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MODELING OF CONTROL OF STABILITY OF COMMUNICATION CHANNELS IN DEVELOPMENT MANAGEMENT CONDITIONS

Abstract. In the management of communications under the conditions of the development of an industrial enterprise, there are continuous violations in communications due to the poor quality of communication channels or due to unexpected changes in the environment with which communication channels can not exist. To solve this problem, a scientific and methodical approach to controlling the stability of communication channels has been developed in the management of the development of an industrial enterprise, which is based on the consideration of the peculiarities of different types of internal and external communication channels and the use of which makes it possible to identify problems in communications in a timely manner and adapt communication channels to changes in external environment or to the features of internal communications.

The methods of formalizing the estimation of the stability of communication channels of an industrial enterprise are developed, providing the basis for their correction or for adjusting managerial decisions in case of distortion of the information received through insufficiently stable communication channels. In order to assess the stability of the communication channels, it is proposed to distinguish between internal and external communication channels. In turn, the internal communication channels can be upright and horizontal. Vertical channels combine subdivisions or individual workers at different levels of the hierarchy, and horizontal channels combine subdivisions or employees of an enterprise that are at the same level of the hierarchy. In addition, it is proposed to distinguish between symmetric and asymmetric channels as well as unitary and binary communication channels.

Models for estimating stability are developed for each of the proposed communication channel types. An analysis of the stability of communication channels of an industrial enterprise allows them to be adapted to changes in the external environment or characteristics of internal communications.

Keywords: modeling, control, stability, communication channels, management, development, industrial enterprise.

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МОДЕЛЮВАННЯ КОНТРОЛЮ СТАБІЛЬНОСТІ КОМУНІКАЦІЙНИХ КАНАЛІВ В УМОВАХ УПРАВЛІННЯ РОЗВИТКОМ

Анотація. При управлінні комунікаціями в умовах розвитку промислового підприємства спостерігаються суцільні порушення зв'язку у зв'язку з низькою якістю комунікаційних каналів або через несподівані зміни у середовищі, з яким комунікаційні канали не можуть існувати. Для розв'язання цієї проблеми розроблено науково-методичний підхід до контролю стійкості комунікаційних каналів в управлінні розвитком промислового підприємства, який базується на розгляді особливостей різних типів внутрішніх і зовнішніх комунікаційних каналів та використання яких дозволяє своєчасно виявляти проблеми в комунікаціях та адаптувати комунікаційні канали до змін у зовнішньому середовищі або до особливостей внутрішніх комунікацій.

Розроблено методи формалізації оцінки стабільності комунікаційних каналів промислового підприємства, що забезпечує основу для їх корекції або для коригування управлінських рішень у разі викривлення інформації, отриманої через недостатньо стабільні комунікаційні канали. Для оцінки стабільності комунікаційних каналів пропонуємо розрізняти внутрішні і зовнішні канали зв'язку. У свою чергу, внутрішні комунікаційні канали можуть бути вертикальними і горизонтальними. Вертикальні канали об'єднують підрозділи або окремих працівників на різних рівнях ієрархії, а горизонтальні канали поєднують підрозділи або працівників підприємства, що перебувають на одному рівні ієрархії. Крім того, пропонуємо розрізняти симетричні та асиметричні канали, а також унітарні та бінарні канали зв'язку.

Моделі оцінки стабільності розроблено для кожного із запропонованих типів комунікаційних каналів. Аналіз стабільності комунікаційних каналів промислового підприємства дозволяє їм адаптуватися до змін у зовнішньому середовищі або характеристиках внутрішніх комунікацій.

Ключові слова: моделювання, контроль, стабільність, комунікаційні канали, управління, розвиток, промислові підприємства.

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МОДЕЛИРОВАНИЕ КОНТРОЛЯ СТАБИЛЬНОСТИ КОММУНИКАЦИОННЫХ КАНАЛОВ В УСЛОВИЯХ УПРАВЛЕНИЯ РАЗВИТИЕМ

Аннотация. При управлении коммуникациями в условиях развития промышленного предприятия наблюдаются сплошные нарушения связи в связи с низким качеством коммуникационным каналов или из-за неожиданных изменений в среде, в которой они не могут существовать. Для решения этой проблемы разработан научно-методический подход к контролю устойчивости комуникационных каналов в управлении развитием промышленного предприятия, основанный на рассмотрении особенностей различных типов внутренних и внешних коммуникационных каналов, использование которых позволяет своевременно выявлять проблемы в коммуникациях и адаптировать их с изменениями во внешней среде или к особенностям внутренних коммуникаций.

