

Artículo de investigación**Technology of convergence of team-coalition and administrative control of industrial enterprise****Технология конвергирования командно-коалиционного и административного управления предприятием промышленности**

Recibido: 19 de octubre del 2019

Aceptado: 22 de diciembre del 2019

Written by:
Arevshad A. Vartanyan¹⁷²**Abstract**

A lot of management entities take part in the management of an industrial enterprise, and they are quite diverse categorically. Some of them act at their own discretion and interests, others are representatives and management agents who manage both from the outside, not being part of the staff, and from the inside, being an integral part of the enterprise team.

Often the same individual is both the external and internal subject of management in relation to the enterprise. It can be part of team-coalition control groups, and also at the same time be a component of administrative and managerial staff.

The condition of many industrial enterprises is determined by the achieved level of development of their management systems, which may noticeably worsen due to the formation of coalition teams with certain managerial capabilities and their own goals, often differing or even contradicting the goals of the enterprise. The presence of such teams can lead to conflicts with the administration and to the deterioration of the economic situation of the enterprise.

There are many-sided, prolonged, and confused conflicts of interest that arose between them and the administration of the enterprise, which are exacerbated on a regular basis and again subside. Often the creation by the administration of a new control loop by creating some commission on the issue under consideration, with the participation of all interested parties, leads to a decrease in its severity, constructive and compromise behavior, and the adoption of a positive decision.

In this regard, there is a need to study the phenomenon of the creation and functioning of coalition teams and multi-circuit management in the enterprise and the corresponding methodology.

Аннотация

В управлении предприятием промышленности принимают участие значительное число субъектов управления, причем они достаточно разнообразны категориально. Некоторые из них действуют по собственному усмотрению и в собственных интересах, другие являются представителями и управленческими агентами, которые управляют как извне, не входя в состав персонала, так и изнутри, являясь составной частью коллектива предприятия.

Нередко один и тот же индивидуум является одновременно и внешним, и внутренним субъектом управления по отношению к предприятию. Он может одновременно входить в состав нескольких командно-коалиционных управленческих групп, а также являться компонентой административно - управленческого персонала.

Состояние многих предприятий промышленности определяется достигнутым уровнем развития их управляющих систем, которые могут заметно ухудшиться из-за образования команд-коалиций, обладающих определенными управленческими возможностями и собственными целями, часто отличающимися или даже противоречащие целям предприятия. Наличие таких команд могут приводить к конфликтам с администрацией и к ухудшению экономического положения предприятия.

На практике известны многоаспектные, пролонгированные и запутанные конфликты интересов, возникавшие между ними и администрацией предприятия, которые обостряются на регулярной основе и вновь затихают. Часто создание администрацией нового контура управления за счет создания некоторой комиссии по рассматриваемой проблеме, с участием всех заинтересованных лиц, приводит к понижению ее остроты,

¹⁷² Doctor in Economic Sciences, PhD in Physico-Mathematical Sciences, Professor of Department "Management and Marketing of High-Tech Industries", Professor, Moscow Aviation Institute (National Research University), Moscow, Russia.

Thus, an industrial enterprise is a management object consisting of at least two contours, the subjects of which are its administrative and managerial staff and informal team-coalition control groups. Accordingly, a need arises not only for the methodology of command and coalition management and the methodology of administrative one, but also for the methodology of convergence of them of an industrial enterprise. At the same time, in addition to designing the administrative control loop, it is necessary to justify the design of a control system that implements command and coalition management and a control system that converts administrative and command and coalition one of an enterprise to solve a problem.

For the effective functioning of an industrial enterprise on the market, if there is the occurrence of such coalition teams, it is necessary for the enterprise management to quickly switch from administrative one to converged (integrated) administrative - command-coalition in order to prevent the problem from growing to catastrophic proportions. And such management must be maintained until the severity of the problem, contributing to the creation of a new contour in the enterprise, is substantially reduced.

Keywords: Team-coalition control, group, internal company management systems, multi-loop enterprise management, team.

конструктивному и компромиссному поведению, к принятию удовлетворяющего всех позитивного решения.

В связи с этим возникает необходимость изучения феномена создания и функционирования команд-коалиций и многоконтурности управления на предприятии и соответствующей методологии.

