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IN THE NUMBER:

ECONOMICS AND MANAGEMENT OF NATIONAL ECONOMY
Beloglazova S.A. International practices of cluster mapping for identification of regional clusters 76
Khlebnikov K.V. Selection of the organizational model of high-tech innovation cluster based on the analysis of the evolution of the factors 77
Katenev V.V., Komarov A.G. Industrial enterprises placing problems in the megacity 78
Khlebnikov K.V. The parameters of the innovation cycle of high-tech pre-acceptance: steps, cost, duration, personnel 78
Pecherskaia E.P., Kamaletdinov Iu.A., Iudina O.V. The problems of effective corporate information systems installation: new approaches 79
Novikov A.A., Elbakian A.M. Increase of investment attractiveness of power industry of the Russian Federation 92
Guliaeva V.B. The assessment of efficiency of functioning of special economic zones: ways of improving 92
Grubyi V.A., Pizengolts V.M., Saurenko T.N. Development of domestic agrarian and industrial complex - the main direction of food independence of the country 93
Iazev G.V. Actual problems of oil crop export in Russian Agroindustrial complex 93
Grubyi V.A., Pizengolts V.M., Saurenko T.N., Tatochenko A.L. Economic and organizational aspects of interaction networks, storage and processing of agricultural products system of domestic food aid 94

FINANCE, MONEY CIRCULATION AND CREDIT
Popova V.P. Financial clusters as the main tool of assessment of activities of commercial bank 94
Nikulina O.M., Zemtsov A.A. Analysis of payroll for individuals: tax expense of legal entities on labor, there is 95

WORLD ECONOMY
Konina N.Iu. The new global environment 95
Zudinova K.Iu. Import substitution in shipbuilding: the way to economic and political security or a new stage of rapid increase in the competitiveness of the industry on the world stage 96

ECONOMICS AND MANAGEMENT OF NATIONAL ECONOMY

INTERNATIONAL PRACTICES OF CLUSTER MAPPING FOR IDENTIFICATION OF REGIONAL CLUSTERS

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Synergistic attributes of clusters allows considering them as an effective tool for managing regional development. At the same time, there are a number of difficulties associated with the identification of cluster presence, their boundaries and structure, evaluation of their impact on the main indicators of economic development. The article presents an analysis of foreign experience of cluster identification by using mapping tools, review of evolution of the cluster mapping methodology and specifics of its implementation in the United States and EU.

Key words: clusters, cluster identification, cluster mapping, geographic concentration, emerging industries.

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SELECTION OF THE ORGANIZATIONAL MODEL OF HIGH-TECH INNOVATION CLUSTER BASED ON THE ANALYSIS OF THE EVOLUTION OF THE FACTORS

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In this paper, the author formulated a look at the evolution of high-tech innovation clusters on the platform of "knowledge economy". A model of the organization of innovation clusters "hub-and-spoke" (A. Markusen), taking into account the factors of their evolution.

Key words: industry, hi-tech, cluster.

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INDUSTRIAL ENTERPRISES PLACING PROBLEMS IN THE MEGACITY*

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In article problems of an industrial enterprises placing in megacity territory (on an example of St.-Petersburg) are considered. Existence of various models of functional zones of a megacity placing (including the industry) is shown. The impossibility of estimation an uniform technique efficiency of placing some industrial enterprises in big city territory creation is proved.

Key words: the industry, placing, a megacity, economic efficiency.

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THE PARAMETERS OF THE INNOVATION CYCLE OF HIGH-TECH PRE-ACCEPTANCE: STEPS, COST, DURATION, PERSONNEL

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This publication presents the research of high-tech enterprise innovation cycle, specified relative duration and cost of stages. A perspective view of the structure and functions of the staff implementing the innovation cycle.

Key words: innovation, high technology.

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THE PROBLEMS OF EFFECTIVE CORPORATE INFORMATION SYSTEMS INSTALLATION: NEW APPROACHES

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The dependence of the corporate industrial enterprise information system project implementation results on the used in the project management processes is determined. The importance of the critical success factors of the enterprise information systems implementation projects at various stages of the project life cycle is examined.

Key words: corporate information systems, risk factors, project management, key factors, management tools, human resource management, implementation stages, project life cycle.

Purpose: The paper defines and systematizes the key factors, which influence the results of Enterprise Resource Planning system implementation, the most common problems of such implementation and the main sources and solutions of above-mentioned. The high value of ERP projects for business, as well as the high risks associated with these projects implementation, requires studying the success drivers of ERP projects and developing a methodology to assess potential transformation of success factors into risk factors in a phased project diagnosis on different life cycle stages. All this will allow providing business executives, business consultants, managers and professionals with an effective tool to identify and eliminate causes that threaten the project success. ***Design/methodology/approach:*** The following approaches were used : logical modeling, statistical techniques, heuristic techniques, such as questionnaires, interviews of representative groups of IT project managers, human resource managers, heads of technical and business units. ***Findings:*** The authors prove the most important critical success factors relating to human resources management. There is analysis and classification of the 22 autonomous critical factors grouped by key players and activities. The authors defined two independent criteria that determine the nature of critical factors effects on project results and present a methodology to assess the potential human-related ("soft") critical success factors of Enterprise

Resource Planning projects and their transformation into factors of risk. **Originality/value:** Aspects of human behavior and risks that a company faces are considered from several perspectives. In order to cover above-mentioned issues the specially developed questionnaire was suggested by authors, which contained 21 points and consisted of 7 main sections. The authors used a systematic literature review approach, starts with literature review, problems identification, selection process, assess, synthesize and write down the ideas proposed, and then make conclusions. The results based on comparison of success factors and risk factors allow to estimate possible transformation of the "soft" critical success factors of ERP-projects into the risk factors within the diagnostic assessment of the company's readiness to implement an ERP project.