Разработаны методы формализации оценки стабильности комуникационным каналов промышленного предприятия, который обеспечивает основу для их коррекции или для корректировки управленческих решений в случае искажения информации, полученной из-за недостаточно стабильных комуникационных каналов. Для оценки стабильности каналов связи предлагается различать внутренние и внешние каналы связи. В свою очередь, внутренние каналы связи могут быть вертикальными и горизонтальными. Вертикальные каналы объединяют подразделения или отдельных работников на разных уровнях иерархии, а горизонтальные каналы объединяют подразделения или работников предприятия, находящихся на одном уровне иерархии. Кроме того, предлагается различать симметричные и асимметричные каналы, а также унитарные и бинарные каналы связи.

Модели оценки стабильности разработаны для каждого из предложенных типов комуникационных каналов. Анализ стабильности комуникационных каналов промышленного предприятия позволяет им адаптироваться к изменениям во внешней среде или характеристиках внутренних коммуникаций.

Ключевые слова: моделирование, контроль, стабильность, комуникационные каналы, управление, развитие, промышленные предприятия.

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Introduction. Management of the development of an industrial enterprise is important to ensure the stability of communication channels. In general, stability is the ability of the system to function in equilibrium and without changes in its own structure. In the context of the development of industrial enterprises and the management of communications under the stability of the communication channel of the industrial enterprise implies its ability to transmit the necessary information to the right extent and without delays. The timely detection of the instability of the

communication channel is necessary for the implementation of measures to fix it or create a new one. In fact, the instability of the communication channel implies the presence of already existing delays in the implementation of communications, loss of information or distortion of information transmitted. Under potential volatility, it is suggested to keep in mind the near-threat of actual instability as a result of channel degradation or the complication of communications that the old channel can not handle in the future.

Literature review. World Bank tends to espouse and promote the title "Development Communication" while UNICEF uses "Communication for Development". The difference seems to be a matter of semantics and not ideology since the end goals of these global organizations are almost identical to each other (UNICEF).

Bessette defined development communication as a "planned and systematic application of communication resources, channels, approaches and strategies to support the goals of socio-economic, political and cultural development". Development communication is essentially participatory [1].

Development support communications is a discipline in development planning and implementation in which more adequate account is taken of human behavioural factors in the design of development projects and their objectives [3].

"Communication is a key factor to begin and keep a proper Sustainable Development strategy" [2]. Development Communication can be defined as a "dialogue-based process entailing the strategic application of communication approaches, methods and/or technologies for social change". This definition highlights the three important features of development communication – process, analytical activity based on dialogue, and aims to achieve change [12].

Communication plays a vital role in project coordination, management, knowledge collection and transfer [8,10].

Jamias articulated the philosophy of development communication which is anchored on three main ideas. Their three main ideas are: purposive, value-laden, and pragmatic (Jamias, 1975).

Communication processes and the adoption of new technology does not go on apart from the factors which define the behavior of the social, economic and political system. Correlational analyses are of little value in explaining communication processes, or in establishing their role in relation to development [7].

According to Shannon and Weaver's model, a message begins at an information source, which is relayed through a transmitter, and then sent via a signal towards the receiver. But before it reaches the receiver, the message must go through noise (sources of interference). Finally, the receiver must convey the message to its destination. Shannon and Weaver's model clearly demonstrates why even the simplest communication can be misunderstood. Transmitting a signal across additional media only adds to the complexity of the communication and increases the chances for distortion [23].

Payne (2001) defined channels as the means used to transmit the message from sender to receiver. Messages can be transmitted through many channels. The choice of channel depended on time available, expenditure involved, urgency of the information and intellectual and emotional state of the sender and receiver.