Таким образом, предприятие промышленности - объект управления в составе, по крайней мере, двух контуров управления, субъектами управления в которых выступают его административно-управленческий персонал и неформальные командно-коалиционные управленческие группы. Соответственно, возникает потребность не только в методологии командно-коалиционного управления и методологии административного управления, но и методологии конвергирования административного и командно-коалиционного управления предприятием промышленности. При этом, помимо проектирования контура административного управления, необходимо обоснованное проектирование управляющей системы, осуществляющей командно-коалиционное управление, и управляющей системы, осуществляющей конвергирование административного и командно-коалиционного управления предприятием для решения возникшей проблемы.

Заметим, что для эффективного функционирования предприятия промышленности на рынке руководству предприятия в случаях возникновения таких команд-коалиций необходимо достаточно быстро осуществить переход от административного управления к конвергированному (комплексному) административно – командно-коалиционному управлению, чтобы не допустить разрастание проблемы до катастрофических размеров. И такое управление необходимо сохранять до тех пор, пока не спадет существенно острота проблемы, способствующее созданию нового контура управления на предприятии.

Ключевые слова: внутрифирменные управляющие системы, группа, команда, командно-коалиционное управление, многоконтурное управление предприятием.

Introduction

The introduction of new technologies, release of new products, search for effective methods of labor motivation, automation of business processes, and unpredictability of changes in the external environment require industrial enterprises to apply modern management methods and forms.

The purpose of management science is to study and improve the principles, structures, methods, and techniques. The search for optimal methods is carried out in a wide range: from technological to economic, from administrative to socio-psychological one (Vartanyan, 2008).

Management provides a continuous and targeted impact on the managed object (system) with its properties that its interrelated elements do not possess. The sequence of individual procedures, operations, and interrelated stages make up the technology of the managerial process, which consists of information, computational, organizational, and logical operations performed according to a specific algorithm.

The economic condition of many industrial enterprises is determined by the achieved level of development of their control systems, which tend to be noticeably degraded due to changes in the external environment and the formation of coalition teams with their own goals (Vartanyan, Sidelnikov, 2005). As a result, non-systemic and unified management environments are formed with outdated intra-company decisions, for which the developed methods of feasibility study are not actually applied.

Therefore, many industrial enterprises are organized on the basis of some representations of administrative staff at different hierarchical levels. Most internal company management systems are used by staffs, who want to have the intuitively empirical and imitative content; moreover, it is accentuated in tactical and short-term aspects. Accordingly, the quality of internal management is in a state that creates serious threats of their loss of competitiveness.

Such groups, formed on an initiative basis, have their own management intentions, may fully or partially consist of administrative and managerial staff, as well as be formed within its structural divisions. Sometimes they are part of communities that go beyond the enterprise.

The group may become a team for the implementation of practical activities during the socialization of its members.

A team is a holistic developing system that has a goal that is not reducible to the goals of its members, which control the subjects and objects that make up it, has needs and potentialities, can rethink and reformulate tasks, and also develop its own point of view, behavior and group the norm for its members, "choose", and make decisions. A team may have a systemic and synergistic effect.

Thus, a team is a group of workers, interconnected by a common goal and the presence of managerial influences for their implementation, with its responsibility for specific results to the enterprise and other

consumers (Vartanyan, Sidelnikov, 2005; Vartanyan, 2008).

Groups can be formalized (for example, trade unions or parties), and also exist in an unformed format (for example, adherents of one scientific school). This phenomenon of self-organization of groups is to identify some of their commonality (consolidating factors are very diverse) and to converge their support and implementation management operations.

Thus, both formal and administrative, or informal and team-coalition control communities, which are often amorphous, illegitimate, and have an internal categorical stratification, regularly appear and operate at an industrial enterprise. The political and vital activities of people who are not able to show it in other forms, which may be associated with the common problems of their members, are there.

Active intergroup migration and multiple involvements of the same workers in various groups, including the administrative and managerial staff of the enterprise, are noted.

Coalition teams, along with the administrative and managerial staff of the enterprise, daily participate in its management, which is actually organized administrative and team-coalition, and legally only administratively. Thus, team-coalition control is illegitimate and it cannot be formally taken into account in the administrative control loop; there is a paradigm of the multiplicity of the industrial enterprise management loops and the initiative in the formation, functioning, development, and termination of some of them. There are examples of creative and destructive, coordinated and antagonistic management by formal (administrative) and informal (team-coalition) groups of employees of the enterprise.

Industrial enterprises are the objects of multi-circuit management, in which both administrative and team-coalition control groups are the subjects. Depending on the situation, the dominance of one of these types and the nature of their convergence changes over time. Often the same individual is both the external and internal subject of management in relation to the enterprise. It can simultaneously be a part of several command and coalition groups, and also be a component of administrative and managerial staff.

