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MANAGEMENT OF BUSINESS PROCESSES AT A WHOLESALE ENTERPRISE

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The study of theoretical approaches to the essence of the system for management of business processes at an enterprise of wholesale trade is carried out. The author's approach to the essence of the term "management of business processes of a trade enterprise" is determined with consideration for functional peculiarities of the enterprise activity. The analysis of the development tendencies of the wholesale trade sector in Ukraine is conducted and the problematic issues of statistical investigation of the availability of warehouse space at enterprises are identified. The methodological approach to the control of flow processes at a wholesale enterprise is developed taking into account the functional features of the formation of a complex of interrelated business that are carried out in a certain sequence and are consistent with the overall strategy of the company under conditions of dynamic changes in the market environment in order to meet the needs of consumers. Having considered the process approach to management of business processes, the mathematical model of management of flow processes is developed.

Keywords: *business processes, management of business processes, flow processes, process approach, mathematical model of management of flow processes.*
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Ільченко Н. Б. Управління бізнес-процесами на підприємстві оптової торгівлі

Проведено дослідження теоретичних підходів до системи управління бізнес-процесами на підприємстві оптової торгівлі. Визначено авторський підхід до сутності поняття «управління бізнес-процесами підприємства торгівлі», враховуючи функціональні особливості діяльності підприємства. Проаналізовано тенденції розвитку оптової торгівлі в Україні та визначено проблемні питання статистичного дослідження наявності складської площі на підприємствах. Розроблено методологічний підхід до управління потоковими процесами на підприємстві оптової торгівлі, враховуючи функціональні особливості формування комплексу взаємопов'язаних бізнес-процесів, що здійснюються в певній послідовності та у своїй сукупності відповідають загальній стратегії підприємства в умовах зміни динамічного ринкового середовища, з метою задоволення потреб споживачів. Розроблено математичну модель управління потоковими процесами, враховуючи процесний підхід до управління бізнес-процесами.

Ключові слова: *бізнес-процеси, управління бізнес-процесами, потоковий процес, процесний підхід, математична модель управління потоковими процесами.*
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Ильченко Н. Б. Управление бизнес-процессами на предприятии оптовой торговли

Проведено исследование теоретических подходов к системе управления бизнес-процессами на предприятии оптовой торговли. Определен авторский подход к сущности понятия «управление бизнес-процессами предприятия торговли», учитывая функциональные особенности деятельности предприятия. Проанализированы тенденции развития оптовой торговли в Украине и определены проблемные вопросы статистического исследования наличия складской площади на предприятиях. Разработан методологический подход к управлению потоковыми процессами на предприятии оптовой торговли, учитывая функциональные особенности формирования комплекса взаимосвязанных бизнес-процессов, осуществляемых в определенной последовательности и в своей совокупности соответствующих общей стратегии предприятия в условиях изменения динамической рыночной среды, с целью удовлетворения потребностей потребителей. Разработана математическая модель управления потоковыми процессами, учитывая процессный подход к управлению бизнес-процессами.

Ключевые слова: *бизнес-процессы, управление бизнес-процессами, потоковый процесс, процессный подход, математическая модель управления потоковыми процессами.*
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The globalization of the economy contributes to the appearance of entirely new patterns in the development of the world economy; these processes are significantly manifested at trade enterprises in Ukraine, which has both positive and negative consequences. Under the influence of the intensification of activities and development by European countries of modern approaches to the functioning of wholesale trade enterprises with the use of new technologies, there arises a need for introducing a new philosophy of strategy formation and optimizing business processes in the wholesale trade sector of Ukraine.

Theoretical and practical aspects of the problem under study are reflected in works of many famous scientists: development of wholesale trade is described by G. M. Bogoslavets, N. O. Goloshubova, A. A. Mazaraki, V. M. Toropkova, N. I. Trishkina, and others; management of business processes is considered in works of B. Andersen, T. H. Davenport, M. Hammer, J. A. Champy, M. Martin, M. Rother, J. Shook, O. V. Vinogradova, A. G. Ryndin, S. V. Tupkalo, G. A. Shamaev, and others.

The analysis of the scientific works and current practices of economic activity showed a negative trend prevailing in wholesale trade and especially in management of business processes. Therefore, the issues of the determination of features and efficiency of wholesale trade services under the current market conditions, its further development, strategic goals and objectives of this important subsystem of the sphere of commodity circulation remain unresolved at a conceptual level, which explains the relevance of the research.

Wholesale distributors are a network of entities of all forms of ownership engaged in commercial intermediation between the production of goods and retail trade. The customers are industrial enterprises, wholesalers, retailers, governmental institutions and the international market. Changes in the wholesale trade segment mainly occur rapidly, but the state, unfortunately, almost did not and does not regulate these processes. This has led to a significant reduction in the role of wholesale trade as a system organizer of the movement of commodity resources.

An important direction of the state influence on the functioning of wholesale enterprises is the coordination of trade flows to ensure savings of overall costs on the process of product distribution. The basis for this should become prediction and alignment schemes of goods movement, coordinated use of regional warehouses of wholesale intermediaries (distribution centers), transport terminals and enterprises that are served to improve the interaction between them on a contractual basis.

In *Fig. 1* the positions of well-known scientists regarding the definition of the essence of the term "business processes" are given.