Such topical communication channels as crout-technology are researched in the work of O.Zozulov and K.Poltorak, who proposed a two-contour model of communication influence. The basis of this model is the evaluation of the effectiveness of two areas of communication impact – contextual information and commodity-information [26]. But it should be noted that this area of communication has a limited audience, which does not always coincide with the actual contractors of the company, that is, this channel does not guarantee the receipt of information by the consumer. In addition, internal communications remain out of focus.

The concept of development communication policy science has reference to the following: Diffusion model which enunciates that 'that the role of communication was (1) to transfer

technological innovations from development agencies to their clients, and (2) to create an appetite for change through raising a 'climate for modernization' among the members of the public [5].

The issue of managing the stability of communications of an industrial enterprise, taking into account the specifics of the post-Soviet countries, was considered by many researchers. Thus, T. Sakharova and M. Filippov investigated the features of marketing communications and obstacles that arise in the process of their implementation [20]. The basis of their research is the model of Shenon-Vivera and the assumption that all barriers to marketing communications are divided into macroshops and microphones. Under the macroshops are meant any interference from the external environment, which can be short-lived or long-lasting. In turn, microsystems are divided into physical, semantic and psychological [20]. The disadvantage of this approach in the absence of methods for detecting and formalizing the impact of these obstacles on the overall stability of the communications industry.

Methods of analyzing communications and making conclusions about their perspectives were developed in studies by L. Sacher, in which it is suggested to relate communication to one of three types: the zone of attraction, variational communications and communication gap [17, 18, 19]. The main criterion for assigning communications to one of these categories is the ratio of costs and results when the communication channel is involved. The main disadvantage of this approach is the focus only on the management of internal communications, as well as the evaluation of communications in general at the enterprise, without separating individual communication channels.

Therefore, there is a need to develop methods for formalizing the assessment of the stability of the communication channels of the industrial enterprise, which provides the basis for their adjustment or for adjusting managerial decisions in the event of distortion of information coming through insufficiently stable communication channels

Methodology. The emergence of defects in communication channels and the assessment of their stability depends on the kind of communication they serve. In this aspect, it is proposed to distinguish between internal and external communication channels. In turn, the internal communication channels can be upright and horizontal. Vertical channels combine subdivisions or individual workers of different levels of the hierarchy, that is, one of the participants in the channel is in subordinate relationships in accordance with another. Horizontal channels combine subdivisions or workers of an enterprise that are at the same level of the hierarchy.

In addition, it is proposed to distinguish between symmetric and asymmetric channels, as well as unarar and binary communication channels [10]. Symmetric communication channels are binary, and the exchange of information is carried out through them on an equal footing. For example, these are the communication channels between the industrial enterprise and its suppliers – communications are carried out through negotiations of two equal parties. At the same time, asymmetric communication channels can also be unary – when the information goes only in one direction. When communicating through binary asymmetric channels, the parties are not equal.

In assessing the stability of communication channels, it is necessary to distinguish between universal stability indicators that are inherent to all communication channels, and specific indicators of stability, which are due to the peculiarities of certain types of communication channels. The main communication streams that are different in terms of stability assessment are shown in **Fig. 1**

The main external communication channels include channels that interact with consumers, resellers, contractors and suppliers, competitors, and government agencies.

