

**REFLEXIVE COORDINATION OF COMMUNICATIONS IN THE CONSTRUCTION OF MODELS FOR THE DEVELOPMENT OF AN INDUSTRIAL ENTERPRISE***Oleksii Bezchasnyi*

**Abstract.** The article develops the mechanism of hierarchical-reflexive coordination of communications at the enterprise, which involves coordinating the actions of management agents in the process of interactions. It was established that in the process of implementation of the mechanism of hierarchical coordination of communications, the interests of agents are coordinated in the horizontal and vertical directions. Accordingly, two types of reflection are used: informational (horizontal coordination) and strategic (vertical). The mutual influence of these types of reflection and the mismatch of the interests of agents within the hierarchy levels lead to contradictions and conflicts of inter-level (vertical) interactions. It is proved that reflection serves as the central management of the enterprise, it is the same task of the administrative function of coordination, at the same time, the task of coordination is the reflection of decisions that are taken as part of their coordination functions. Moreover, due to reflection there is a certain selection, filtering of management information, and coordination in turn serves as a managerial task that allows the company to move in the chosen direction.

**Keywords:** reflection, coordination, communication, model, mechanism, development, industrial enterprise, interaction, hierarchy

**JEL Classification:** M120, C610, O120

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**Citation:** Bezchasnyi, O. (2018). Reflexive coordination of communications in the construction of models for the development of an industrial enterprise. *Virtual Economics*, 1(1), 66-83. [https://doi.org/10.34021/ve.2018.01.01\(5\)](https://doi.org/10.34021/ve.2018.01.01(5))

Received: July 7, 2018. Revised: August 7, 2018. Accepted: September 7, 2018.

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## 1. Introduction

Constant changes in the socio-political, economic and other conditions of modern life require from the person changes in its value orientations and social orientations. New economic conditions in particular require a new understanding of the role of time in society and objects of the economy, the realization that management is a science with certain laws, and possessing it requires time and appropriate professional training. In the science of management, the past half century has accumulated many theories and approaches, and one of the most popular is the approach in which management is understood as a process consisting of interconnected, continuous actions that are equally important for the development and success of the organization. These actions are called management functions and, depending on the specifics of the object of management, allocate them to one or another set.

## 2. Literature review.

In the theory of management is aimed at ensuring the stability of the system.

Representatives of the cybernetic school (Viner, 1958) consider management as a "targeted influence" in complex mobile systems that can move from one state to another. Due to such influences, you can maintain the stability of the system and maintain its dynamic balance with the environment, and due to the internal factors of the system. D.M. Gvishiani (1972) observes that such an approach reduces management to a set of concrete actions; while outside the control sphere there are those processes and phenomena that precede actions of the result.

Management as an artificially created human process is opposed to the order of nature in the work I. Prigogine and I. Stengers (1984). In their view, the actions of the management are aimed at resisting the forces of nature and they are completely subjective. This idea makes the discussion thesis of cybernetics that the management system is self-governing, and its stability can be provided by internal factors.

Consequently, the definitions of "management" are given visualize differently positioned accents, due to which we have different interpretations that influence the further development of ideas about the management of a specific object and the need to allocate certain components to improve the efficiency of such management.

The object of this research is an industrial enterprise our task is to formulate conditions for its more effective development taking into account modern laws and market requirements, a new type of economic behaviour, adapting all aspects of production activity to a changing and complicated situation in Ukraine. At this time, we consider only one of the whole set of conditions that is related to the role of the employee and his contribution to the final results of the enterprise.

In other words, the purpose of this unit is to find effective ways of managing labor, which ensure the activation of the human factor (Aubrey, 2015).

The first one who accumulates the energy of the industrial enterprise development and directs it in a certain direction is the management of the enterprise.

In order for the leader to act consciously and not as a blind man, he must be armed with all kinds of professional means necessary for management - the information resource, personnel, which collectively form the appropriate focal point, in which all communication flows converge and which develops a strategy of moving the company forward.

Coordination as a key function of the named centre allows you to trace and ensure compliance with the operating regime, performed operations and procedures proposed standards and norms. Thanks to it, the management functions are performed continuously and uninterrupted. The object of coordination activity is both managed and management system. To coordinate their action among themselves and to avoid ineffective duplication of functions is a complex task of management of the production-economic system, including the industrial enterprise.

The Latin term "coordination" ("c" (cum) - together and "ordinatio" - ordering), means not just the coordination, but the coordination of the actions of several elements in the system. The system in which the coordination provides an additional movement is not static, but dynamic and is in constant motion. Depending on which direction the system chooses in the universe of human activity, the role of coordination among other management functions depended.