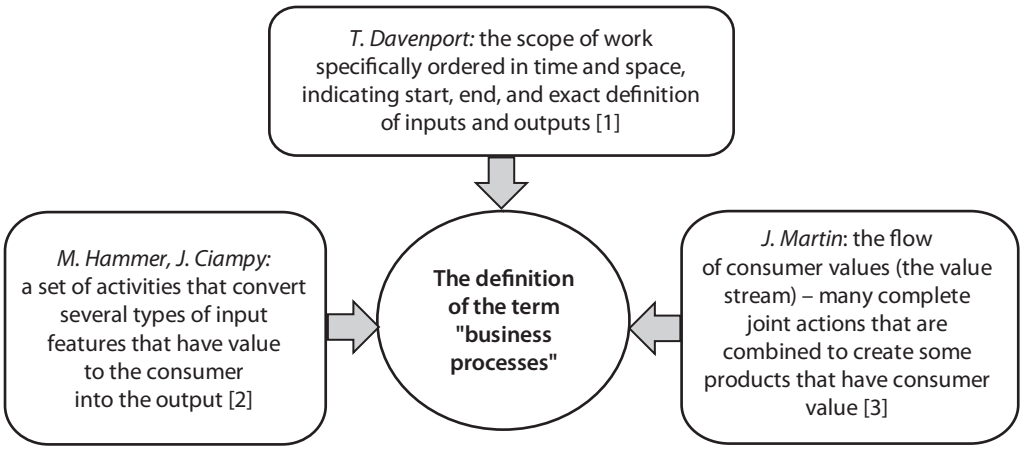


Fig. 1. The definition of "business processes" from the perspective of famous researchers

B. Andersen believes that a business process is a certain logical sequence of related actions that transform input to results or output" [4, p. 74]. Such an understanding of a business process is based on the formal allocation of the main components of the process, including such concepts as "input", "process", "output", "control", "supplier of the process", "customer of the process."

M. Rother and J. Shook define business processes as "a system of consistent, targeted, and regulated types of activities in which, through the control action and use of resources, inputs of the process are transformed into the output results of the process that are valuable for consumers" [5].

Workflow Management Coalition (WFMC) defines business processes as "a set of one or more procedures or activities that collectively realize a business objective or policy goal, normally within the context of an organizational structure defining functional roles and relationships" [6; 7].

The Russian scientists O. G. Ryndin and G. A. Shamaev singled out a concept close in the content to the modern interpretations of a business process: "a business transaction is a set of related transactions aimed at making a profit" [8, p. 27].

V. V. Gorlachuk and I. G. Yanenkova believe that a business process is a systematic, sequential execution of logically related and interdependent tasks using resources that support production activities with the aim of creating products that have consumer value for the customer [9, p. 263].

To the definitions desclosing the essence of modern business processes there can be attributed the one given by S. V. Tupkalo: "a business process is a hierarchy of internal and dependent on each other cyclic functional actions that ultimate goal is to produce products or their separate elements, and manage the cycle of "plan-do-check-act (PDCA)" [10].

However, the approache to determining the system for management of business processes at trade enterprises need to be improved. Business processes at a trade enterprise include a wide range of different processes, which explains the lack of an established definition of a business process for this type of enterprises. Currently, there are a lot of definitions of a business process that describe it from different perspectives.

BPM (*Business Process Management*) – the concept of process management of an enterprise considering business processes as special resources of the enterprise continuously adapting to constant changes and relying upon such principles as clarity and visibility of business processes by modeling business processes using formal notations, software for simulation, monitoring, and analysis of business processes; the ability for dynamical rebuilding models of business process by its participants with the use of software systems [11].

Businiess processes are not created themselves but implemented in the management system. Consequently, business processes are organized, planned and controlled on the basis of the developed strategy of the enterprise. Thus, based on the carried out study, we propose to identify the elements of a trade enterprise and its business processes, which are shown in *Fig. 2*.

Any commercial enterprise is an open system that responds to changes in the external environment. At the inlet,