1. Introduction

1.1. The Problem Background

Enterprise resource planning has been implemented by many organizations seeking for a system to integrate various business process across various functions. Much have been discussed about the challenge in implementing ERP systems. Implementation of Enterprise Resource Planning (ERP) systems is usually characterized by their riskiness. Many projects were halted because of the problems related to organizational behavior and human resource management. Such problems may include: unwillingness of end users to use the system, staff resistance to changes, poor training, high turnover of staff, lack of communication, low-qualified consultants, etc. Successful implementation of ERP projects can be under threat because of purely technical issues, such as software bugs and complexity in the system configuration design (Sumner, 2000; Kumar et al., 2003). However, we agree with the conclusions of many researchers (Markus et al., 2000; Chen, 2001; Kumar et al., 2003) that the main reasons for failures in projects implementation are people, organizational aspects and unprofessional management of changes. It should be noted that the problems related to the human dimension are generally perceived to be much more complex than those related to the hard (or technical) dimension of project implementation. Development and operationalization of corporate information systems are complex projects; a high level of human resource management is a key success factor for them (May & Kettelhut,1996; Hawa et al., 2002). Besides, many researchers (Welti, 1999; Holland et al., 1999; Sumner, 2000, Matende et al., 2013; Hwang, 2014; Saide & Mahendwathi, 2015; Costa et al., 2016) include effective management of human resources (HR) in the list of key factors underlying ERP systems projects success. Therefore, it is very important to understand the role of the stakeholders involved in the ERP project implementation. Aspects of human behavior and risks that a company faces should be considered from several perspectives: by internal and external experts, specialists on system functioning, managers, suppliers, users, and other involved parties.

1.2. The Problem Importance

ERP-system projects typically require quite extensive use of Business Processes reengineering (BPR); enterprise business processes are redesigned in line with the system features. Such changes are the reason for members' resistance, who see the changes as a threat to their jobs, authority and credibility. In the opinion of some authors (Evans, 1994; Zucchi & Edwards, 1999; Marjanovic, 2000; Chung-Hsing Yeh & Yan Yu, 2013), the main cause of failures in project reengineering is insufficient attention to human aspect. Olson (2004) provides a list of the main reasons for the failures in BPR projects:

- Lack of attention to human aspects,
- Staff resistance to changes,
- Inadequate staff recruitment,
- Inadequate tools of developers and users,
- Poor coherence of strategies and objectives,
- Lack of control,
- Lack of management commitment to the project.

According to O'Leary (2000), all risks within the project framework of ERP system introduction can be divided into 3 main groups:

- Technical risks. Technical risks are associated mainly with data processing, software modification, integration of systems, errors in data, network capabilities, etc. Occurrence of technical risks and compensation of their effects typically involve experts from a technical company together with the software vendor.
- Business risks. Business risks appear in projects because of wrong choice of certain models and business processes. The examples of business risks can be lack of resources, unskilled as-

sessment of costs and benefits, decline in operational efficiency as a result of the system introduction etc.

• Organizational risks. Organizational risks are related to human factors, the operating model and organization structure as well as the aspects of the company's corporate culture. The examples of institutional risks are lack of training for users, key personnel turnover, cultural aspects, lack of attention to the choice of professional consultants, unrealized reengineering of business processes, etc.

It should be noted that business risks and organizational risks are, as a rule, the most serious and difficult to control. Olson (2004) summarizes the results of the research, which was made by Willcocks and Sykes (2000) and dedicated to the analysis of reasons of failures in ERP projects. Willcocks and Sykes found that companies that failed should have implemented changes in human, cultural and organizational relations. In particular, Willcocks and Sykes defined 3 scenarios of implementation, generally resulting in a failure of an ERP-project (Table 1).

Table 1. **Scenarios of implementation that lead to ERP project failures**

Scenario	The focus of the Chief Information Officer/IT group	The typical result
Technological determinism	Technology. Observance of the project budget	Business benefits are not achieved
Dominance of vendors/consultants	No focus	Excess costs
Obsolete relationships	Lack of competence	Chaos

Technological determinism assumes that the manager who is responsible for enterprise's information technology (usually Chief Information Officer or CIO) is too focused on technical aspects. Thus, the personnel of the IT group have advanced technical skills. In this case, the ERP-system is considered as a package solution that can resolve all process- and technology-related issues by means of hardware. Such perspective often causes staff resistance to changes and a high probability of a project failure. In the implementation of the project, the IT group focuses mostly on project budgets or deadlines instead of achieving business benefits.

The scenario of suppliers' or consultants' domination occurs when top managers introduce a project without necessary consultations with the CIO and IT group. This situation appears because top managers believe in an ERP system as a strategic tool or they distrust the specialists from the IT group. In such situation, the project is outsourced to the ERP-system suppliers and consultants. Such approach usually results in exceeding the project budget.

The scenario of obsolete relationships and abilities occurs when the Chief Information Officer and IT teams are unable to cope with new technologies and related issues. For example, they lack required technical competencies necessary for the ERP system implementation, but still are in charge of the respective intitative. As a result, to fill in the gaps, the company hires external specialists. The relationship with the users remain undeveloped, the focus is on minimizing costs, rather than on strategic benefits. After the system starts, the company is about to maintain a new system. This scenario is the most common one and can be found even in successful ERP system projects.