For example, such a role is constructive if it is understood as an agreement, a connection, an order, respectively (actions, concepts, constituents of something) (Gaponenko & Pankrukhin, 2004). It depends on the goals set by the enterprise, if this is understood as the process of uniting the work of divisions and other structural components of the enterprise (Burkov & Novikov, 2004).

The following is the most commonly used definition in the special scientific literature for coordination.

Coordination is the process of achieving the unity of efforts of all subsystems (divisions), organizations for the realization of tasks and goals (Parakhina & Ushvitskiy, 2003).

Coordination - management activity, which is to ensure the interconnection and coherence of subjects, objects and processes of work in time and space (Gaponenko & Pankrukhin, 2004).

Coordination is the achievement of consistency in the work of all parts of the system by establishing rational connections between them (Hedouri et al., 2007).

As it proves M.D. Mesarović (1970), the central principle of coordination is the principle of observance of feedback. Following it, the head has the opportunity to correct the decision and monitor the progress of its implementation, if necessary, making the necessary adjustments. Thus, at each stage of the management decision, it is possible to remove information about the implementation, analyze it and develop it and make possible corrective points that can improve the implementation of the decision. In extreme cases, an ineffective decision, if not timely received information about its ineffectiveness, can be canceled at all.

Such changes in the external and internal environment occurring at the enterprise are based on the implementation of solutions for adaptation and correction, resource manoeuvre, and this forms the content of coordination.

An important form of manifestation of the mechanisms of self-regulation and self-preservation of the system is coordination V.D. Rudashevsky (1990). He believes that the highest level of complexity are those measures that relate to the qualitative transformation of the entire system.

A separate task of managing an enterprise in the process of coordination is the achievement of a coherent operation of systems that are at a lower level of its hierarchy (Mesarović et al., 1970). To do this, G.L. Morrisey believes that it is necessary to create conditions for the organization members to perform the actions necessary to achieve the goals of the organization (Morrisey, 1977).

Consequently, the above definitions of the term "coordination" reflect two interrelated aspects of the concept - the coordination of interests and the provision of interaction of elements. It is through coordination that relations between the subjects of management activity can be defined, which can be defined as horizontal, that is, the links between disparate directly by the subjects of management activity.

Based on research objectives, the main task of coordination is to achieve consistency in the work of all units of the organization by establishing rational ties between them. Such consistency allows to ensure continuity and continuity of the management process. This task may be the basis for defining the concept of "coordination of managerial decisions at industrial enterprises," which we understand as the mechanism for establishing rules of interaction between the subjects of management activity in the enterprise.

From the foregoing it can be concluded that coordination as a function of the management process at industrial enterprises is very important. Without coordination of actions and decisions of separate units of the enterprise it is impossible to professionally manage it, in this case, the implementation of strategic plans will be impossible.

Vertical coordination was the object of research in the theory of hierarchical management system, so it is traditionally considered that processes of coordination arise in organizations such as "hierarchy" to reconcile goals and objectives. It is mandatory to have a coordinator in

place on the principles of stimulation and restriction. Coordination efforts largely depend on the style of leadership: if the style is authoritarian, coordination is based on the Statute and laws, the hierarchy; In a liberal style, informal methods are used, and so on.

The main roles of coordination activities: preventive (anticipation of problems and difficulties); eliminates (eliminating interruptions in the work of the organization); stimulating (improving the organization even in the absence of a problem); regulating (preserving the existing scheme of work).

There are number of approaches to coordination:

- informal non-programmed coordination, carried out on a voluntary basis and without a prior plan, is based on mutual understanding, general attitudes, interests and psychological stereotypes;
- programmed impersonal coordination, carried out in complex organizational structures, is based on standard impersonal methods and rules of work that are laid down in plans, programs, projects for frequent problems of coordination;
- programmable individual coordination, carried out in order to ensure that the performer does not interpret the tasks and directions of their work on their own;
- programmatic group coordination, conducted in the form of collective discussion at the meetings, which allows for individual preferences, group and general organizational interests, and the opinions of various narrow-profile professionals (Mesarović et al., 1970).