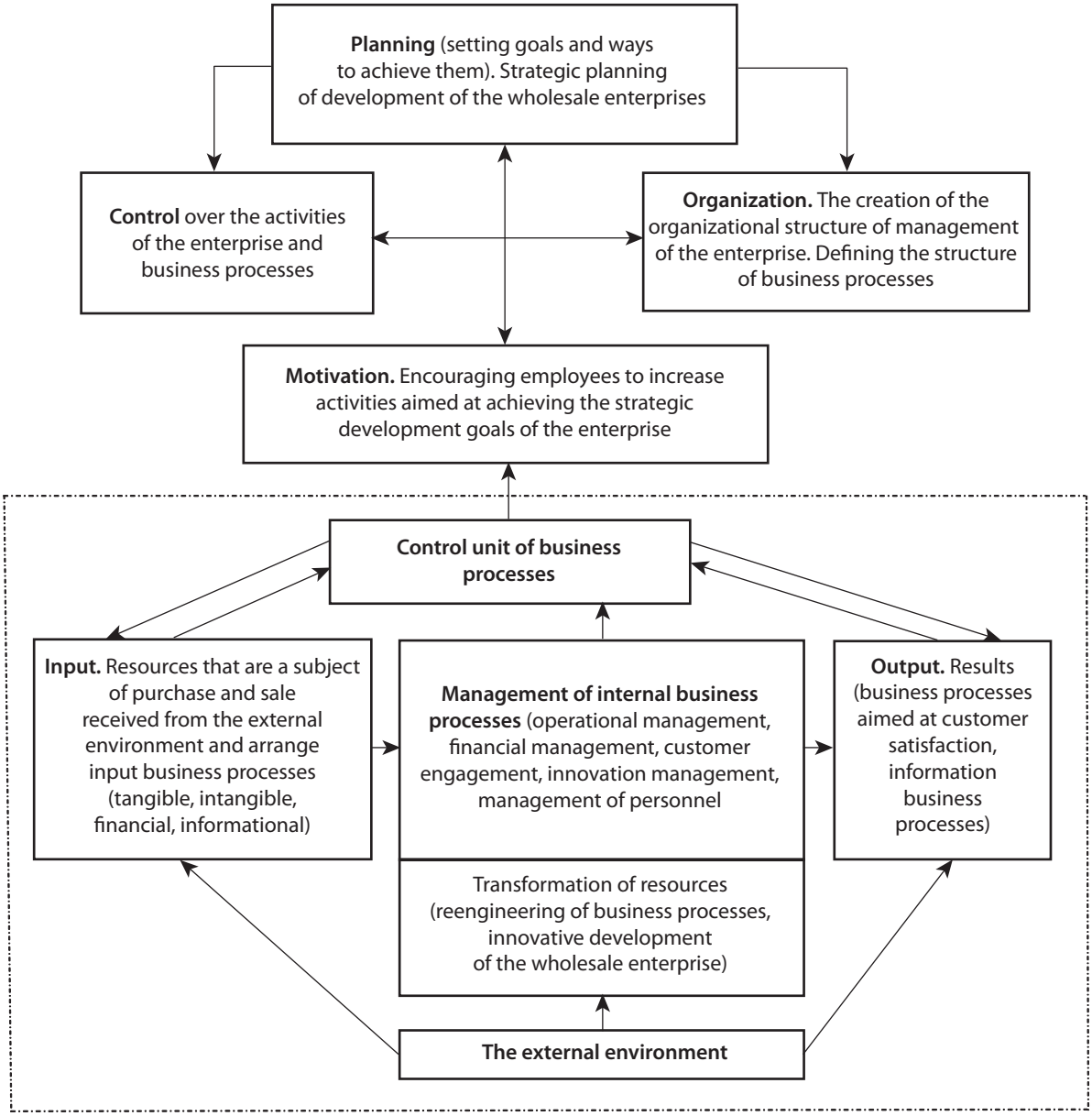


Fig. 2. The system for management of business processes at wholesale enterprises

a wholesaler receives resources from the environment. Input resources, which are a subject of purchase and sale on the market, come to an enterprise from the external environment. Input resources are divided into tangible and intangible, with tangible resources prevailing over intangible ones. This includes commodity flows, financial resources, etc. Intangible inputs include human and information resources.

Thus, let us define the author's approach to the essence of the term "management of business processes at a trade enterprise": it is a purposeful activity, developing optimal models of implementation of business processes, identifying optimal procedures to perform efficient trading activities on the basis of flexible technologies able to ensure the adaptability of business processes to changing conditions of functioning with the use of a range of techniques and tools to meet the needs of consumers, while using the resources of the company.

Management of business processes at a trade enterprise, based on the definition suggested by the author, should be associated with the enterprise development strategy, take into account the future needs of consumers and changing conditions of the dynamic development of the market environment, be based on the analysis of existing business processes, and with the help of this information develop a priority model of formation of business processes, the use of which will contribute to long-term competitive advantages of the enterprise in the market.

Thus, in the course of the research the feasibility of studying management of business processes of wholesale distributors was justified, which will contribute to the solution of urgent problems in further development of their activities.

We have proposed an approach to the identification of the structure of business processes that involves distinguishing the processes of wholesale enterprise development: business processes of wholesale enterprise management contribute to formation of the enterprise development strategy, de-

termine the financial policy, and emphasise setting the task of supplying necessary resources and providing their availability as well as appointing persons responsible for the implementation of business process management; business processes of resource management of a wholesale enterprise that include business processes of supplying resources necessary for the process of enterprise management, the formation of internal and external business processes and measurement of their effectiveness; business processes of development that allow measuring and collecting data to analyze indicators of efficiency and effectiveness of a wholesale enterprise.

Before developing a methodological approach to assessing the efficiency of management of business processes at an enterprise of wholesale trade, it is necessary to study specific features of development of the wholesale trade sector in Ukraine.

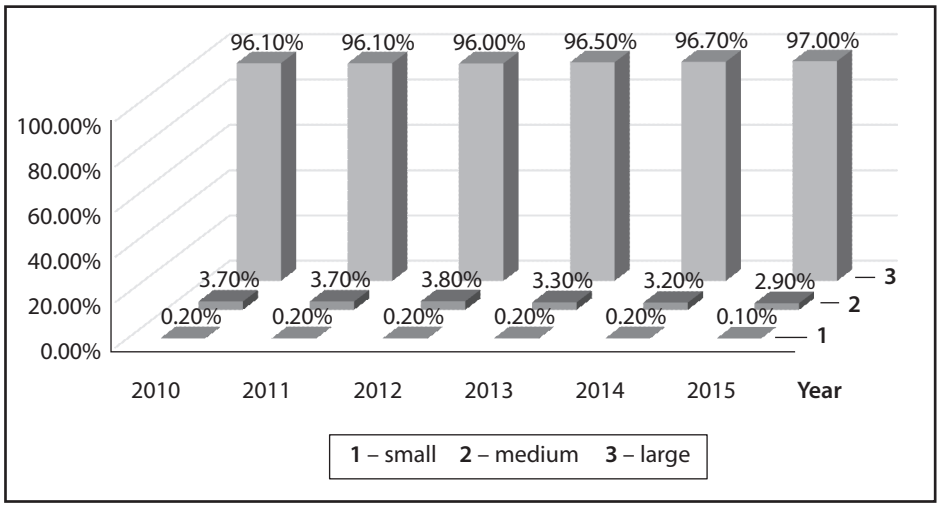


Fig. 3. The dynamics of the number of enterprises by the type of economic activity "Wholesale and retail trade; repair of motor vehicles and motorcycles" as a percentage of the total number

Source: systematized by the author [12] excluding the temporarily occupied in 2014 territories of Ukraine.