The success of project introduction is a multifaceted concept and, therefore, can be measured in various categories. These categories include introduction speed, visible and measurable business benefits, as well as fast return of investments. In Hong and Kim's studies (2002), successful implementation of a project is measured by achievement of planned objectives, taking into account cost overruns, missed deadlines, shortage of system productivity, as well as by impossibility to achieve planned benefits. In a similar research conducted by V. Kumar (2003), it was found that the most frequently used measures to define the project success are meeting deadlines and budget. The author also associates the success of a project with the achievement of the company's key performance indicators, such as the life-cycle of sale completion, inventory turnover.

However, it is clear that successful implementation depends on various other factors, such as human resources management, organizational aspects, change management, process optimization and trainings. For example, in Umble's research (Umble et al., 2003), key success factors are divided into 10 basic groups:

1. Shared and unambiguous views on corporate startegy and goals.

2. Involvement of top executives in project governance and oversight.

3. Established competencies of project management.

4. Professional project team.

5. Proficiency in resolving technology-related issues.

6. Preparedness for organizational changes and commitments.

7. Training and information

8. Data accuracy.

9. Effective performance of measurement tools.

10. Solutions to the problems arising from the geographical diversification of the project participants.

2. Materials and methods

Based on the analyzed scientific literature (Parr & Shanks, 2000; Akkermans & Helden, 2002; Somers & Nelson, 2004) and practical experience, we determined 22 autonomous critical factors and grouped them by key players and activities. They form a base for reducing the risks of failures during implementation of corporate information systems. These factors were divided into "hard" ones (H), which can be easily measured and are usually associated with uniquely interpreted phenomena, and "soft" ones (S), which are difficult to measure and tend to be nonmaterial, ambiguous, related to the areas of human psychology and organizational behavior (Table 2).

We also defined two independent criteria that determine the nature of critical factors effects on project results: 1) the life cycle of project implementation; 2) the key factors of ERP system implementation project (presence and behavior).

The study was carried out in two parts. The first part was aimed at evaluating the level of significance of the above-mentioned factors for the project success. Here, the collection of data was conducted using an online questionnaire, since this method assumes receiving a significant amount of feedback within a short period of time. In addition, this method allows questioning a large number of respondents; if the response rate is too low, it is possible to send letters-reminders. Other research methods were refused. For example, questionnaires mailing would have high costs and long response time, personal interviews would be very expensive.

200 Russian industrial enterprises received proposals to participate in the questionnaire.

The list of potential respondents for the research was generated using available industrial data on subject-information technologies, corporate information systems, information management, etc., as well as the sites of official software suppliers and major industrial holdings, i.e. reliable sources, which contained references to companies with introduced ERP systems.

The key focus-group of the research were IT project managers, human resource managers, heads of technical and business units – those who were involved in the implementation of corporate information systems at their enterprises. Only one employee from every selected company was to answer the questionnaire.

The specially developed questionnaire contained 21 points: 11 open questions and 10 closed multiple choice questions. The questionnaire had been drawn up in Russian and consisted of 7 main sections: 1) Common questions, 2) Skills and competencies, 3) Education, training and

Table 2. **Critical factors for implementation of corporate information systems at industrial enterprises**

Key project participants	Key activities
Senior management (H)	Training of Users (S)
Project leader (H)	Expectations Management (S)
Project Management Committee (H)	Careful selection of an appropriate package of services, systems, modules, etc. (H)
Implementation Consultants (H)	Project management (H)
Project team (S)	Customization (H)
Partnership between a provider and a client (H)	Analysis and interpretation of data (H)
Provider tools (H)	Reengineering of Business processes (H)
Provider support (H)	Definition of architecture (H)
	Resource allocation (H)
	Change management (S)
	Setting clear goals and objectives (H)
	Learning new business processes (S)
	Internal communication (S)
	Intercompany collaboration (S)

development, 4) Change management 5) Communication, 6) Remuneration system, 7) Risk factors.

The respondents were asked to rank the importance of each critical success factor (CSF) for ERP implementation on a scale from very low to very high - from the list of 8 soft and 4 hard factors.

The second part of the research was to identify the factors and project life cycles with the highest probability of risk. The methodology was as follows:

Step 1: questioning. There was a questionnaire for the participants of corporate information systems projects. The respondents indicated risk factors that they consider to be significant at each project stage (one open question), and graded their importance on a Likert scale from 1 (very low) to 5 (very high).

Step 2: categorization of responses. The categorization of the respondents' answers was done to unify similar responses of different respondents in general statements; it allowed creating a list of risk factors that are common to most respondents. We calculated average score of importance for each risk factor. The significance of the factors, which were not mentioned by the respondents, was taken for zero.

Step 3: comparison of success factors and risk factors. The identified risk factors were compared with the "soft" critical success factors (project team competence, user training, intercompany communication and interaction, expectations management, change management).

Step 4: drawing conclusions. The obtained data were analyzed and research findings were formed.

3. Results

3.1. Significance of critical success factors

Many studies (Ross, 1999, Somers & Nelson, 2001; Akkermans & Helden, 2002; Grant et al., 2013) refer to relatively high importance of such hard drivers as executive support and involvement or advanced project management competencies. The respondents of this research marked the significance of "hard" factors as well. The respondents also noted the implication of such factors as involvement of users, intercompany communication, competence of project teams, users training and internal communications. The results are, in many ways, similar to the result of the critical success factors research conducted by Akkermans and Helden (2002) and based on data obtained from the questionnaire of 52 top managers. The only exception is the expectations management factor, which was highly assessed in the research of Akkermans and Helden, but received relatively poor valuation in this research.