Problems of coordination in management work in one way or another are disclosed K. Bagrinovsky (1977), V.N. Burkov and D.A. Novikov (2004), D. Kahneman and A. Tversky (1979), T. Klebanova et al. (2002), H. Dźwigoł and M. Dźwigoł-Barosz (2018), Almeida J., Silvestre C., Pascoal A. (2008), L. Hossain and A. Wu (2009), W.S. Alaloul, M.S. Liew, and N.A. Zawawi (2016), K. Pająk et al. (2016), Y. Wang, Y. Liu, and C. Canel (2018), and so on. But constant practical achievements in this area require the continuation of scientific description and theoretical substantiation of this phenomenon on the basis of new models and approaches. But first we consider some basic methodological provisions for further theorizing.

The modelling of the task of coordination of work in project management on the basis of the use of the theory of fuzzy sets is carried out in the work C.Y. Lam and K. Tai (2018). In the work (Vasiliev, 1973) also widely discussed are the issues of information support for the coordination of the activities of structural elements at all levels of the hierarchical pyramid enterprise management.

Three types of coordination for enterprise management systems were proposed by W.G. Ouchi. In particular, he highlighted: rigid (authoritarian), economic (market) and organizational type of coordination using the procedures for coordinating interests. In his work (Ouchi & Jaeger, 1978) an attempt was made to formulate a methodological approach to the synthesis of these three types of coordination for integration into the situational mechanism of preparation and adoption of managerial decisions at the enterprise, and formalizing it to the level of specific economic and mathematical models.

As for industrial enterprises, Ukrainian researchers T.S. Klebanova, E.V. Moldavskaia, and Kh. Chang (2002) proposed a classification of coordination activities according to the following criteria: operational, investment, financial and economic, reflexive, marketing, innovative, reflexive. The last of the criteria of coordination - reflexive - in the opinion of the authors, should become a key point in the adoption and agreement of management decisions.

Thus, in our further considerations, there are grounds for discussing a reflexive approach to the preparation and adoption of managerial decisions at industrial enterprises (Dymchenko, 2013) (Malchik, 2010). Further research here requires organizational, methodological, methodological and other problems, since the processes of awareness, rationality of decision making by market participants, etc are not described in detail at present, and even more so these descriptions have not been verified by the corresponding formal models.

Consequently, for the management of an industrial enterprise, the manager must first establish a management activity (his own "reflexive" activity (Kalinescu, 2013), and then coordinate - by involving subordinates - an adequate object activity for him.

Reflexion (reflexio (Latin) – turning back, reflection) is understood as the form of human theoretical work aimed at understanding their own actions and laws. The content of reflection is determined by subject-sensory activity. Reflexion is the realization of practice, the objective world. Simultaneously, this is the method of philosophy. In the XVIII century David Yum (1998) refers to the reflection of secondary perceptions (perception), those ideas that are based (secondary) on the already realized sense perception (primary). A. Schopenhauer (2000) defines reflexion, as a phenomenon of secondary order, which is preceded by a visual representation, generalization to the concept, and then reflection as a reproduction of the primary visual material, meaningful in certain notions of the world.

L.P. Grimak (1991) suggests that René Descartes identified reflexion with the individual's ability to concentrate on the content of his thoughts, abstracting from all external; J. Locke shared the philosophy and feeling, interpreting the first as a special source of knowledge - internal experience (reflection), in contrast to the external, based on feelings. Psychologist S.L. Rubinstein (2000) deduced the definition of reflection in terms of two ways of life: the first - is the direct life in interpersonal relationships, the second (reflection) - is the ability of a person to take a position outside of life, to look at life from the side, it is through reflection, he argued, there arises a person's philosophical awareness of life, and therefore its moral formation takes place.

It is important for us in these definitions to identify (and this is common in them) that a person reflects on his own thoughts, feelings and other spiritual achievements - thoughts (Descartes), feelings (D. Hume and J. Locke), the will (A. Schopenhauer), the life (S.L. Rubinstein). Similarly, the reflection in management is possible in a person only in relation to his own activities.

### 3. Methodology.

As it is deepened into the subject of research, we can say that the reflection for the subject of governance itself gives a new quality of understanding of the situation, since it summarizes it even more by introducing its actualization, specification, coordination and demand itself. Of the many manifestations, hidden, and even potentially possible variants of the situation, the subject of management (in our case, the head of an industrial enterprise) chooses one such generalization, which, on the one hand, allows us to focus on the development of something specific, on the solution of some, on the opinion of the head, the most actual problem in this situation, and, and, on the other hand, allows you to bring management beyond the framework of the program of reflective management. Concrete contributes to the development of management process due to the fact that the subject of management overcomes the complexity of infinite variety of practices, updating for itself in one of its area. The property of the specifics of reflexive management partially corresponds to the situation that exists in any professional field - each of them "in-itself" is specialized. But there is also a significant difference: management works with the whole continuum of problems, whereas any other professional activity deals with a certain (always limited) context.