The communication channel between the industrial plant and the consumers it produces is asymmetric and binary (channels 1 and 2). This is due to the fact that industrial enterprises usually do not have direct contact with the consumer, but carry out sales through resellers. Information about its products is provided by the company through advertising, and information on consumer attitudes toward industrial production is obtained through marketing research and direct complaints.
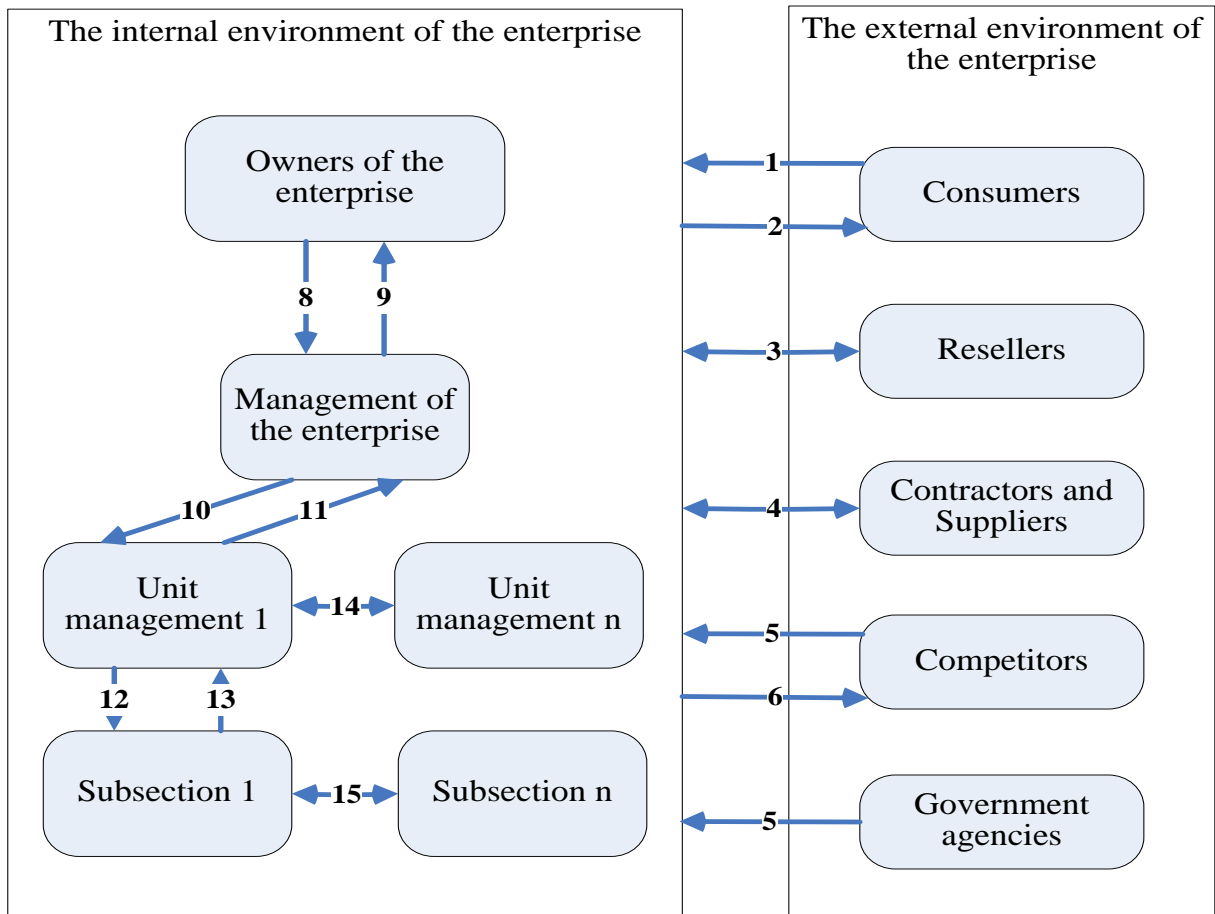
Figure 1. The main types of communication flows of the enterprise in terms of stability assessment

Advertising communication channels are usually unstable due to the very principles of time-limited advertising campaigns. The only exception is advertising through a permanent presence on the Internet, that is, through the company's website. The stability of such a communication channel can be estimated through the dynamics of visits and the level of consumer satisfaction. The dynamics of visits is proposed to be evaluated as:

$$S^{siteV} = \sum_{t=1}^{T} k_t \left(\frac{V_t - V_{t-1}}{V_{t-1}} \right), \tag{1}$$

where S^{siteV} – the dynamics of the visit of the site of the industrial enterprise or other means of representation on the Internet;

k_t – weight coefficient for the time moment t;

V_t – the number of visits at the time t;

V_{t-1} – the number of visits at the time t-1;

T – the number of periods for which the stability analysis of the communication channels is carried out.

In the general we can assume that the more distant the period from the modern one, the less its weight, therefore, it is possible to calculate the weight as $k_t = \dfrac{t}{T}$. If the dynamics of the visit is positive, then this communication channel can be considered stable.

In turn, the level of consumer satisfaction is proposed to be assessed as:

$$S^{siteZ} = \sum_{t=1}^{T} k_t \left(\frac{P_t^D}{V_t^D} - 1 \right), \tag{2}$$

where S^{siteZ} – the level of satisfaction of consumers of products of the industrial enterprise in the implementation of communication through the Internet;

k_t – weight coefficient for the time moment t;

P_t^D – the growth rate of sales at the time t;

V_t^D – the growth rate of visits at the time t;

T – the number of periods for which the stability analysis of the communication channels is carried out.