The conducted research showed that the level of significance for five selected core people-related risk factors (project members' skills and competencies, internal communication, acceptance of new operating processes, change management, trainings and infromation provided to users) is closely connected with reduction of ERP project risk failure and the significance of each "soft" factor varies depending on the stage of the project life cycle.

The results of respondents' answers and their analysis are given below; topics are related to the aspects of human resources management (HRM).

Table 3. **Ranking of critical success factors in ERP projects (in descending order of their importance)**

Critical success factors (n = 160)	Scale
Executive support and involvement (H)	4.25
End-User involvement (S)	4.25
Advanced project management competencies (H)	4.19
Intercompany communication (S)	4.19
Skills and competencies of project members (S)	4.13
Trainings and information provided to users (S)	4.06
Internal communication (S)	4.06
Business process re-design and optimization (H)	3.96
Change management (S)	3.50
Acceptance of new operating processes (S)	3.44
Managing expectations (S)	3.38
Compatibility of software and physical equipment (H)	3.19

Competencies of the project team

The results of the research (Table 4) showed that respondents consider experienced and skilled project members as a key prerequisite to increase the efficiency of the enterprise systems introduction. That agrees with the viewpoint of many scientists, who write about the impossibility of successful project implementation in case qualified and motivated staff is lacking. The next most important factor was the availability of necessary human resources and expertise to implement a project. Project team structure was not indicated as an important factor. That contradicts the position expressed by Welti (1999), who defined resources and expertise availability, project teams' quality and structure as key HRM requirements for successful project implementation.

Table 4. **Ranking of HRM requirements in ERP system implementation (in descending order of their importance)**

HR management requirements	Scale
Experienced and skilled project participants	3.94
Adequate staffing for project implementation	3.69
Presence of required expertise	3.50
Project team structure	3.31

The analysis of the data obtained from the respondents of the questionnaire allowed us to propose the most optimal project team structure. It greatly improves the efficiency and success of ERP projects implementation at enterprises (Table 5).

Table 5. **Key persons in the structure of a project team**

Key persons	% of respondents
Managers	66.7
IT staff	55.6
Top executives	44.4
Consultants	44.4
ERP system suppliers	27.8
IT consultants	11.1
Other	11.1

The results showed that the key persons for ERP project should be managers (66.7%), IT personnel (55.6%), top executives (44.4%) and consultants (44.4%). A few companies-respondents had representatives of ERP system vendors and IT-consultants in their project teams. The project team structure obtained in our survey is consistent with the position of Hawa (2002), who defines 3 key categories of professionals involved in reengineering initiatives: managers, employees, outside consultants and technical company experts.

Similarly, Welti (1999) recommends a project team built of a project manager, project team members and consultants. According to Hawa, the members of different project teams should not only have necessary skills, but also constantly collaborate with each other, making emphasis on the value of personal contacts and relationships.

Based on our analysis of respondents, we prepared an assessments table of various skills important for different key groups of professionals involved in an ERP project. According to our respondents, the most important thing for top managers is the ability to lead and communicate. Support from top executives, their constant and active involvement in all processes of project implementation, as well as project team formation by top managers are also essential elements of success.

The skills, which are necessary for the managers of lower levels, include communication, monitoring, leadership, planning, and interpersonal communication. Unlike Wateridge's research (1997), in which leadership qualities are at the first place, our study identified communication skills as the most important for managers. We assume that at present time, when project management has a trend to focus on human resources management, communication and interpersonal skills are more important than before.

The importance of project management competencies, such as developing plans and exercising control, remains high because project management is indispensable on every stage of the project life cycle. That requires such skills as planning, control, monitoring of social, behavioral and "power play" aspects, and many other skills. Our respondents noted that technical skills are not important for managers, which is in line with the conclusions of Wateridge.

Communication skills and the ability to build personal contacts are the most important factors for end-users. That could be grounded by the fact that planning and control functions are realized by managerial staff. Users are not required to have special technical skills. In addition to understanding the functions connected with performance of their working duties, users are expected to understand new processes and procedures.

For consultants, the key skills were experience in ERP-systems implementation, planning skills, communication skills. External consultants provide project teams with valuable expertise in the field of project management, planning, system tuning and training. Good consultants have a positive impact on project terms and quality, while incompetent consultants are in the group of the main obstacles to successful project implementation. The ability to communicate is critical for consultants, because they have to deliver their ideas to companies' executives, as well as to share their knowledge with the personnel of their clients.

Technical skills are required for IT consultants, ERP system suppliers and the company's IT staff. IT personnel also requires developed communication skills. For this category of personnel, mere availability of technical know-hows is not enough, the ability to interact effectively with other project team members is also important.

Training and development

The significance of training is a popular topic in academic literature. Insufficient training causes users' misunderstanding of the changes in the company's business processes, which a new system brings. It is one of the main reasons for failures in ERP projects. It is no wonder that the survey participants named the study of the new system and its working functionality, acceptance of new processes and procedures, and staff training in implementation of changes as key factors for ERP projects. The following factors were also marked as important: availability of qualified coaches, defining required types of training and giving support when training is organized. The results are similar to the results of the research conducted by Kumar (Kumar et al., 2003). Nowadays, it is not enough to be a professional only in the field of ERP; it is necessary to understand how business and ERP systems work together. Unfortunately, professionals with such understanding are rarely found in the market. Different groups of users have different requirements, preferences and abilities to learn. The factor of available necessary budget is in the middle of our ranking of importance, although many researchers (Kumar et al., 2003) believe that insufficiency of budget is one of the major obstacles to successful training of users. Documentation for the training process and assessment of trainings effectiveness was given the lowest score in our ranking of importance.