Withdrawing from the reflexive control of external constraints, we arrive at a certain self-sufficiency of the subject of control. And the essence of the practice of reflexive management can now be considered self-actualization of its subject. In other words, a professional manager (leader), unlike a person who performs a reflection for self-development and solves certain personal tasks, performs socially significant work (building an institution and integrating it into a general social context with different types of transactions), engages in such their activities are professional institutions and personnel.

Any professional task, which not related to management also needs reflexive moves of performer and concentration on a particular actual task for this activity at that time, that is, a certain specialization. But the manager works with all the contexts of the problem, while the development of a professional task all the time narrows the field of general search and actualises individual skills and predispositions of a person.

In view of this, we distinguish the features of reflexive management, which are:

- actualization of socially significant demand;
- construction of a set of unique managerial concepts (abstractions) and relations in this set
- the so-called conceptual enterprise;
- implementation of the conceptual enterprise - management activity, including through the involvement of professional experts in the conceptual enterprise conceptualization;
- coordination of management activities in the construction of the organizational structure of the industrial enterprise.

Consequently, we have proved that reflection serves as the central management of the enterprise is the same task of the administrative function of coordination, at the same time, the task of coordination is the reflection of decisions that are taken within their framework of

managerial coordination functions. Moreover, due to reflection there is a certain selection, filtering of management information, and coordination in turn serves as a managerial task that allows the company to move in the chosen direction.

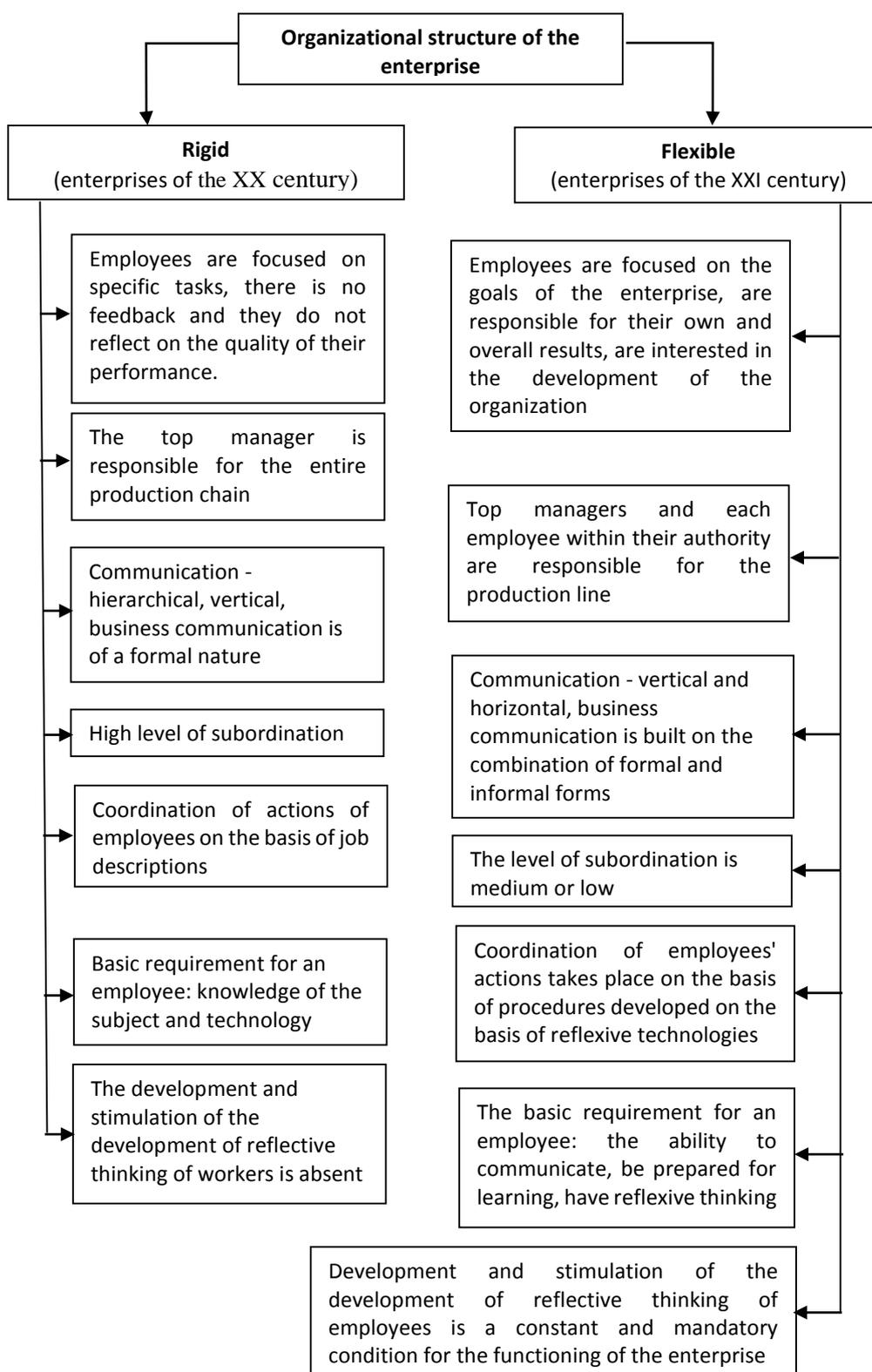
In the field of enterprise management, the preservation of effective and appropriate coordination is ensured through the reflection of reconciling decisions. The word "concordance" here indicates that there is communication between different actors of management and we have predictions that more subjects facilitate a more balanced and responsible management decision. In addition, in the process of reflection, the effects of learning and mutual enrichment as a result of informative exchange are constantly revealed. As a management support function, coordination covers the idea of information provision inherent in information-oriented coordination concepts. In contrast to the latter, the information task here follows from the highest management function of coordination, and thus it is included in the internal organization field of action.