In order to assess consumer satisfaction, the assumption is made that a satisfied visitor makes purchases of an industrial company's products, therefore the growth rates of sales and visits are approximately the same. It should be noted that this assumption makes sense only in the absence of irregular events, first of all, advertising campaigns. If the indicator is close to zero, then this communication channel can be considered stable.

Communication channel in communication with the consumer in the opposite direction, from the consumer to the enterprise, can be evaluated by traditional methods of analysis of marketing research. In this case, indicators such as sample representativeness, factor distribution, dispersion reliability criteria, etc. are used.

Communication channels with resellers, contractors and suppliers are symmetrical, and the interaction with these counterparties is carried out on an equal footing (channels 3 and 4). Typically, these communication channels are stable, and problems arise when the external environment drastically changes, that is, the stability of this type of communication should be evaluated using universal indicators for assessing the stability of external communication channels.

More sophisticated and specific in terms of assessing the stability of communication channels is the relationship with competitors. These channels are asymmetric, and the leak of information from the enterprise to competitors in general is considered undesirable. For an effective development, an industrial enterprise needs to have information about technologies that use competitors and the effectiveness of their business processes. The stability of the communication channel from competitors to the industrial enterprise (Channel 5) is proposed to be evaluated depending on the completeness of the indicators that characterize the activities of competitors. The calculation of the integrated indicator of the company's awareness of competitors is proposed to be carried out according to the formula:

$$I^{conc} = \sum_{c=1}^{C} w_c \left(I_c^{plan} - I_c^{fact} \right), \tag{3}$$

where I^{conc} – an integrated indicator of the company's awareness of competitors;

w_c – weighting factor for the c-th characteristic of competitor activity;

I_c^{plan} – assessment of the required awareness of the c-th characteristic of competitors' activities;

I_c^{fact} – evaluation of actual awareness of the c-th characteristic of competitors' activities;

C – the number of characteristics of competitors' activities that are necessary for constructing a strategy for the development of the competitiveness of an industrial enterprise.

Consequently, the communication channel from the industrial enterprise to the competitors (channel 6) should pass only the information that is useful to convey and filter all the other in order to minimize the possibility of industrial espionage, copying of technologies and know-how, and so on. At the same time, the purpose of functioning of the communication channel with competitors

comes into conflict with the communication channels with other contractors, because excessive secrecy may prevent the delivery of information to consumers.

The last type of external communication channels, with the government, is considered as one way (channel 7). This is due to the fact that the formal exchange of information, such as submission of reports to public authorities, is not considered – this type of activity is regulated and stable in substance. Information from government agencies that may be lost or received late is data on changes in legislation and regulations relating to an industrial enterprise. The assessment of this communication channel should be made taking into account the timeliness of obtaining information and sending it to all interested enterprises.

A feature of assessing the stability of all external communication channels is the need to take into account the possibility of abrupt changes in the state of the environment. The Ukrainian economic environment is characterized by catastrophic changes that manifest themselves in the form of ordinary financial and economic crises associated with fluctuations in the world economy, but they have Ukrainian autonomous features.

All these crises require the company to have stable and strong communication channels for timely detection of problems in the external environment and response to crises. Economic and state actors communicating with an industrial enterprise, in times of crisis, are changing their behavior, so traditional communication channels may not be able to cope with new needs. Usually, in crisis phenomena, economic entities have several possible trajectories of further functioning. Points in which different trajectories are possible are called bifurcation points. Traditionally, under the point of bifurcation, we mean the critical state of a system in which it becomes unstable with respect to fluctuations and there is uncertainty about the subsequent state of the system [11]. Therefore, when assessing the stability of external communication channels, it is necessary to identify bifurcation noises, indicating the possibility of a sharp change in the behavior of the contractor of communication. The presence of bifurcation noise indicates the potential instability of the communication channel. Bifurcation noise refers to information on changes in the external environment that exceeds the limit value and directly or indirectly affects the communication channels of the industrial enterprise.