Fig. 3 describes the dynamics of the number of enterprises by the type of economic activity "wholesale and retail trade; repair of motor vehicles and motorcycles" as a percentage of the total number.

Thus, according to the type of economic activities "wholesale and retail trade; repair of vehicles and motorcycles", microenterprises constitute the major share of the total number (*Fig. 4*).

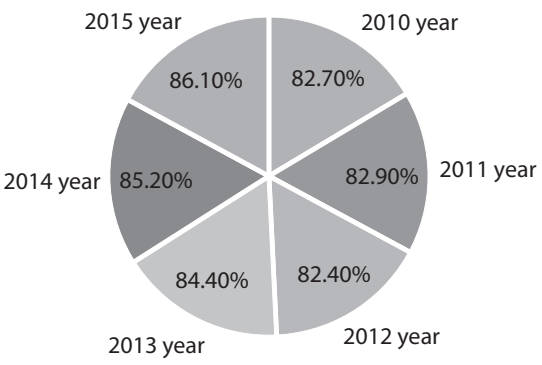


Fig. 4. The dynamics of the structure of microenterprises by the type of economic activity "wholesale and retail trade; repair of motor vehicles and motorcycles" as a percentage of the total number [12]

Fig. 5 presents the data on the wholesaling of food and non-food goods, the turnover of which in 2015 amounted to 18 and 82% respectively. The same trend is observed for 2005–2015.

Fig. 6 shows the structure of the wholesale trade turnover of wholesale enterprises by types of economic activities in 2015 year. More than a third in the overall structure of the wholesale trade turnover constitute other types of specialized trade, while the share of types of non-specialized trade is two times less, the share of the wholesaling of food, beverages, and tobacco amounts to the total of 15.3 % and that of household goods – even less.

The current statistical observation does not provide information on the number of wholesalers that use their own warehouses, so it is impossible to estimate even the level of provision with warehouse space in the wholesale trade sector of Ukraine. Based on the conducted research, it is clear that some enterprises have a semblance of using storage facilities, and some do not have them at all.

Fig. 7 presents data on the total area of warehouse space of enterprises in the wholesale trade sector for 2011-2014. The area of warehouse facilities of wholesale enterprises is constantly decreasing, and in 2014 reached its limit level.

The highest concentration of warehouse facilities of wholesale enterprises is observed in Kyiv and Kyiv region. A large number of them are also located in Dnipropetrovsk, Odessa, Poltava, and Vinnytsia regions. According to the State Statistics Service of Ukraine, the highest figures concerning the area of wholesale warehouses were in 2011 in all regions, except for Kyiv, Poltava, and Sumy regions. In 2014, compared to 2011, the area of wholesale warehouses was reduced by 57.12% countrywide. In Kiev and Kiev region – by 36.25%, in Poltava region – by 62.7%, in Sumy region – 45.25%

However, as already noted, it is impossible to assess the average area of warehouse space per one wholesaler. That

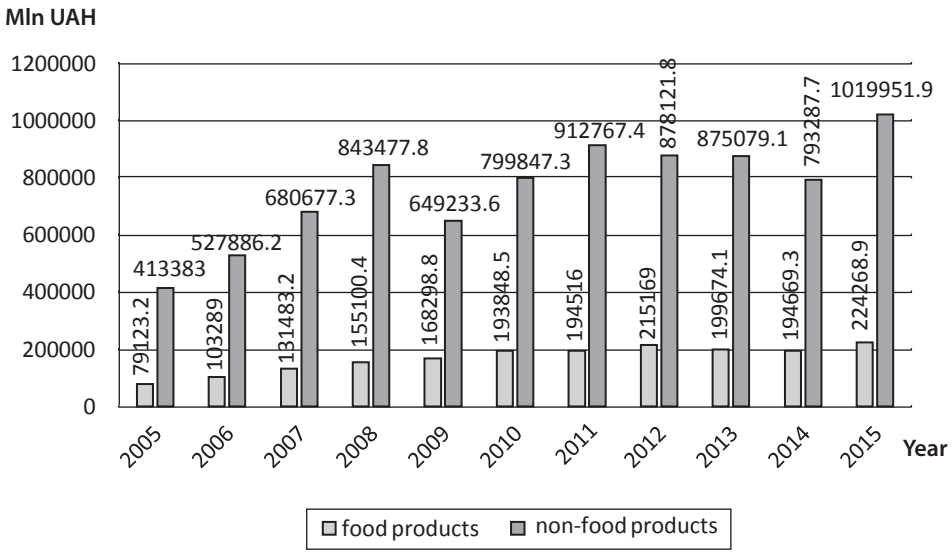
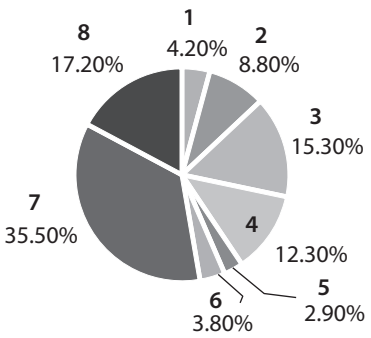


Fig. 5. The dynamics of the wholesale trade turnover for 2005–2015

Source: systematized by the author according to the data of the State Statistics Service of Ukraine for 2010–2015 [14] excluding the temporarily occupied in 2014 and 2015 territories of Ukraine.