Previously, such groups also existed, but functioned at the middle and lower levels of

government. Self-organization and organizational distancing of individual units at a low hierarchical level took place, which, if the enterprise improved, would organizationally return and be integrated into its structure. Sometimes this led to the formation of a new enterprise on the basis of a structural unit or to a group transition to a new place of work.

Ignoring this paradigm of multiplicity and organizational duality or incorrect reaction to its existence entails excessive risks not only of a strong deterioration in the results of operations and the state of the enterprise, but also its bankruptcy. In this case, the rational and legitimate organization of management at an industrial enterprise is suppressed by the processes of its illegitimate disorganization.

This managing problem is clearly recognized by a significant part of enterprise directorates, however, often in the form of a temporary, non-catastrophic, and easily overcome obstacle.

Some of the members of the coalition teams consider their activity doomed to failure, others expect a partial change in the situation in accordance with their ideas, or consider themselves obliged to express their position, even if they have final victory in the competition with the administration of the enterprise. There are various scenarios for the development of a managerial competition, including those related to the transformation of the opposition into its actual or even formal administration, which inevitably has a new opposition, including due to members of the previous administration that have retained work at the enterprise or have influence on it. The rotation of the administration and opposition may have radical managerial transformations in the enterprise, including a fundamental change in its nature.

Each employee of the enterprise can be member of the management groups. However, his inter-circuit conflict of interests is resolved by himself, and not at the level of organization of internal company management. It is impossible to force him to choose a control loop and to decide on managerial positioning unequivocally, therefore, the directorate can solve the problem by dismissing or changing the employee's position, possibly making a managerial mistake and radicalizing his behavior.

In connection with the foregoing, there is a need to study the process of creating and functioning coalition teams and multi-circuit management, as well as to build the appropriate team-coalition

control methodology and convergence methodology for administrative and team-coalition control at an industrial enterprise, at least with two control loops (formally administrative and informal command-coalition). At the same time, in addition to designing the administrative control loop, it is necessary to design a control system that implements command-coalition management and a control system that converges it and administrative one of an enterprise.

The purpose of this work is to study and justify the existence of multi-circuit management in an enterprise and the need to create a convergence methodology for administrative and team-coalition control, which will allow managers of various enterprises to find quick and effective solutions when various problems arise for their employees.

For the effective functioning of an industrial enterprise, the enterprise management and its Board of Directors should study the needs and goals of the emerging coalition teams, and, based on appropriate methodologies, design the necessary management contours, as well as transition from administrative management to converged (integrated) administrative - command coalition one.

Theoretical basis

Scientifically based response to the objective existence of several management loops is required, associated with both administrative and team-coalition control groups of workers, which should be stating the mandatory presence of both administrative and multiple team-coalition control of an industrial enterprise as applied to the prevailing internal and external conditions, as well as the mandatory organization and implementation of converging coordination functioning and development of these control loops (Kodama, 2014).

Thus, in addition to designing the administrative control loop, it is necessary to design a control system that implements team-coalition control and a control system that converges administrative and team-coalition control of an enterprise.

There is a need for a methodology for team-coalition control and its converging of an enterprise. In the methodology, global conceptual scientific and design solutions (conceptual interpretations, principles, etc.), conceptual decisions on the execution of

management mechanisms (in terms of the environment, structure, and procedures of functioning and development), and conceptual evaluations of the effectiveness of the methodology (conceptual assessment methods) are to be distinguished, *a priori* and *a posteriori* estimates.

In one of the works (Vartanyan, 2008) there is a methodological support for team-coalition control of the enterprise, which was built and tested, the feasibility of such management and its conceptual systemic positioning in intracompany management was substantiated. In addition, the structuring of this methodology; conceptual interpretation, structuring and typing of teams; conceptual interpretation and development of technology for assessing the potential and needs, sustainability, and effectiveness of their managerial activities; conceptual development of team-coalition enterprise control technology was carried out (Novikov, 2019).

Thus, enterprises are active systems with a dedicated group of active subsystems that implement multiple, high-level, and hierarchically distributed administrative and non-administrative self-organization of the enterprise as a dynamic management for all stages of the life cycle of an in-house control system, in which the area of micro-level management carried out within the framework of the team-coalition control, convertible with the administrative systematic way now (Maurseth, 2001).

The basic conceptual idea of team-coalition control of an enterprise consists, firstly, of a mandatory transition to a two-level hierarchical management system, at the first (highest) level, the convergence of administrative and command-coalition management is carried out, and at the second (lower) level, administrative and command coalition one.