Change management

In the section about change management, participants were to define the importance of change management strategies. Involvement of managers in the process of change received the highest scores in the ranking of importance (Table 6). This result is consistent with the research proving that top executives' involvement is a crucial driver for the success of ERP projects (Aladwani, 2001). Other strategies with high marks of importance became delegating responsibilities to personnel and strategic understanding of ERP systems significance. The most common strategy is to increase users' acceptance through delegation of responsibilities and inform them about the strategy of ERP system use and its benefits for users. Next, there was availability of a strategy to develop new assessment criteria and control measures. The importance of assessing this strategy is quite logical in view of possible changes in the work processes, which a new system brings. The significance of the strategies of resistance sources identification and specific expertise identification of resistant staff was low. However, in scientific literature, there is an opinion that these strategies should help senior managers understand the reason for resistance to changes, as well as form a strategy to overcome resistance to change (Welti,

Table 6. **The importance of change management strategies during implementation of ERP system projects**

Factors of change management strategies	Scale
Involvement in change process	4.21
Delegation of responsibilities to employees	3.93
Availability of a strategic vision in ERP systems and project management	3.86
Development of new assessment criteria and control tools	3.71
Taking time to listen and discuss employees' concerns	3.64
Defining the sources of resistance	3.57
Defining specific employees, who are resistant to changes	3.50
Getting users' agreement with implemented changes	3.43

1999). It is surprising that users' acceptance of changes was given the lowest place in the ranking. Many authors (May & Kettelhut, 1996; Welti, 1999; Aladwani, 2001) emphasized the need to reach staff agreement with implemented changes for successful management of ERP implementation. Scientists believe that it is easier to generate reasons to implement ERP solutions, than to get users' agreement.

Communications

As the purpose of any ERP system is integration of different business functions in different company departments, internal interaction and communication are essential for ERP system implementation (Akkermans & Helden, 2002). Here, participants had to assess the influcence of communication factors on the success of ERP implementations. The factors with the highest score are efficient communication between key project participants, as well as interaction and involvement of key stakeholders (Table 7). The results are fully consistent with the findings explained in scientific literature. Efficient communication and collaboration are vital as they help to define expectations and reduce anxiety, to form users' acceptance of changes, and to increase involvement of all parties (May & Kettelhut, 1997). Akkermans and Helden (2002) found that effective communication and collaboration between project memebers is a key to successful project implementation. Information about future benefits of ERP system and implementation strategy is a vital part of any ERP project. The lowest score was given to develop of communication rules. It is quite clear that this practice is far from first place in the general communication strategy.

Managing expectations

Successful management of users' expectations is directly related with ERP implementation success; it remains relevant on any stage of the life cycle of enterprise resource planning project (Akkermans & Helden, 2002; Somers & Nelson, 2004). The most significant, according to our respondents, are such factors as staff involvement and creation of conditions for comfortable work. Let us remind that it is very hard to find and hire professionals who are skilled both in the field of ERP systems and business. Company-paid trainings for further development of such specialists are extremely expensive. In these circumstances, staff retention should be one of the key goals for a company. Rewards for individual success were rated higher than remuneration of team works. This result can be explained by predominance of individual culture, in which, in contrast to cooperative culture, individual achievements are more appreciated. Thus, money goes to the last place, fame is on the second place, and team spirit building is on the first place. Clarification of future career opportunities to the staff was not considered as an important factor.

Table 7. **The importance of each communication factor in the implementation of ERP systems**

Communication factors	Scale
Efficient communication between key project participants	4.53
Interaction and collaboration of key participants	4.20
Information about ERP system benefits	4.13
The practice of regular communication	3.93
Informing about the changes that are caused by ERP -System introduction	3.87
Rules of communication	3.33

3.2. Evaluation of "soft" critical success factors of ERP projects for possible transformation into risk factors

The analysis of CSFs significance conducted above shows that on all stages of the ERP project life cycle, high assessment of critical success factors importance contributed to successful project implementation, while insufficient attention to these factors led to project failures. Therefore, in case of lack of attention or incorrect approach to critical success factors management, these critical factors can be transformed into risk factors of ERP projects.

The objectives of the second part of our empirical studies were:

• Identification of "soft" critical success factors with the highest probability of transformation into risk factors in case of wrong management approach.

• Identification of the stage of the ERP project life cycle, on which each critical success factor is more likely to transform into a risk factor.

The analysis of the respondents' responses revealed that some risk factors were very close to "soft" success factors at each stage of ERP project life cycle. Thus, there were two similar key "soft" factors – "internal communications" and "internal interaction". It allowed us to combine them in one criterion – "intra-company communication and collaboration". The situation with two "soft" factors - "personnel training of work with a new system" and "personnel training of new business processes" – was analogous and we combined them under the general wording "Training of Users". Hereinafter. we will use the following list of key "soft" success factors:

• Project team competence
• Training of Users
• Internal communication and interaction
• Managing expectations
• Change management

For the classification of project risks, we used the following model of the ERP project life cycle:

• Design
• Decision on ERP-system introduction
• Project planning
• Introduction
• After introduction.