1 – Trade of vehicles equipment
2 – Wholesale trade of agricultural raw materials and alive animals
3 – Wholesale trade of food, beverages, and tobacco
4 – Wholesale trade of household goods
5 – Wholesale trade of information and communication equipment
6 – Wholesale trade of other machinery
7 – Other types of specialized wholesale trade
8 – Non-specialized wholesale trade

Fig. 6. The structure of the wholesale turnover of wholesale enterprises by types of economic activity in 2015 [14]

is why, when carrying out statistical observations of activities of wholesale enterprises, it is advisable to take into account the quantity of warehouse facilities and quality of their use.

Table 1 presents data on the chain resale of goods in the wholesale trade sector in 2015, which averaged to 2.3.

The analysis of changes in the volume of commodity stocks of wholesale enterprises for 2010–2015 is shown in *Table 2*.

As is evident from the conducted study, the basic part of the structure of commodity stocks of wholesale enterprises is accounted for by non-food goods. Their share in the studied years amounts to 75-85% of the commodity stock, which confirms the expediency of stock-piling of non-food products and accelerating the turnover of stocks of food products.

In 2015 the relative ratio of capital investment in wholesale and retail trade; repair of motor vehicles and motorcycles to the total number of capital investments by types of economic activities amounted to 7.57%. This confirms once again the existence of the problem of development of the wholesale trade sector in Ukraine and lack of funds for the implementation of innovative development processes. The index of capital investment in the wholesale and retail trade; repair of motor vehicles and motorcycles (as a per-

Table 1

Chain of goods resale in the wholesale trade sector in 2015, mln UAH

Group of products	Wholesale turnover		Chain of resale
	Total	Out of it sold to other enterprises of wholesale trade	
Food	224268.88	120759.688	2.2
Non-food	1019951.87	579455.136	2.3
Total	1244220.75	700214.824	2.3

Source: systematized by the author according to the data [13] excluding the temporarily occupied territory of the Crimea and Sevastopol, a part of the ATO zone.

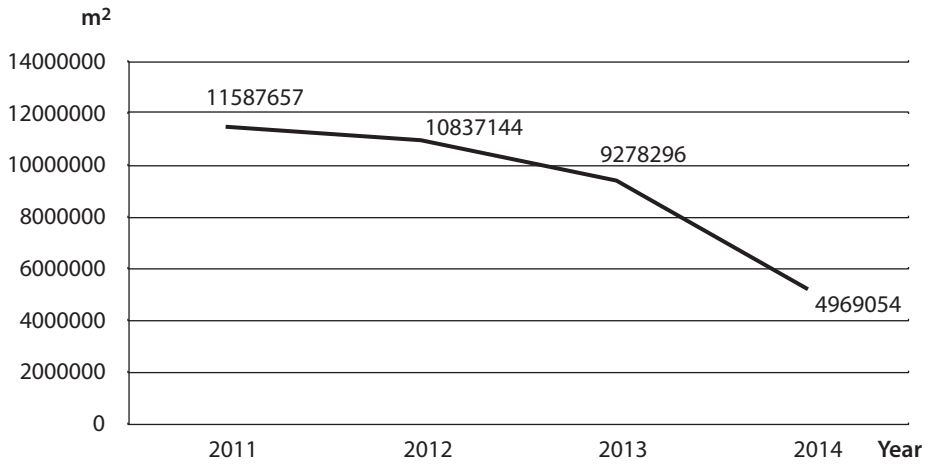


Fig. 7. The dynamics of the total area of warehouses of wholesale enterprises of Ukraine for 2011–2014, m2 [13]

Source: systematized by the author according to the State Statistics Committee of Ukraine for 2011–2014, excluding the temporarily occupied in 2014 territories of Ukraine.

Table 2

The dynamics of the commodity stock of wholesale enterprises for 2010–2015, billion UAH

Stock of goods	2010	2011	2012	2013	2014	2015
Total, incl.:	730.8	83.9	109.2	112.1	122.5	156.6
– food	17.8	20.6	21.5	25.6	22.7	23.1
– non-food	55.2	63.3	87.7	86.7	99.8	133.5

Source: systematized by the author based on [13] excluding the temporarily occupied territories of the Crimea and Sevastopol, a part of the ATO zone.

centage of the figures of the corresponding period of the previous year) amounted in 2011 to 105.6 %, in 2012 year to 113.7 %, in 2013 – 92.8 %.

The potential of our state to participate in the global processes of the market economy is quite significant, but at the present stage Ukraine uses it insufficiently as a result of unfinished reforms. To implement the tasks it is necessary to continuously improve the process of the wholesaling of goods, expand the range of services that wholesale intermediaries will provide for producers and retailers and seek to optimize business processes in the supply chain of goods.

Business processes are the basis for efficient operation of an enterprise, but under modern conditions it is necessary to take into consideration the process approach to management of wholesale enterprises. The introduction of the process approach to enterprise management is quite expensive and it takes a long time to transfer the activities of a wholesale enterprise to the "process" principles. On the other hand, in practice there observed a situation when the application of the process approach does not produce the expected results.