It is necessary to design command-coalition management and converge administrative and command-coalition one, to provide the necessary access for members of coalition teams to the managerial resources of the administrative circuit of managing an industrial enterprise. Formally, all control loops should be practically parity, but the administrative loop should have slightly more weight than the command-coalition and converging loop.

Today there is no description of a holistic methodology for converging administrative and

command-coalition management of an enterprise, and this work can be one of the important steps in this direction.

The convergence technology of command-coalitional and administrative management involves a preliminary assessment of the sphere of intracompany management of an industrial enterprise, and, if necessary, three control loops are distinguished: administrative, command-coalitional, and converging, which coordinates the functioning of the first two loops.

The converting circuit should be in the zone of close attention of the enterprise management. It must carry out his activities on an ongoing basis, and regularly report on his results to the Board of Directors and the Management Board of the enterprise. In the event of the loss of relevance of such a converting circuit due to the solution of an existing problem, the Board of Directors may change the existing system and again switch from multi-circuit management to single-circuit administrative management of the enterprise.

The scientific novelty of the study is that the three-circuit management of an enterprise in industry is in highlighting the contours of administrative, team-coalition, and converged control, in the systematization of team-coalition control communities in an enterprise, and in the development of a technology for converging administrative and team-coalition enterprise control.

The practical value of the research is determined by the demand and application of the results in the fields of design, applied management, education, and science.

As a part of the proposed methodology for multi-loop enterprise management, various crisis and problem situations at industrial enterprises were studied and practical advice was offered to the leaderships of these companies on changing the existing management system (Vartanyan, 2008). In particular, when introducing the comprehensive information system at an enterprise and its subsequent pilot-industrial use, along with the old system, serious problems arise with overloading and motivation of the staff of many departments involved in this process. In particular, the enterprise management can create a converting unit (permanent commission) together with a spontaneously arising discontented group of employees interested in solving the problems that will solve these problems, i.e. go to two-level management with the administration.

Methodology of team-coalition enterprise control

One of the mandatory types of support for any control system is its methodological support is the methodology of the corresponding specialized management. The methodological design of the control system is primary and basic in relation to the design of all other types of support for the control system. We will rely on a sequentially positioning chain: “methodology → science methodology → management methodology → enterprise management methodology → methodology of team-coalition enterprise control → converged enterprise management methodology”.

For an industrial enterprise, there are two control loops distinguished by the directorate and certain group of team-coalition communities, and the obligatory coordination of their functioning and development, appropriateness of using some converging intra-company super-system. In the simplest case, team-coalition communities are formed only from the employees of the enterprise, including members of the directorate, who exercise their managerial influence within their managerial competence at the place of performance of official duties. Thus, lobbying of the interests of the employees of the enterprise from the outside is excluded (Utkin, Baldin, 2005).

By the nature of managerial influences, the directorate is an integral component of the internal company management circuit, which is organized according to the basic scheme of subordination, i.e. bosses and subordinates stand out among the staff; there is a certain managerial hierarchy at the enterprise.

A comprehensive conceptual idea implies the transition from administrative management to converged (integrated) administrative-team-coalition control at an industrial enterprise; ensuring the legitimacy and transparency of team-coalition control; designing a team-coalition inter-company control and convergence of administrative and team-coalition control; ensuring the necessary access for members of coalition teams to the management resources of the administrative control loop (Sadik, 2008).

Correlation of administrative and team-coalition control of an enterprise can be made in the context of mutual dominance and initiation. Two extremes are unacceptable: dominance of team-coalition control over administrative management, and giving the contour of team-

coalition control disappearing of low priority, which will be considered by groups as ignoring their interests. Consequently, formally, both circuits should be practically parity, but the administrative circuit should have a bit more “weight” (Bernard, Jones, 1996).

In terms of initiating management decisions, four options are possible. The initiator is the staff: administrative community, team-coalition communities, converging communities, etc. The preferred option is in which the initiator is an administrative group that monitors the course of events and takes the necessary managerial influences to stabilize the situation in the team. Otherwise, problems may arise that will not allow to fulfill the tasks assigned to the directorate and lead to numerous conflicts (Kanashchenkov, Novikov, Veas Iniesta, 2019).

Regarding the choice of a conceptual management scheme, a feasibility study scheme for its decisions should be used, which should be applied in determining the appropriate management option for the administrative and managerial staff of the enterprise.