On the basis (Lepskiy, 2006) created figure 1, which presents the characteristics of traditional and new types of enterprises that have an organizational structure of different levels of rigidity. This allows us to draw conclusions about certain aspects of the organization of reflexive processes in industrial enterprises of the XX and XXI centuries.

The comparison of the characteristics of the organizational structure of enterprises represented in Figure 1, typical to the past and present century, gives grounds for talking about:

- 1) increase the role of subjective attitude towards employees on the part of managers - each employee should be not formally, but sincerely interested in the results of the enterprise, and management should take into account his view on the management and organization of production processes;
- 2) increase responsibility for the result and its differentiation by level of authority or level of employee contribution to the production process;
- 3) increasing the role of reflexive technologies in building a communicative enterprise system;
- 4) new requirements for basic knowledge, skills and communication skills of employees;
- 5) creation of conditions for the development of reflexive abilities of "carriers of reflection."

To consolidate this conclusion, we quote the statement of the well-known management theorist Piter Drucker: "The foundation of modern society, economics and human relations is not technology or information and not productivity. The foundation of modern society, economy and human relations is a managed organization as a social institution whose purpose is to achieve the result" (Drucker, 2007).



**Figure 1.** Types of organizational structure of the enterprise and its characteristics (communicative, reflexive, coordination)  
 Source: formed by the author on the basis (Lepskiy, 2006).

The managerial coordination function always takes into account the goals of the higher order enterprise (as the individual leader applies the entire set of information for the solution - both beyond the management system and the one that reflects the communicative connections within the system). Given the appearance of possible deviations caused by incomplete or distorted information about the actual state of affairs of the enterprise, the performance of tasks of reflective coordination is exposed to such principled methodological difficulties.

First, the system of communication at the enterprise in practice is formed not according to the given parameters, but arises from extremely complex relations of exchange and interactions. Because of this, it is difficult to achieve a clear subordination and build a structured hierarchical system that is geared towards strict adherence to rules and goals.

Secondly, the reflection of the subjects of management may be too broad, focused on specific details, which can be omitted from the attention of the higher order objectives. Therefore, there is a need for constant verification of goals, their specifics to individual tasks and the perfect tools for evaluating the results. Thirdly, when evaluating management activities, there are accounting problems. On the one hand, managerial action in most cases has an immediate effect on several goals, and on the other, several management measures can affect one and the same purpose.

These three major problems can be limited, but not completely solved. The latter has great consequences for the organization of coordination of economic processes in the enterprise.