4. Discussions

4.1. Risks at the stage of design

The analysis of the responses (from the second part of the data set described in the Methods section) showed that the risks at the stage of design are caused by the errors, which are made during the implementation of two main groups of administrative actions, the decision to start project planning and project implementation. According to the classification by O'Leary (2000), these risks fall into the category of "business risks". Business risks that appear at the stage of design become evident on later stages and are usually extremely difficult to control.

Table 8 lists the risk factors, which occur at the stage of design, as well as assessment of importance of these factors by the respondents (using a five-point Likert scale: from 1 - very low importance to 5 - very high importance).

The research has shown that some risk factors arising on the design stage, are connected with the "soft" critical success factors of the ERP-project:

• The risk factor "Lack of attention to the aspects of managing the human factor", which got a low score of 2.5 on the design stage, is directly connected with all the chosen "soft" success factors of the ERP projects.

• The risk factor "The desire to preserve the existing methods of conducting business", with

Table 8. **The factors of risk at the stage of design and their significance**

№	Risk factors	Significance of the risk factor (1-5 scores)
1	Absence of a formed strategic approach in the sphere of ERP systems and their implementation	4.2
2	Indistinct criteria of choosing a software for ERP system	4. 0
3	Lack of branch decisions in ERP system for the branch of the consumer	3.8
4	Lack of understanding the difference between the standard functional of the system and the company's existing business processes	3.8
5	Underestimation of the necessity of business processes reengineering	3.6
6	Inadequate planning of implementation duration	3.6
7	Inadequate planning of benefits from exploitation of the system	3.6
8	Inadequate planning of project costs	3.4
9	Inadequate planning of the project team workflow (roles, resources, mechanisms of control and interaction)	3.4
10	The desire to preserve the existing methods of conducting business	3.5
11	Excessive focus on the external consultants	3.1
12	ERP system has functional, which is too big for the company's business needs	2.9
13	Lack of practice in the organization of tenders when choosing implementation contractors	2.8
14	Functionally unrealizable plan of the implementation of system modules	2.8
15	Overestimation of the ERP-system possibilities	2.6
16	Selection of external consultants with domination of the price criterion	2.5
17	Lack of attention to the aspects of managing the human factor during ERP implementation	2.5
18	The functional of the ERP-systems is not capable to meet the company's needs	1.8

a rather high score of 3.5, suggests the emergence of personnel resistance to changes. Therefore, this risk factor is directly related to the "soft" critical success factor "Change management".

• The risk factor "Excessive focus on the external consultants" with the score of 3.1 usually appears because of absence of necessary competences inside the company or low estimation of such competences by the top managers of the company. Correspondingly, this risk factor is connected directly with the "soft" critical factor of success "Competence of the project team".

• The risk factor "Inadequate planning of the project team workflow" appeared because of inadequate estimation of the skills, knowledge and experience of the project team by the top managers. This risk factor is connected with the mistakes of estimation but not with actual lack of competences of the project team. So, this factor cannot be directly connected with any of the "soft" key factors of success.

4.2. Risks at the Stage of Implementation

The stage of implementation is characterized by the realization of numerous "business-risks", which appeared on the previous stages of the project, as well as the risks appearing during the process of implementation - "technical" and "organizational" risks (O'Leary, 2000). In the opinion of many researchers, organizational risks are more difficult for management than technical risks (O'Leary, 2000; Skok & Legge, 2002; Aladwani, 2001; Poston &Grabski, 2001, Kumar et al., 2003).

Table 9 provides a list of risk factors that arise during the implementation and the assessment of their significance by the respondents (with a five-point Likert scale: from1 - very low importance to 5 - very high importance).

The study revealed the following relationship of risk factors with "soft" critical success factors for ERP-project on the implementation stage:

• The risk factor "Additional burden on the user" with one of the highest marks of 4.4 appeared because of lack of personnel motivation to take additional burden of working with a new system in terms of changed business processes. Consequently, this factor is directly connected with the "soft" critical factor of success "Managing expectations".

• The risk factor "Lack of top management involvement in the project", which also has a high mark of 3.7, is directly connected with the factors "Managing expectations" and "Change management" because the realization of the corresponding practices of HR management is usually not possible without active support of top management.

• The risk factor "Non-participation or opposition to the project implementation of key participants" with a rather high mark of 3.6 is directly connected with the "soft" factor of suc-

Table 9. **The factors of risk arising at the stage of implementation and their significance**

№	Risk factors	Significance of the risk factor (1-5 scores)
1	The business processes are not standardized or poorly standardized	4.4
2	Additional burden on the user (the need to develop new methods of work, increased responsibility) in the course of the project implementation and in future	4.4
3	Lack of unified information and methodological basis (databases, directories, etc.)	4.2
4	Lack of top management involvement in the project	3.7
5	Non-participation or opposition of key participants to the project implementation: CIO, chief accountant, heads of departments, etc.	3.6
6	Opposition of large groups of employees or the entire staff to the project implementation and organizational changes initiated by it	3.5
7	Differences between the business processes of the company and the standard algorithms of the ERP system	3.5
8	Problems in cooperation of technical specialists and business units involved in the project	3.4
9	Problems in cooperation of the company and the external consultant	2.6
10	The emerging need for changes in the system due to changes in the internal or external business environment	2.5
11	Inefficient cross-level interaction between the employees of the company, leading to non-fulfillment of the orders of higher authorities and other employees	2.4
12	Incompetent team of consultants	2.4
13	Problems with the integration of existing IT systems of the company with the implemented ERP-system	2.4

cess "Change management" as the existing practice of HR management is aimed at overcoming the resistance of personnel.