The technology of convergence of team-coalition and administrative control involves a preliminary assessment of the internal management of an economic entity, and in case of insufficient level of development of this sphere, the subjects of internal management are identified and three circuits of enterprise management are distinguished: administrative, in which the enterprise administration is the subject; team-coalition, in which the subjects are its institutionalized or non-institutionalized management communities; converging, in which a certain group (for example, department in the staff management structure, or a department directly subordinate to the director, or a commission headed by a member of the company's Board of Directors) coordinates the functioning of the first two circuits. The converting circuit should always be in the zone of close attention of the general director and the Board of Directors of the enterprise, which should carry out its activities on an ongoing basis, and report on the results of work at meetings of various levels (on the Board, at meetings of the Board of Directors, etc.).

The basic conceptual idea is to preserve and develop team-coalition control groups of workers in the enterprise. Their goals, behavioral models, and role structuring are determined with the identification of typical members, managers, and leaders, as well as potentials, motivation and self-

motivation systems, conflict patterns, conditions of stability, and functioning efficiency. The intra-group distribution of roles and the areas of managerial competence of the converging group are optimized, conditions for a stable, conflict-free and efficient operation of all control loops are determined, as well as the corresponding conceptual schemes (Taipaleenmäki, Ikäheimo, 2013).

There are management tasks, main factors that determine and modify the managerial activity of coalition teams, and ways to manage them with the allocation of funds and tools. The procedure for assessing the state of the enterprise using the pyramid and business matrix is occurring (Vartanyan, 2008). The issues of team participation in the preparation and implementation of changes in the enterprise, as well as its involvement in projects are considered.

Results

Administrative and team-coalition control of an enterprise has many conceptual features, in particular, they operate based on the interests of management entities, have a need for resources, are subject to the laws and regulations established by the management community itself and environmental actors. At the same time, the administrative circuit has a high priority and introduces regulations for the contours of team-coalition control, corresponds to the life cycle of communities and the dynamics of their condition. At the same time, the administrative management circuit is legitimate and more transparent than the team-coalition one, the existence of which may be known to a narrow circle of enterprise employees. Moreover, they can remain inactive for a long time or the entire period of their existence, and their members may consider that joining these groups was inappropriate, forced, and emotional, the level of discipline of their members' behavior may be insignificant (they can be forced through mechanisms morally psychological impact).

The administrative management contour of an enterprise always exists, and the contours of team-coalition control can arise and disappear, and do not have their own managerial infrastructure and management entities are forced to either empirically prepare or make their managerial decisions, or use the enterprise's resources in violation of official regulations.

In general, the quality of managerial decisions in the administrative and team-coalition contours of

control may differ from each other. The presence of two control loops in an enterprise is an objective reality and a prerequisite for changing the quality of internal management. With the correct solution to the problem of multi-loop control, the quality of enterprise management will improve.

The main components of the developed methodology for team-coalition enterprise control, as well as the convergence methodology of administrative and team-coalition enterprise control, have been successfully tested at various industrial enterprises and have also been introduced with some transformations in macro, meso and micro level organizations. In particular, it is studied methods of constructing various teams, including business teams depending on tasks and available resources; conditions necessary for the stable functioning of teams and possible conflicts in enterprises were determined; ways to determine the potential of the team and its members as applicants for participation in the project, etc.

Implementation of the development was accompanied by certain complications due to the fact that they infringed on the interests of some employees and teams, which significantly increased the project timeline. The implementation of the developed methodology is economically feasible, the payback period of which, as a rule, does not exceed a calendar year (Vartanyan, 2008).

Discussion

In any labor collective there are management groups of actual and formal subjects of management of several types (Vartanyan, 2008). The first of them form the classic administrative and managerial staff of the enterprise, existence, and areas of competence of which are determined by administrative documents. The latter are also represented by formally institutionalized groups of workers, providing their members with some preferences related to their employment, and concretization of labor activity. These ones include trade unions and various associations of workers at their personal and professional interests (for example, associations of athletes, animal lovers, etc.), as well as persons with disabilities or beneficiaries who act through directorates, for example, acting as representatives labor collectives at the conclusion of collective agreements, initiating various appeals, etc. They do not fall out of the administrative control loop, do not form a new circuit, their managerial influences are in the

nature of wishes, recommendations, warnings, etc. to the directorate or heads of units. It should be noted that the leaders of many communities are either creatures of directorates or workers specially stimulated by them. Therefore, these managerial communities cannot be considered in isolation from the management activities of the directorate, which in some cases expands the variety of goals and prohibitions of its management in order to take into account the interests of institutionalized groups of workers.