Problems of introduction of the process approach at a wholesale enterprise are associated with many reasons: management of business processes is seen as an isolated function; the system of business processes is not connected with the goals of the wholesale enterprises; the multifaceted nature of business processes and different nature of their interactions are not taken into account; leaders consider the process approach as a panacea to solve all problems at once, whereas under conditions of limited material and financial resources and lack of time, it is impossible to implement it.

Process management differs from functional in identifying the essence of business processes as a sequence of actions aimed at achieving the final result of activity of a wholesale enterprise, providing customer satisfaction, obtaining basic and additional resources that contribute to increasing the enterprise value.

In view of the conducted research of the process approach, it is necessary to determine methodological approaches to management of flow processes of a wholesale enterprise. Management of flow processes is an important scientific problem and requires developing methodological approaches. The analysis of scientific literature showed that there are different methodological approaches to management of flow processes that are associated with complexity and dynamism of development activities of enterprises, especially those of wholesale trade.

So, we believe that the objects of management of flow processes of wholesale distributors are a set of material flows, financial flows, information flows, flows of labour resources, service flows, traffic flows, flows of innovation that are formed in the process of production and economic activity of wholesale enterprises and create economic relations between the subjects of the management system, namely internal and external partners.

All objects of management of flow processes are integrators of developing the activity of a wholesale enterprise and define strategic activities creating the value of enterprises that operate in space and time both in internal and external environment, and an effective management of flow processes helps to optimize business processes.

We have proposed an integrated system for management of flow processes at wholesale enterprises (*Fig. 8*).

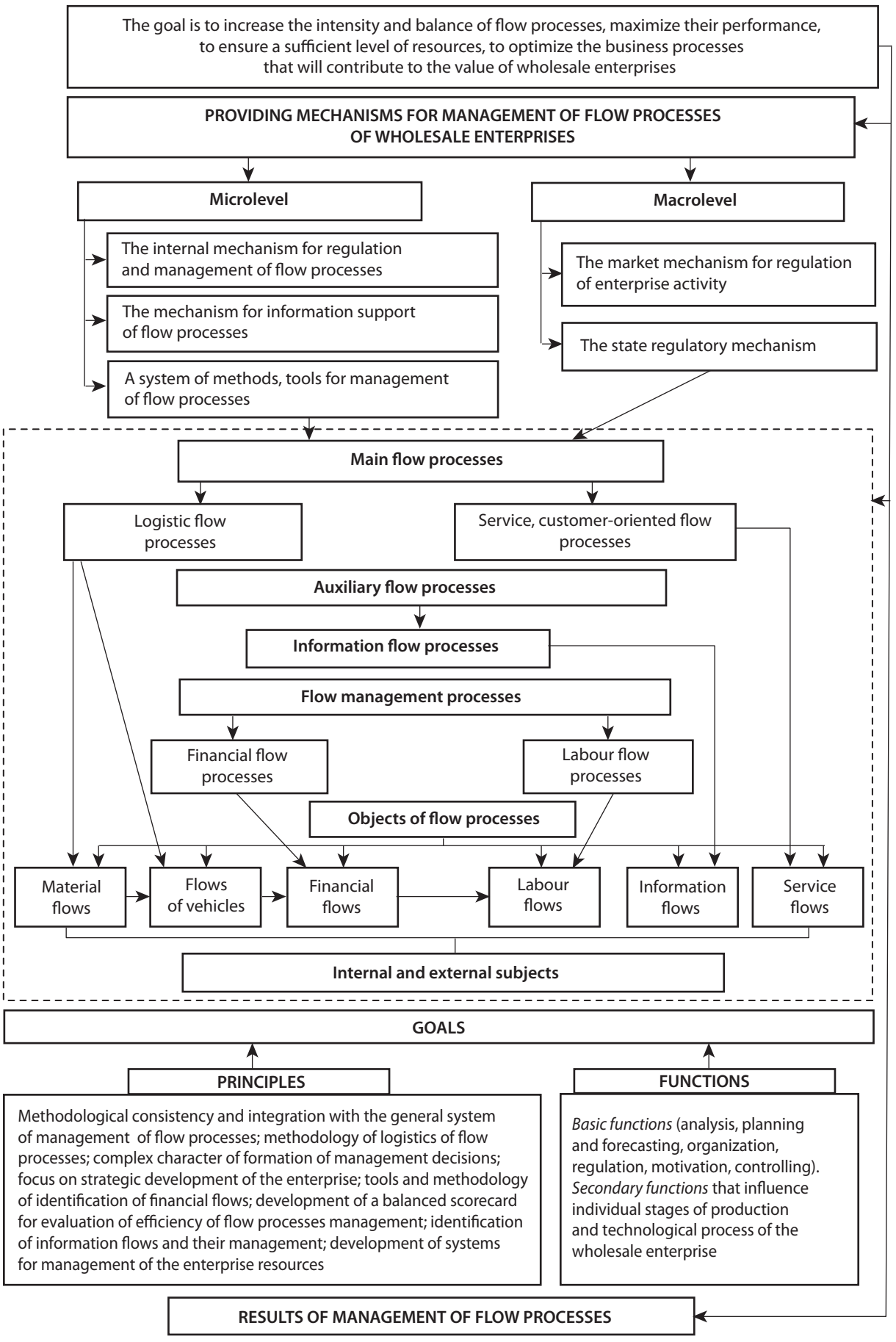


Fig. 8. A comprehensive system for management of flow processes

The strategic level of management of a trade enterprise establishes a system of goals and directions of development approaches and principles for evaluating business processes. Taking into account the overall corporate strategy, the enterprise creates a portfolio of functional strategies focused on the process approach in the system for management of business processes at a trade enterprise. The mechanism for management of flow processes at a wholesale enterprise, in the author's opinion, is a system of interaction of objects and subjects governing development processes (planning, adjustment, optimization) and implementation (execution and control) of management decisions through the effective use of regulatory and market mechanisms, resource, production, and financial potential of the enterprise of wholesale trade on the basis of a set of interrelated business processes that are carried out in a certain sequence and are consistent with the overall strategy of the company under conditions of dynamic changes in the market environment in order to meet the needs of consumers.