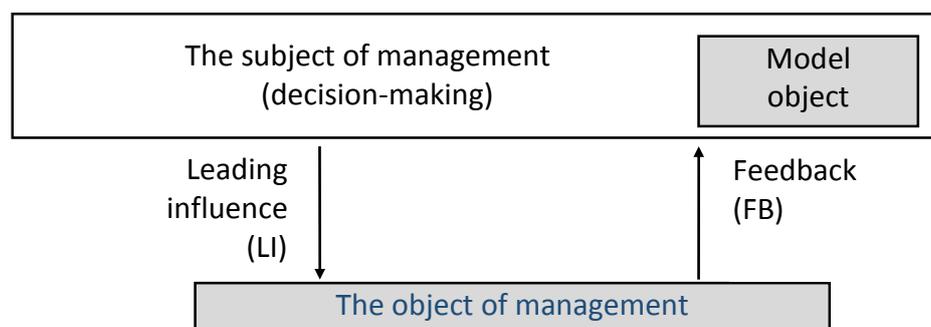
Under the traditional type of organizational structure of an enterprise, if the manager even delegates' powers, then in order to control and verify the "delegated" activities, there is an established idea of how one or other function must be performed. It is here that the property of reflectivity, through which changes in the policy direction of development does not occur - because the direction of development and key issues is developed on the basis of the vision of such a leader. That is, there is an effect of the identity of the manager and the enterprise.

If the organizational structure of the company is based on the principles of reflexive management (that is, as the ratio of officials (managers and specialists) of the enterprise), then each manager's attitude to the subordinates is adequate to the structure of his own activities, that is, any problem (if you look at it through the prism of the structure) can always be localized to the exact and sole responsible official for it. And this localization is achievable and carried out within the activities of the head of this person. Accordingly, the professional duty of the manager of the lowest level is not to "issue" the problem beyond his own activities (that is, at the upper levels of management).

And any problem, if the company operates the principle of reflexive management, manifests itself at an adequate level in the activity of a specific manager or specialist responsible for it. The property of coordination at the same time always provides sufficient informational completeness of the given official for the professional solution of the problem.

In view of this, there is no need to reflect the organizational structure of the enterprise in the form of a scheme in order to trace the way of solving the problem and participation in these particular units. Because an official who is responsible for solving it situatively creates a team that can solve it. This practice is accepted, for example, in Japanese firms that do not have a certain organizational structure (Duncan, 1999), and where the delegation of fragments to subordinates (one of the main points of structuring) is determined only by the organization of each manager of his own activities, provided that it can and should change, accompanied by change, removal, and constantly evolving as changes of external circumstances and as the improvement of their activities by leaders of different levels of government.

Figure 2 shows the feedback control scheme required by the manager who manages the traditional methods. This scheme manager should apply to each object of the set of processes (technological, economic, industrial, etc.), which are carried out by its subordinate managers and specialists with a diverse and quite complex professional activities for everyone.



**Figure 2.** Feedback control scheme

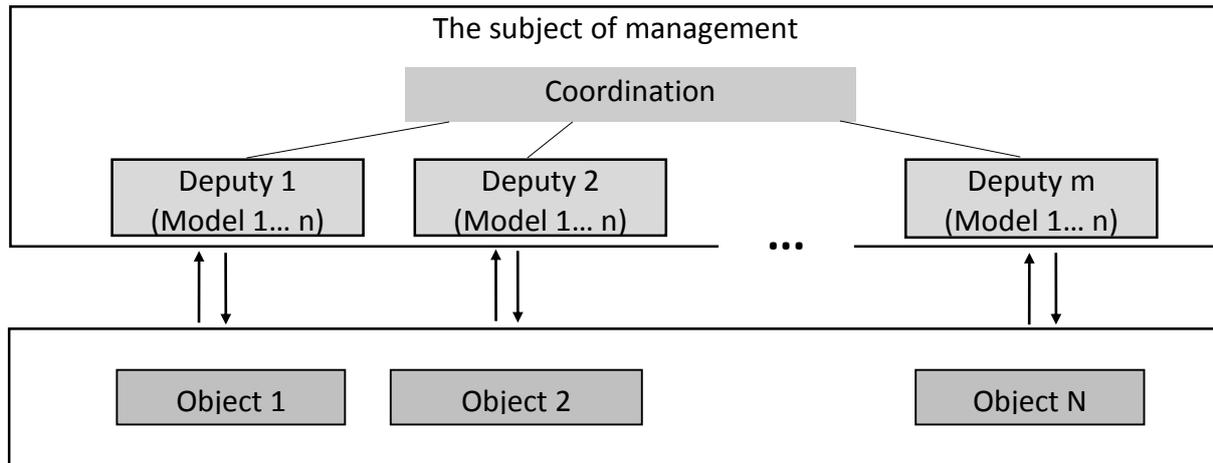
Source: formed by the author (Duncan, 1999).