• The risk factor "Opposition of large groups of employees or the entire staff" got the same mark (3.5). This risk factor is also connected with the "soft" factor of success "Change management".

• The risk factors "Problems in cooperation of technical specialists and business units involved in the project" (3.4), "Problems in cooperation of the company and the external consultant" (2.6) and "Inefficient cross-level interaction between the employees of the company" (2.4) are directly connected with the "soft" factor of success "Internal communications and interaction in the company".

• The risk factor "Incompetent team of consultants" got the mark lower than the average one (2.4) and is directly connected with the "soft" factor "Competence of the project team" as external consultants (if there are any) are the part of the project team implementing the ERP system.

4.3. Risks on the Stage "After Implementation"

After the ERP-system is launched and its productive operation starts, many risk factors lose their importance or become completely leveled off. However, there appear new factors of risk that create problems in the post-implementation phase. These risk factors are absent in the classification of O'Leary (O'Leary, 2000) but they can be classified as "business risk" arising not at the design stage but after implementation. Table 10 presents the list of risk factors appearing after implementation, and the mark of significance given by the respondents (with a five-point Likert scale: from 1 - very low importance to 5 - very high importance).

At this stage, there is one risk factor, which can be connected with the "soft" critical factors of success of the ERP project - the risk factor "Problems in the new system support after consultants leave the company" with the average mark of significance 2.4. It is caused by insufficient competences of the company's personnel and can be linked with the "soft" key factor of success "Competences of the project team".

5. Conclusion

The research allowed preparing a classification of the critical success factors and risks that arise at different stages of the ERP project life cycle. The proposed method estimates possible transformation of the "soft" critical success factors of ERP-projects into the risk factors within the diagnostic assessment of the company's readiness to implement an ERP project. It can be used by business leaders, top managers, business consultants, experts, practitioners and researchers - for the purpose of early detection of the "soft" critical success factors of an ERP project, where a wrong approach to its management can lead to complete failure of the business.

Risks and reasons that increase the success of ERP introduction at different stages of the project life cycle are studied by such researchers as A. Aladvani, H. Akkermans, T. D□ыels, M. Kettelhut, D. O'Leary, M. Milford, A. Mital, J. Mei, K. G. Nelson, D.L. Olson, A. Ortiz, L. Ros, T.M., Somers, G. Stewart, J. Uoterid, M. Hawa, B. Hunter, T. Hunter, R. Evans, J. S. Edwards and others.

Today, many researchers (Wateridge, 1997; Skok & Legge, 2002; Kallunki et al., 2011; Grant et al., 2013) analyze the importance of professional staff competencies, arguing that project success depends on qualified and motivated staff with necessary set of business and IT skills. In

Table 10. **Factors of risk at the stage "after implementation" and their significance**

№	Risk factors	Significance of the risk factor (1-5 scores)
1	Changes in the strategy and structure of the company	3.6
2	Changes in the legislation	3.4
3	Changes of the owners	2.4
4	Problems in the new system support after consultants leave the company	2.4
5	Changes in the principles and methods of interaction with the key business partners stipulating the changes in the ERP system	2
6	Reduced flexibility in the restructuring of business processes in case business processes are already adapted to the ERP-system	1.8
7	Obsolescence of the implemented ERP-system	1.2

particular, Hawa and his colleagues (2002) note that the effectiveness of a company's work is based on successful implementation of IT projects, which depends on human resources management. Based on the performed study, Hawa analyzes human resources requirements for implementing a project successfully, particularly focusing on know-hows, project team members' experience and roles; he offers mechanisms and tools to improve human resources management during implementation of ERP projects. The author notes that the implementation of integrated cross-functional projects requires coordination, communication and mutual acceptance between various participants in the project: managers, technical staff, end users, consultants, suppliers, etc. This statement puts the human factor to a key position when a project is implemented at the company level.

The study by Skok and Legge (2002) considers key stakeholders of an ERP project. The authors, in particular, define the four main parties involved in the ERP implementation intitiatives: managers, users, developers, consultants. The authors used the analysis of stakeholders to identify the key factors underlying risk reduction in ERP projects, and also analysed the interaction between the parties. All the identified areas of conflict were considered as probable causes of the project failure. In addition, the study examined the ability of stakeholders to influence the result of the ERP project, as well as strategies to exercise this influence.

Thus, the high value of ERP projects for business, as well as the high risks associated with these projects implementation, requires studying the success drivers of ERP projects and developing a methodology to assess potential transformation of success factors into risk factors in a phased project diagnosis on different life cycle stages. All this will allow providing business executives, business consultants, managers and professionals with an effective tool to identify and eliminate causes that threaten the project success.

Everything mentioned above determines the relevance of the completed research.

6. Recommendations

The main provisions and conclusions of the research can be used for the purpose of improving the methodological basis for management decisions aimed at handling the processes of effective implementation of corporate information systems at industrial enterprises.We hope that the results may be useful for consulting companies providing advice on effective business and organizational change management in the sphere of IT, minimization of the personnel resistance, development of motivation systems for project teams members and ERP end-users, leadership skills and management competencies, creation of systems for personnel selection.