Having considered the process approach to management of business processes we developed a mathematical model of management of flow processes.

We suggest calculating logistic business processes *PP*, which take into account:

a) the process of management of logistics business process at the enterprise PP_{spr}, which consists of the objective of the process $PS^1_{spr} = \{spr^1_1\}$, the result of the logistic business process $PP^2_{spr} = \{spr^1_1, spr^2_2\}$ and activities in the process $PP^3_{spr} = \{spr_1^3,\ldots spr_6^3\}$;

b) the business process of procurement management PP_{inv}, which consists of the objective of the business process – procurement $PP^1_{inv} = \{inv^1_1\}$, the result of the business process of procurement $PP^2_{inv} = \{inv_1^2,\ldots, inv_5^2\}$ and the activities in the process of procurement of goods in the logistics chain $PP^3_{inv} = \{inv_1^3,\ldots, inv_8^3\}$;

c) warehousing and technological business processes PP_{gsp}, which consist of the goal of building the warehouse business process in the supply chain $PP^1_{gsp} = \{gsp^1_1\}$, the result of process $PP^2_{gsp} = \{gsp_1^2,\ldots, gsp_5^2\}$, and activities of warehousing business process in the supply chain $PP^3_{gsp} = \{gsp_1^3,\ldots, gsp_7^3\}$.

Management of financial flow processes of wholesale distributors PP_{fp}, which consists of the objectives of the financial flow process $PP^1_{fp} = \{fp_1^1\}$, the result of the financial flow process $PP^2_{fp} = \{fp_1^2, fp_2^2, \ldots, fp_3^2\}$, the financial activity in the process $PP^3_{fp} = \{fp_1^3,\ldots, fp_5^3\}$.

The flow process of customer service PP_{sur}, which consists of the objectives of the flow process of customer service $PP^1_{sur} = \{sur_1^1\}$, the result of the flow process of customer service $PP^2_{sur} = \{sur^2_1,\ldots sur^2_6\}$, the activities in the process of customer service $PP^3_{sur} = \{sur^3_1,\ldots sur^3_6\}$.

The process of management of labour flow processes PP_{hr}, which consists of the objectives of management of labour flow processes $PP^1_{hr} = \{hr_1^1\}$, the result of management of labour flow processes $PP^2_{hr} = \{hr_1^2,\ldots, hr_6^2\}$, and the activity of the staff in the process $PP^3_{hr} = \{hr_1^3,\ldots, hr_6^3\}$.

The information flow process PP_i, which consists of the objectives of the informational flow process $PP^1_i = \{i_1^1\}$, the result of the information flow process $PP^2_i = \{i^2_1,\ldots i^2_6\}$, the activity in the information environment of the wholesale enterprise $PP^3_i = \{i^3_1,\ldots i^3_6\}$.

We have Formula (1), which defines the relationship between the flow processes at the wholesale enterprise in the form of an ordered set:

$$\begin{aligned} PP &= (PP_{spr}, PP_{inv}, PP_{gsp}, PP_{fp}, PP_{sur}, PP_{hr}, PP_i);\\ PP_{spr} &= \{PP^1_{spr}, PP^2_{spr}, PP^3_{spr}\};\\ PP_{inv} &= \{PP^1_{inv}, PP^2_{inv}, PP^3_{inv}\};\\ PP_{gsp} &= \{PP^1_{gsp}, PP^2_{gsp}, PP^3_{gsp}\};\\ PP_{fr} &= \{PP^1_{fr}, PP^2_{fr}, PP^3_{fr}\};\\ PP_{sur} &= \{PP^1_{sur}, PP^2_{sur}, PP^3_{sur}\};\\ PP_{hr} &= \{PP^1_{hr}, PP^2_{hr}, PP^3_{hr}\};\\ PP_i &= \{PP^1_i, PP^2_i, PP^3_i\}. \end{aligned} \qquad (1)$$

Thus, when management of flow processes at an enterprise of wholesale trade creates a class of objects for each pair of objects in which, PP_1 and PP_2, there specified a set of morphisms $Hom\ (PP_1, PP_2)$ for each pair of which (of morphisms), for example, $g_{pp} \in Hom\ (PP_1, PP_2)$ and $f_{pp} \in (PP_2, PP_3)$, there determined their composition $g_{pc} \cdot f_{pp} \in (Hom\ (PP_1, PP_3)$, that is, the processes of coordination in the activities of a wholesale enterprise create a category of sets. This model allows to defining the system for coordination of flow processes between objects of flow processes and build business processes at managing the commercial activity of a wholesale enterprise.

The functioning of any flow process at a wholesale enterprise should be assessed according to its contribution to achievement of the enterprise goals and not individual performance or profit, or any other criterion. In the process, the chain of performers is seen as internal suppliers and consumers. The contractor is at the same time is the supplier for the next contractor and the consumer for the previous one. Therefore the goal of every contractor should be the best customer satisfaction as a result of activity of the wholesale enterprises.

