: none"> – definition of target benchmarks and criteria for improvement of the organizational structure; – formation of the structure of administrative and functional subordination; – distribution of areas of responsibility and functional functions between subdivisions and employees; – organization of information interaction of units; – development of the control system for the achievement of the indicators set by the system of balanced indicators; – recording changes in the organizational structure in the main organizational documents – “Regulations on the organizational structure” and job instruction 		+		+		+
2.5	Financial structure development:	–	+	+	+	–	+
	<ul style="list-style-type: none"> – consolidation of income and expenses by structural subdivisions, allocation of financial liability centers within the company, their classification and distribution by levels, decentralization of management when making operational strategic decisions; – consolidation of indicators of the system of balanced indicators by the centers of responsibility; – establishing interconnection with indicators of the budgeting system 		+		+		+
			+		+		+

Table 4.1(continued)

1	2	3	4	5	6	7	8
2.6	Creation of information base:	-	+	+	+	-	+
	- development of SIMI classifiers for unifying the collection of initial information;		+		+		+
	- development of an administrative account plan for the collection and registration of initial information;		+		+		+
	- development of the base document regulating the recording of managerial information – “Regulations on managerial information provision”		+		+		+
2.7	Construction of a management reporting system:	-	+	+	+	±	+
	- development of classifiers of documents by type and types		+		+	-	+
	- creation of an album of standard forms of documents (primary documents and reports) for each department of the enterprise;		+		+	-	+
	- creation a registry of management reports		+		+	-	+
	- definition of the rules for collecting, registering, storing and providing information that is necessary for making managerial decisions, building maps of forming documents in departments		+		+	-	+
	- elaboration of the base document regulating the construction of the management reporting system – “Statement on SIMI and reporting”		+		+	+	+
2.8	Construction of expenditure management system and calculation of cost	-	+	+	+	-	+
	- determination of the cost center (with specification from the workplace to the units and the company in general);		+		+		+
	- development of the classification of expenses for the purposes of SIMI;		+		+		+
	- cost analysis and operational control of their changes, determination of the possibility of standardizing certain types of expenses;		+		+		+
	- approval of the base document regulating the rates of expenditure – “Regulations on the rationing of costs”;		+		+		~
	- approval of the main document describing the stages of the construction of the expenditure management system – “Regulations on the expenditure management system”;		+		+		~
	- definition of methods of calculation of the cost price of products that are planned to be used		+		+		+
2.9	Construction of budgeting system:	-	+	+	+	-	+
	- development of the budgeting procedure;		+		+		+
	- budgeting organization;		+		+		+

Table 4.1(continued)

1	2	3	4	5	6	7	8
	– development of forms of budgetary control		+		+		+
3.	Taking a decision on a software product: self-development of the managerial information system or the selection and implementation of the existing software product	–	–	–	+	+	+
4.	Preparation of information systems at the operational level:	–	–	+	+	–	+
	– hardware upgrade, network and system architecture;			+	+		+
	– integration of various company information systems (physical and logical integration);			+	+		+
	– control of the flow of documents and workgroups based on Intranet technologies			+	+		+
5.	Implementation of automated SIMI	+	+	+	+	+	+
5.1	definition of the strategic objectives of the project and the tactical plan for the introduction of the automated system	+	–	–	+	–	+
5.2	pre-project survey (industrial audit) – checking the compliance of business process organization with standards	+	–	–	+	–	+
5.3	training of specialists of the implementation group	+	–	+	+	+	+
5.4	business process modeling – specific tasks, responsibilities, participants, terms	+	–	–	+	–	+
5.5	development and coordination of the setup of reference books and system classifiers according to the requirements defined in the previous stages	+	–	–	+	–	+
5.6	adjusting the system in accordance with the decisions and testing the functions of the project team;	+	–	–	+	+	+
5.7	test runs at separate units	+	–	–	+	+	+
5.8	users training how to work with the system	+	–	+	+	+	+
5.9	experimental and industrial exploitation	+	–	–	+	+	+
5.10	introduction of the system into industrial exploitation;	+	–	–	+	–	+
5.11	post-project survey / industrial audit /	+	–	–	+	–	+

Note: “+” present, “-“ absent, “~” optional

Undoubtedly it is necessary to start the setting of the system with the organizational measures (p/p. 1) that is sufficiently described by (Kolesnykov S., 2003) [13] but it would be advisable to involve the measures (Abramova I., 2003) [2] and [14] to approve the motivation program and the list of documentation.

After the necessary organizational measures are taken, one can move to the most important stage – “Statement of the economic model”, which begins with the business diagnosis (p/p. 2.1). Proposed as sub-stages of the economic model statement to take as a basis the sequence outlined (Abramova I., 2003) [2], since they reflect the process of constructing a full-fledged SIMI model.

The construction of strategic maps at any level of management is a formulation of the tasks facing the system of internal managerial information and the definition of information managerial needs, which fully reflects the individual peculiarity of business, the competitive situation and the strategy of the enterprise (p/p.2.2).

The description of business processes (clause 2.3) involves the use of certain business process modeling techniques (SADT / IDEF0, DFD, IDEF3, ORACLE, BAAN, ARIS) and their supporting software (Design / IDEF, BPWin, Power Designer , Oracle Designer 2000, BAAN EME, ARIS Toolkit).