In order to detect bifurcation noise affecting the communication channels of an industrial enterprise, it is proposed to construct a set of dependencies of the form:

$$R_h = f_h(x_1, ..., x_{K_h}),$$ (4)

where R_h – h-th indicator of development of industrial enterprise;

f_h – a function that connects the h-th indicator of the development of an industrial enterprise with the parameters of the environment;

$x_1, ..., x_{K_h}$ – indicators of the environment reflecting the existence of a crisis for the h-th indicator of the industrial enterprise;

K_h – the number of environmental indicators that reflect the presence of the crisis, and associated with the h-th indicator of the development of an industrial enterprise;

H – the number of indicators for the development of an industrial enterprise;

$h = 1, ..., H$.

To identify dangerous situations in which a small change in the environmental index can lead to a significant change in the indicator of the development of an industrial enterprise it is necessary to find a partial derivative function at the point:

$$D_{h,t}^{k} = f_h^{'k}(x_{k,t}),$$ (5)

where $D_{h,t}^{k}$ – angular coefficient of the tangent to the function graph at the point t;

$f_h^{'k}$ – partial derivative of a variable function, which connects the h-th indicator of the development of an industrial enterprise with the parameters of the environment;

$x_{k,t}$ – the value of the k-th index of the external environment at the point t.

The geometric meaning of the derivative calculated for a single point is that it shows the angular coefficient of the tangent to the function graph at that point. Therefore, if the angular coefficient is greater than the limit value, it can be assumed that the existing bifurcation noises, which indicate a significant change in operating conditions, which is a danger to the development of an industrial enterprise, respectively, to overcome this danger, the communication channel needs to be analyzed for compliance with the prevailing conditions.

Each communication channel can be linked to several indicators of the development of an industrial enterprise. Thus, the communication channel with suppliers is related to the indicators of cost and quality of products. Therefore, in order to assess the danger to the communication channel, it is necessary to take into account all the indicators of development associated with it and partial derivatives for a function that describes the dependence of these development indicators on the environmental performance.

Therefore, in order to decide on the danger to the communication channel, it is proposed to calculate the bifurcation noise ratio:

$$S_t^w = \frac{\sum_u b_{u,t}}{U}, \tag{6}$$

$$b_{u,t} = \begin{cases} 1 \mid D_{u,t} \geq D_u^M \\ 0 \mid D_{u,t} < D_u^M \end{cases}, \tag{7}$$

where S_t^w – the bifurcation noise ratio for the w-th communication channel at the time t;

$b_{u,t}$ – assessment of the existence of danger for indicators of development of an industrial enterprise at time t for the u-th partial derivative, $u \in U^w$;

U^w – the set of partial derivatives for indicators of the development of an industrial enterprise associated with the w-th communication channel;

U – power set U^w;

$D_{u,t}$ – angular coefficient of the tangent to the function graph at the time t;

D_u^M – limit value of the angle factor which is considered dangerous.

If the value is S_t^w is equal to zero, then the w-th communication channel can be considered stable. The closer you are S_t^w to one, then the greater the threat that communication capabilities will not be enough.

For the case of internal communication flows, the main difference that determines the assessment of stability is the equality of their parties. Vertical communication channels are asymmetric and unequal in nature, they combine leadership and performers. These channels include channels between the owners and the management of the enterprise (channels 8 and 9), the management of the enterprise and the management of the divisions (channels 10 and 11), the management of the divisions and performers (channels 12 and 13).

For asymmetric vertical channels, it is suggested to evaluate stability, depending on whether the information comes from the manager to the subordinates, rather the opposite. When communicating from subordinates to managers it is necessary that the information is aggregated, but at the same time, sufficiently fully reflects the results of their work or problems that arise and

require intervention of the management. The estimation of stability of internal asymmetric vertical channels from subordinates to managers is proposed to be carried out according to the formula:

$$S_q^{Up} = \frac{m_q^{pl} + m_q^{fm} + m_q^{eo}}{\widehat{m}^{\max}}, \qquad (8)$$

where S_q^{Up} – assessment of the stability of the q-th internal asymmetric vertical channel from subordinates to managers;

m_q^{pl} – assessment of informing about non-fulfillment of plans;

m_q^{pl} – assessment of information on force majeure;

m_q^{pl} – evaluation of the electronic document flow system;

$\widehat{m}^{max}$ – the maximum possible amount of estimates.