Groups of the third type, team-coalition groups, are legally unformed management communities that differ from each other, are, as a rule, non-institutional groups of employees of the enterprise, connected by interpersonal relations. Among them there are groups with a family community due to family ties; ethical and aesthetic community; community of professional views; community by the presence of close problems and hobbies; community of property; age community; service community associated with previous work; educational community; racial, linguistic, national or confessional community; hierarchical community, etc.

The persons assigned to the team-coalition type control community have the self-identification of the corresponding affiliation, which they have chosen and strictly adhere to.

Along with these three types of management groups, there may be groups of employees in the form of one-time or stable criminal communities.

Ignoring the problem of multiple circuits in the internal management of an enterprise can lead to disastrous consequences. The only acceptable seems to be the use of a conceptual design: solution streamlining multi-loop enterprise management with one control object through the introduction of a new higher control loop, i.e. transition from a multi-loop control system to a hierarchical control system with preservation and regulation of multi-loop at the lower hierarchical level. It is possible to build enterprise management systems using multi-level systems having more than two levels, where at the lower hierarchical levels there is a multi-circuit management.

Conclusions

1. The level of development of control systems at a lot of industrial enterprises is unacceptably low. Along with certain positives, these systems do not correspond to the realities of modern

- conditions for the implementation of industrial and economic activities.
2. The development of control systems is a critical factor ensuring competitiveness and, accordingly, financial and economic performance of the enterprise.
3. When organizing and implementing effective enterprise management, one should proceed from the presence of three management loops: administrative, team-coalition, and converging, as well as the obligatory combination thereof.
4. The analyzed situation at industrial enterprises gives reason to state the mandatory organization of command-coalition management and the development of an appropriate methodology.
5. The operators of the team-coalition control are teams that are characterized by the presence of a common goal and managerial influences.
6. Organization and implementation of team-coalition management of the enterprise are mandatory and do not have legislative, technical, and ethical prohibitions.
7. The primary type of support for the management system should be its methodological support, in which there are global conceptual scientific and design decisions on the implementation of mechanisms and the evaluation of the effectiveness of its application.
8. The transition to a two-level hierarchical management system, at the highest level of which the convergence of administrative and team-coalition control is carried out, and at the lower level administrative and team-coalition control is carried out, provides improved financial and economic results of the industrial enterprise.
9. The developed methodology has been successfully tested and implemented on a number of important business entities. The degree of success of implementation depended on a number of factors, including mental preferences and prohibitions of the directorate of an economic entity. Appropriate implementation should be supported by a security interventions program.
10. Design allows for significant development, including areas of administrative intra-company and non-company incubation of teams, internal

separation of teams (formation of sub-teams), scientific design of convergence of administrative, command-coalition management, etc.

References

- Bernard A.B., Jones C.I. (1996). Technology and Convergence. *Economic Journal*. 106(437), 1037-1044.
- Kanashchenkov A.I., Novikov S.V., Veas Iniesta D.S. (2019). Technology formation of the mission of micro-level management enterprise in aviation. *IOP Conference Series: Materials Science and Engineering*, 537 (4)
- Kodama F. (2014). MOT in transition: From technology fusion to technology-service convergence. *Technovation* 34(9), 505-512.
- Maurseth P.B. (2001). Convergence, geography and technology. *Structural Change and Economic Dynamics*. 12(3), 247-276.
- Novikov S.V. (2019). Conceptual Analysis of Aviation Infrastructure. *Russian Engineering Research*, 39(4), 354-356
- Novikov, S., & Veas Iniesta, D. (2019). Analysis of development trends in the innovation industry of the Russian Federation. *Amazonia Investiga*, 8(19), 298-307.
- Sadik J. (2008). Technology adoption, convergence, and divergence. *European Economic Review*. 52(2), 338-355.
- Taipaleenmäki J., Ikäheimo S. (2013). On the convergence of management accounting and financial accounting – the role of information technology in accounting change. *International Journal of Accounting Information Systems*. 14(4), 321-348.
- Utkin V.B., Baldin K.V. (2005). *Information Systems and Technologies in Economics: Textbook for High Schools*. Moscow: UNITY-DANA.
- Vartanyan A.A. (2008). Methodology of team-coalition enterprise control. Moscow: MAI-PRINT.
- Vartanyan A.A., Sidelnikov Yu.V. (2005). Group goals. *Economic strategies*. 07(41), 114–119