In order to make competent decisions and act according to the above scheme, the manager should not only know the specifics of individual processes of the enterprise, but also perform a coordinating function between these processes. Such, is not feasible for one person, therefore in the practice of management are used two simplifying methods:

1) the head enters into operation an institution of deputies, who take over the work or part of the work in separate areas (and models), thereby unloading the first person (relations between the head and deputies are not formalized - these deputies differ from the heads of subordinate units);

2) the models, which the manager works are so simplistic that activities within their framework become accessible to him.

In both cases, the application of such a scheme (figure 3), the leader really "loses" in personal competence.



**Figure 3.** Real control circuit with feedback

Source: developed by the author

In the first case, it releases part of its activities from the hands, and in the second case, the models are so "simplistic" that they do not reflect the real state of affairs. And then, in the presence of local and contradictory interests in the subordinates, the head can take inadequate real situation solution. In the first case, he also receives additional "human" problems - in connection with the introduction of new officials (deputies) into the scope of their activities.

The complexity of the position in this control scheme is to achieve the adequacy of the model of the managed object, as well as the appearance of the model itself. What the basis for building the model of the enterprise or its individual production processes? A priori, it does not exist, nobody represents its director. To consider that the head (for example, from many years of experience in various positions at a given or similar enterprises) is competent enough to construct such a model (or models) - also wrong, because in such a competence the head of the model eliminates the very necessity.

In addition, this feedback scheme can not reflect the situation of enterprise development, when a new production process is being built, there is no existing function of the existing enterprise, but there is a function only of the activities of the manager and therefore can not reveal in the scheme the subject - cognitive relations.

#### 4. Results and discussion

There is a need to consider the functions of coordination in a differentiated way - as a management function and as a function of management support that would simultaneously provide the enterprise with the tasks of distribution, stimulation, provision of communications, coordination of interests, etc. This would have a purposeful influence on the decision-making model of management agents to ensure their coordinated interaction in

accordance with the rules established by the coordination centre, which are aimed at achieving the common goal of the operation/development of the enterprise.

The solution of the above-mentioned coordination tasks in hierarchically organized management structures, including industrial enterprises, is impossible without formalizing the interconnection of the elements of the corresponding mechanism, which determines the feasibility of constructing an object model for the coordination of managerial processes within a hierarchical reflexive approach.

Before defining the main and secondary levels of coordination and modeling the relationships, it is necessary to identify key management objects, find out their place in the structure of the enterprise, identify and describe their information potential.

Immediately predict that the key objects of the general mechanism of coordination of managerial processes at the enterprise are most tied to the goals of the operation / development of the system  $Z, z = \overline{I, Z}$ . According to the goals formulate more specific tasks within the overall strategy of enterprise development. This allows the whole spectrum of goals to be divided into separate blocks (tasks)  $B, b = \overline{I, B}$  and bring it to the level of local solvable tasks  $C, c = \overline{I, C}$ .

At traditional enterprises, where the management structure has the form of hierarchy, according to the levels of hierarchical control, all tasks are distributed. At the same time, the strategic and coordination tasks of management are separated from operational activities: strategic directions and goals of development formulate top managers, they also take the most important industrial and economic decisions; coordinates the activities of all divisions of the enterprise middle management level; operational management of tasks and organization of activities in structural sub-divisions engaged in management of the lower level. Means and methods for reaching the set goals operational level of management (lower and partially middle managers) develops and performs independently, but only within the framework of those relationships and interdependencies that are established within the enterprise and are regulated by senior management.

R.N. Lepa (2006) has developed a general scheme of management of an industrial enterprise, having identified the following levels of governance: government (level 0); general manager (level 1); managers for functional areas (level 2); heads of enterprise divisions (level 3); specialists of enterprise divisions (level 4); enterprise operating system (level 5). Having taken this scheme for the methodological basis of the mechanism of coordination of management processes, we denote a hierarchically organized structure of an industrial enterprise that contains six key levels of management  $I, i = \overline{0, 5}$ .

Objects organizational structure of the enterprise, which are distributed at certain levels of the hierarchy, are management agents responsible for the implementation of a certain range of tasks assigned to them, functions  $F, f = \overline{I, F}$ . The latter may take the form of job descriptions,

production, technological, financial, design, information tasks, etc., but their main characteristic is the establishment of communicative information interchange in order to fulfill these tasks.

If we return to the management scheme, which we adopted for the methodological basis of the developed mechanism for coordination of managerial processes, then for level 0 - members of the board of directors of the enterprise, level 1 - general manager, level 2 - managers of functional directions (for the industrial enterprise - chief engineer, chief economist, chief of production, heads of main workshops, chief accountant, deputy director of commercial matters, deputy of personnel and social issues, etc.), level 3 - heads of enterprises a (heads of departments and shops of industrial enterprises), level 4 - specialists of enterprise divisions, level 5 - operating system of the enterprise.