We suggest calculating the discrepancy between the input and output of flow processes occurring in a certain period of time and express it through a differential equation:

$$\frac{\sum FP_{out}}{FP_{input}} = (k_1 F(t) + \delta(t)) + k_2 E(t) + G(t), \qquad (2)$$

where $F(t)$ – the flow processes occurring at the wholesale enterprise;

$\delta(t)$ – errors that occur when controlling the flow processes associated with decision-making in the system for commercial management of the wholesale enterprise activity;

$E(t)$ – the correction vector that determines the degree of the change in business processes;

$G(t)$ – fluctuations that arise due to the changes in dynamic environment leading to deviations of flow processes from the target program;

k_1 and k_2 – the indices reflecting the functional dependence of the change in the state of management of flow processes under the influence of the parameters $F(t)$ and $E(t)$.

We propose to conduct a study of target values of management of flow processes taking into consideration business processes at wholesale enterprises.

We support modern approaches to estimating the efficiency of enterprise activity. However, we suggest calculating the efficiency of activity of wholesale enterprises taking into account the system for management of flow processes and the system for evaluation of the efficiency of management of business processes applied by the wholesaler with consideration for functional characteristics of the enterprise activity in the market.

We offer to calculate the integral index of efficiency of flow processes at a wholesale enterprise by the formula (3):

$$I_{ef\,fp_{wt}} = \sqrt[5]{I_{ef\,1\,fp} \cdot I_{ef\ ffp} \cdot I_{ef\ fplr} \cdot I_{ef\,ifp} \cdot I_{ef\ cfp}}, \quad \textbf{(3)}$$

where $I_{ef\,1fp}$ – the integral index of efficiency of logistic flow processes;

$I_{ef\,ffp}$ – the integral index of efficiency of financial flow processes;

$I_{ef\,fplr}$ – the integral index of efficiency of flow processes of labour resources;

$I_{ef\ ifp}$ – the integral index of efficiency of information flow processes;

$I_{ef\ cfp}$ – the integral index of efficiency of service, customer-oriented flow processes.

$I_{ef\,fp_{wt}}$ – the integral index of efficiency of flow processes takes the values from 0 to 1, and the indices of efficiency of logistical, financial, labour, information, service flow processes take values from 0 to 1. In a view of the integrative approach, all these indicators should be considered equally weighted (since the lack of development of one component of flow processes leads inevitably to a loss of efficiency of all flow processes at the wholesale enterprise), which allows to take into account the calculation of the geometric mean (an even stiffer approach that can be applied to evaluate the level of development is using the minimum efficiency indices of the five proposed indicators).

Using in the methodology mathematical estimation of the importance of one or another index makes it more flexible and more accurate in comparison with the known approaches to integral evaluation of flow processes.

Let us calculate the integral index of the most important indicator of the development of the flow process at wholesale enterprises:

$$I_{pnn} = \frac{\sum_{i=1}^{n} I_{dfp_i}}{n}, \quad \textbf{(4)}$$

where I_{dfp_i} – the index of the ith most important indicator of flow process at a wholesale enterprise;

n – the number of indicators of the production process.

Let us calculate the integral index of changes in overall development indicators of flow processes at the enterprise:

$$I_{cfp} = \frac{\sum_{i=1}^{n} I_{cfp_i}}{n}, \quad \textbf{(5)}$$

where I_{cfp_i} is the index of the ith general indicator of development of flow processes at the wholesale enterprises.

The calculation of the integral index of development of flow processes of wholesale distributors provides the average evaluation of the integral indices of individual groups of individual indicators of development of flow processes of a wholesale enterprise in the light of the weighting coefficients and integral index of changes in overall indicators, the importance of which is accepted as a constant value of 1.0:

$$II_{DEP} = \frac{\sum_{v=1}^{k} IIpi_v \cdot Ki_v}{k} + \frac{II_{cfp}}{2}, \quad \textbf{(6)}$$

where II_{DFP} – the integral index of the development of flow processes at the enterprise;

$IIpi_v$ – the integral index of the v^{th} group of individual indicators of development of flow processes at an enterprise;

Ki_v – an index of importance of the v^{th} group of individual indicators of development of flow processes at the enterprise;

k – the number of groups of partial indicators of development of flow processes at the wholesale enterprise.

The development of the wholesale market in Ukraine require intensive formation of its infrastructure; creation on a new foundation of information, financial, and regulatory support; development of the material and technical base of enterprises, warehouses, distribution centers by attracting investments, which will contribute to optimizing business processes, improving the functioning of the economy.

CONCLUSIONS

Further improvement is required for: the development of a competitive trade environment; the formation of modern warehousing network and inventory optimization; development of wholesale markets; expansion and improvement of the infrastructure of wholesale enterprises; the increasing of the role of wholesalers in the marketing of domestic products and the formation of integrated supply chains; the creation of an effective unified information space for wholesale enterprises and market information services in Ukraine; the optimization and legalization of a network of retail and wholesale enterprises; the improvement of the wholesaling of goods, the expanding of the range of services that wholesale intermediaries will provide for producers and retailers; the promotion of the development of e-commerce in wholesale trade, which requires to build its network infrastructure, software, and mechanism for formation of a contractual relationship between participants in this process.

We have developed proposals that will contribute to the optimization of business processes at wholesale enterprises, taking into account the functional features of the formation of a complex of interrelated business processes that are carried out in a certain sequence and are consistent with the overall strategy of the company under conditions of dynamic changes in the market environment in order to meet the needs of consumers. ■

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