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INCREASE OF INVESTMENT ATTRACTIVENESS OF POWER INDUSTRY OF THE RUSSIAN FEDERATION

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The article considers the key issues of functioning and development of modern electric power industry of the Russian Federation. As the main of them is the problem of physical and moral aging of generating and transmission facilities. In the article the necessity of formation of alternative management systems development of the power industry aimed at increasing investment attractiveness. Described disadvantages of the scheme of organization of the modern investment process. Proposed measures to improve investment attractiveness of the industry and the major issues associated with moral and physical deterioration of the generating and transmission facilities.

Key words: electricity, energy efficiency, energy infrastructure, investment in the electricity sector, functioning of the energy sector.

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THE ASSESSMENT OF EFFICIENCY OF FUNCTIONING OF SPECIAL ECONOMIC ZONES: WAYS OF IMPROVING

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A study was made of the assessment of efficiency of functioning of special economic zones (SEZ). The criterions for the assessment of efficiency of functioning of SEZ has been designed. Calculate the threshold level of the criterions of the influence of the functioning of SEZ on the sustainable regional development.

Key words: special economic zones, assessment of efficiency, innovation infrastructure, socio-economic regional development.

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DEVELOPMENT OF DOMESTIC AGRARIAN AND INDUSTRIAL COMPLEX - THE MAIN DIRECTION OF FOOD INDEPENDENCE OF THE COUNTRY

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Article is devoted to questions of food independence of the country, an ecological component in a section of use of farmlands. Results have shown direct dependence of one factor on another, also a question of demography and specifics of food of the population of our country.

Key words: agro-industrial complex, food security, food independence, spheres, infrastructure, country farms, personal subsidiary farms, food and processing industry.

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ACTUAL PROBLEMS OF OIL CROP EXPORT IN RUSSIAN AGROINDUSTRIAL COMPLEX

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Russian oil and fat branch is developing relatively well, mainly due to innovations and huge cultivated areas of sunflower, but there are some important institutional and infrastructural problems. Author analyzes the Canadian experience of fat and oil branch development and suggests the directions for solving of these problems.

Key words: oil crop, agroindustrial complex, state support, infrastructure, export.

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ECONOMIC AND ORGANIZATIONAL ASPECTS OF INTERACTION NETWORKS, STORAGE AND PROCESSING OF AGRICULTURAL PRODUCTS SYSTEM OF DOMESTIC FOOD AID

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The article discusses the issues of poverty reduction through the development of a system of domestic food aid. It is shown that an effective tool is to organize clusters of social power in the major cities. The supply of food to the clusters of social power needs to provide wholesale distribution centers of agricultural products. To improve the efficiency of wholesale distribution centers, in addition to it is advisable to create the network storage of agricultural products in walking distance from the manufacturer. The decision about the storage allocation must be taken on the basis of ranking of regions by their infrastructure and resource security.

Key words: poverty reduction, social power cluster, wholesale distribution centers of agricultural products, a network of vegetable stores within walking distance of the manufacturer, the ranking of regions for infrastructure and resource security.

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FINANCE, MONEY CIRCULATION AND CREDIT

FINANCIAL CLUSTERS AS THE MAIN TOOL OF ASSESSMENT OF ACTIVITIES OF COMMERCIAL BANK

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In the stagnation of the economy expressed by inflation, foreign economic and foreign exchange risk, there is a question on the development of mathematical tools, the most accurate method to

evaluate the effectiveness of the commercial bank. Use of financial clusters will reveal the most weaknesses in the conduct of the main activities of the financial institution.

Key words: cluster indicators, Commercial Bank, criterial weight assessment.

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ANALYSIS OF PAYROLL FOR INDIVIDUALS: TAX EXPENSE OF LEGAL ENTITIES ON LABOR, THERE IS

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In Russian science the tendency to reduce of interest in issues of labor, and also the analysis of prospects of development of labor activity, which is due to some overabundance of interest in these issues, formed in the conditions of command-administrative economy in the previous period. It is not quite justified, as the assessment of the state of Affairs in the field of labor - a necessary condition for the choice of effective directions and methods of realization of measures for economic recovery.

Key words: wages, tax to incomes of physical persons, cost of wages.

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WORLD ECONOMY

THE NEW GLOBAL ENVIRONMENT

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The subject of the study is the evolution of the global business environment and the changing nature of the international operations of companies in the new normality, geoeconomic wars and accelerating technological revolution. New normality along with accelerating technological revolution are creating a new environment of business and force companies to revise their business strategy.

Key words: global environment, the new reality of the global economy, new normal slowdown in the growth, volatility, uncertainty, globalization, technological revolution.

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IMPORT SUBSTITUTION IN SHIPBUILDING: THE WAY TO ECONOMIC AND POLITICAL SECURITY OR A NEW STAGE OF RAPID INCREASE IN THE COMPETITIVENESS OF THE INDUSTRY ON THE WORLD STAGE

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This article discusses the measures of government support for the sector, aimed to accelerate the reduction depending on the supply of foreign equipment, and examples of import substitution program in the shipbuilding industry, including participation of research institutions, which introduce the joint work with the real sector of the industry.
Key words: shipbuilding, development of shipbuilding, import substitution, the Russian Federation, protectionism, government support for shipbuilding.

Import substitution is one of the priority directions of development of the national economy. In consequence of sanctions' implementation from European countries and United States, Russia was forced to quickly adopt economic measures to ensure the security of the country. Shipbuilding, being the industry responsible not only for commercial needs, but also ensuring country's defense, is one of the most vulnerable in the issue of the replacement of foreign components with the local counterparts.

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