In the process of implementation of the mechanism of coordination of managerial processes in the enterprise, agents interact with each other through information links. Considering the connections in hierarchical organizational systems, the authors of the work (Burkov et al., 1989) substantiate their horizontal and vertical direction, emphasizing that the vertical direction shows not only the subordination relations (as traditionally), but also the movement of information flows from the bottom up and in the opposite direction, while the horizontal links show the position of the control elements relative to the external environment and among themselves within the framework of the considered level of the hierarchy. Thus, the information reflexive links of agents within a single level of the hierarchy are defined as horizontal interactions of agents, interlayer interactions - as vertical ones.

On the example of a pair of management agents, we consider the possible types of interactions that arise in the process of coordinating management processes at enterprises. Assume that certain management agents  $A_j^i$  i  $A_q^k$  (where  $j(q)$  - serial number of management agent at  $i(k)$  - th level of the hierarchy) interact with each other in the process of coordinating management processes  $v_k \supset [A_j^i, A_q^p]$ .

Then:

at  $i \neq p$  observe a horizontal connection, or interaction of agents within the same level of management;

at  $i = p$  observe a horizontal connection, or interaction between management agents of different levels of the hierarchy;

if  $\begin{cases} j = q \\ i = p \end{cases}$  - there is a reflection of the management agent about their own ideas about

reality, the principles of their activities, etc. (autoreflexion).

In addition, the presence of strategic and informational reflection in the process of interaction of management agents should be noted. Information reflection is the process and result of the agent's reflection on the values of the uncertain parameters that these opponents are aware of and their opponents think (other agents); strategic reflection is the process and

result of the agent's reflection on which decision-making principles is used by his opponents (other agents) within the framework of the awareness he attributes to them as a result of information reflection, that is, strategic reflection precedes the decision-making by the agent of the chosen actions (Novikov & Chkhartishvili, 2002).

The development of the mechanism of hierarchical and reflexive coordination at the enterprise involves the coordination of the agents of management in the process of interactions of agents  $v_k$  with the help of information flows  $G_{v_k}$ , which contain a large number of indicators  $\{X_{G_{v_k}}\}$  on realization of planned (target) tasks of enterprise management.

At the same time moving from the top down to the hierarchical structure of the set  $\{X_{G_{v_k}}\}$  is detailed according to the level of the hierarchy. Thus, each of the agents of the respective levels of management has a set of planned indicators  $\{X_{G_{v_k}}^t\}$ , which corresponds to the goals of enterprise development at a certain point in time  $t$ . But, each of the agents of management perceives sets of such indicators  $\{X_{G_{v_k}}^t\}$  through the prism of their own intentions and goals, which requires the consideration of reflexive components in the process of implementing the mechanism of coordination of managerial processes. In addition, it is important to take into account the completeness of the agents of management awareness, their competence and the motives for making decisions when implementing relevant planning tasks.

Thus, there is a need to take into account the subjective factor of the perception of the agents of management of the relevant indicators of management in the composition of information flows  $G_{v_k}$ . To do this, in the object model of the coordination of managerial processes in the enterprise within the hierarchical-reflexive approach to determine  $G_{v_k}$  except for sets of planned indicators  $\{X_{G_{v_k}}\}$  distinguish characteristics of information flows  $\{H_{G_{v_k}}\}$  and appropriate intents of control agents  $\{U_{G_{v_k}}^{A_j}\}$ . At the same time, under the characteristics of information flows  $\{H_{G_{v_k}}\}$  is the probability of distortion of the truth due to the incompetence or ignorance of the agents of management, and the probability of ambiguous interpretation of the information received, which is determined by the intentions (intentions) of the agents  $\{U_{G_{v_k}}^{A_j}\}$  of management  $\{U_{G_{v_k}}^{A_j}\}$  in the process of implementing the scheduled management tasks.

Thus, in the process of implementing the mechanism of hierarchical coordination, the interests of agents are coordinated horizontally and vertically. Accordingly, for such an agreement, two types of reflection are used: informational (horizontal coordination) and strategic (vertical). The mutual influence of these types of reflection and the mismatch of the interests of agents within the hierarchy levels lead to contradictions and conflicts of inter-level (vertical) interactions. In view of this, the necessity of using the tools of complex harmonization of the interests of the participants of interactions within the framework of the mechanism of hierarchical and reflexive coordination is updated.

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