For the transfer of qualitative assessment by managers to the quantitative measurement, we propose a scale, which is shown in **table 1.**

Table 1

Scale for estimating the internal asymmetric vertical channel from subordinates to managers

Indicator	Qualitative assessment	Quantitative assessment
Informing about non-fulfillment of plans	On time	0
	Delay for a few days	1
	Only upon request from the management	2
	Hiding and distorting information	3
Informing about force majeure	On time	0
	Delay for a few days	2
	Hiding and distorting information	4
Availability of electronic document management system	Full coverage	0
	Partial coverage	1
	Missing	2

In the implementation of communications from managers to subordinates, the main thing is to ensure the manageability and bringing the tasks to the required detail. Management standards depend on the type of management activity. The following norms are considered to be optimal [16]:

complex non-standard work requiring high qualification of employees - 5-7 subordinates to the head;

subdivisions with standard procedures and skilled workers - 10-12 subordinates to the head;

typical standardized work, such as management of workers in production workshops - 15-17 subordinates to the manager.

The estimation of the stability of internal asymmetric vertical channels from managers to subordinates is proposed to be carried out according to the formula:

$$S_q^{Dn} = \frac{m_q^{kr} + \sum_r \left(\frac{1}{R} \cdot \left(m_{qr}^{dz} + m_{qr}^{eo} \right) \right)}{\widetilde{m}^{\max}}, \qquad (9)$$

where S_q^{Dn} – assessment of the stability of the q-th internal asymmetric vertical channel from managers to subordinates;

R – the number of workers in the lower link of the communication channel (instead $\frac{1}{R}$ weight coefficient can be used for each worker);

m_q^{kr} – assessment of the implementation of the standards of manageability;

m_{qr}^{dz} – evaluation of the quality of the decomposition of tasks from the r subordinate;

m_{qr}^{eo} – assessment of the coverage of the functions of the worker by the electronic document management system;

$\breve{m}^{max}$ – the maximum possible amount of estimates.

For the transition from qualitative evaluation to the quantitative measurement, a scale is proposed, which is shown in **table 2.**

Table 2

Scale for estimating the internal asymmetric vertical channel from managers to subordinates

Indicator	Qualitative assessment	Quantitative assessment
Compliance with the manageability indicator	Norm	0
	More than one and a half and less than twice the rate	1
	Exceeds the norm by two or more times	4
Decomposition of tasks	Complete to the level of everyone performer	0
	General	2
	Missing	4
Availability of electronic document management system	Full coverage	0
	Partial coverage	1
	Missing	2

There are symmetric unary communication channels between the units and managers of the same industrial enterprise. Through these communication channels, units or their leaders coordinate their activities on an equal footing. To assess the stability of such channels, the main indicators are the number of conflicts that arise in the communication process:

$$S_j^{Gor} = \frac{\sum_l \left(\frac{1}{L} \cdot \left(m_{jl}^{con} + m_{jl}^{sol} \right) \right)}{m^{max}}, \tag{10}$$

where S_j^{Gor} – assessment of the stability of the j-th internal symmetric horizontal channel;

L – number of channel participants on both sides (instead $\dfrac{1}{L}$ weight coefficient can be used for each participant);

m_{jl}^{con} – estimating the number of conflicts that occur during communication, the l-st participant;

m_{jl}^{sol} – evaluation of the results of conflict resolution by the l-st participant ;

m^{max} – the maximum possible amount of estimates.

To translate the qualitative assessment by the participants of the horizontal communication channel to the quantitative measurement, we propose a scale is shown in table 3.

Table 3

Scale of evaluation by the participants of the internal horizontal communication channel

Indicator	Qualitative assessment	Quantitative assessment
The number of communications conflicts	Always	5
	Often	3
	Sometimes	1
	Never	0
Results of conflict resolution	Not solved	5
	Is solved with the involvement of management	2
	Is solved on their own	1
	Conflicts do not arise	0

Thus, for each of the types of communication channels considered it is expedient to use specialized methods for assessing their stability. An analysis of the stability of communication channels of an industrial enterprise makes it possible to adapt them to changes in the external environment or to the characteristics of internal communications.

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