In the course of improving the organizational structure of the company there is a redistribution of functions and responsibilities among employees, reorganization of units (p/p. 2.4). The formation of the economic model also involves the development of a financial structure (p/p. 2.5), the creation of an information base (p/p. 2.6), the construction of the managerial accounting system (p/p. 2.7.) and expenditure management and cost calculation systems (p/p 2.8.).

In the General Plan the attention was paid to the construction of the budgeting system which in our opinion is not included in the SIMI but is interconnected with MIS, so it is also necessary to pay attention to it. Development of budgeting involves the development of budget forms of the company’s master budget and financial responsibility centers, the methods of filling these forms and consolidating budgets, centers of financial responsibility (CFR). Organization of budgeting is the appointment of responsible budget, developing the scheme of interaction of the CFR, the development of regulations on budgeting and document circulation (p/p. 2.9). Thus, the stage of the economic model statement covers all three SIMI subsystems: subsystem of key indicators, subsystem of management reporting and a subsystem of accounting for managerial information (including expenditure management and cost calculation). This stage covers the following four basic business models that are required for a reasonable construction of the SIMI subsystems: process, functional, organizational and financial models.

The decision as to independent development or implementation of

the existing automated MIS is very important and responsible step since the effectiveness of the implementation process depends on it (p/p. 3).

It should be noted that the presented work is devoted to the conceptual description of the system of internal management as a separate organizational and technical system of information support of financial and economic management of the enterprise on the basis of the system approach. Undoubtedly the functioning of such a system is impossible without its automation i.e. the consideration of the process of formation of SIMI without covering the general issues associated with automation will not be complete. But the author's work can not be completely devoted to all the details of the automation process, the aspects of the software and hardware of the automated information system because this is the task of another specialty.

Not giving attention to the detailed analysis of the scientific heritage on automation of managerial information systems by well-known scientists (V.N. Amitan, V.M. Glushkov, Ya.G. Bersutsky, L.S. Vinarik and O. M. Shchedrin, S. Bira , M.M. Lepi, K. Shannon and others) and the development of detailed recommendations as for the automation of SIMI, the authors considered in more detail the very formulation of the economic model of SIMI as one of the main stages of the implementation of SIMI at the enterprise (association).

Therefore, in the proposed General Plan only some important, in the authors' opinion, stages related to the automation of SIMI are considered.

The preparation of information systems at the operational level (p/p. 4) allows specialists to significantly simplify the implementation process, as it will accelerate the process of gathering informative data. In the process of integration the following steps must be performed:

- 1) determine the management requirements as for information (cutoffs (analytics) of the information, the degree (level) of completeness of the information, specification of parameters, fractionality, efficiency, accuracy), as well as to determine the extent of the possibility of extracting from existing information systems the information for management;

- 2) it is necessary to formalize the requirements of management to information in the form of information and logic scheme which provides information objects and interconnections between them which will clarify the requirements of management and determine the possibilities of providing information and transformation of data into managerial information;

3) the development of integration technology (development of the logical physical structure of data in the central database and data in “portions”, transmitted from the units, the choice of database for the central database and data formats, transmitted from the units, the development of organizational mechanisms of regular or continuous integration which determines how the integration system will function: when and by whom the integration mechanisms are launched, how the synchronization of reference and normative data is provided, what data and in what terms are arriving).

As sub-steps of the direct process of implementation of the automated system of SIMI, we propose to take as a basis the sequence set forth by (Kolesnykov S., 2003) [13] (p/p. 5). The stage of defining the strategic objectives of the project and the tactical plan for the implementation of the automated system involves the establishment of the basic implementation plan: the organization of the project, its structure, objectives and scope, the structure of the project team, the implementation methodology, the indicative plan for the preparation of the project team, the coordination of the main stages, methods for assessing the quality of work (p/p. 5.1). The production plan involves the training of both SIMI users and specialists for further implementation. The training program for the implementation team should be at the program level for consultants (p/p. 5.3).

Test runs in separate units are performed as follows: real data are to be entered into the system in a limited volume, by simulating the real situations – for example, shipment, placing in property – successively tested business functions, each unit performs its “key” example (p/p 5.7). In the course of experimental and industrial exploitation, it must be ensured that the functionality of the system fully meets the requirements of the enterprise. At this stage, specialists receive standard reports and verify the identity of the data; it is possible to carry out special verifying procedures; the system is introduced fragmentarily by separate areas of accounting (management) into industrial exploitation; job placement instructions are being recorded, the job descriptions of the participants in the accounting process are being corrected, all the input options and the procedure for the use of standard directories are presented (p/p. 5.9).

Thus, in order to solve the problem of enhancing the efficiency of the implementation of SIMI at domestic enterprises, general methodology of SIMI statement, consisting of five main stages: organizational measures, statement of the economic model, decision making as for software product, preparation of information systems at the operational level,

implementation of the automated SIMI.

Conclusions. The methodology makes it possible to efficiently set up SIMI on the basis of the creation of a complete economic model of the enterprise that includes business process models, organizational, functional and financial structures, strategic and informational models.

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