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## INTERNAL NETWORKS AND SYSTEM ROUTING OF TOURISM AND HOTEL-RESTAURANT CLUSTERS

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### ВНУТРІШНІ МЕРЕЖІ ТА СИСТЕМНА МАРШРУТИЗАЦІЯ КЛАСТЕРІВ ТУРИЗМУ ТА ГОТЕЛЬНО-РЕСТОРАННОГО БІЗНЕСУ

***It is proved that economic clustering is objectively considered a basis that provides conditions for the emergence of a qualitatively new organizational specificity of regulation of the participants' development – integrative. This specificity is based on different organizational types of internal physical, virtual networks and innovative approach to routing their development, which consists in the refusal of rigid determinative hierarchy of systems. Such specificity of routing is directed on operation by large numbers of data and usage: computing resources; servers, storages and databases, networks, software, analytics and intellectual analysis via the Internet. Within the framework of the research attention is focused on the fact that cloud services not only transform the internal networks of the tourism and hotel-restaurant cluster, but increase the flexibility of their structure, direct organizational development, provide economy due to its high scale and optimal routes of data transmission in networks of their communication. The study has shown that cluster formation and development are related to parallel deployments of its physical and virtual networks that are capable of scaling. Under these conditions, the cluster and its networks are dynamic entities. At the same time, the internal virtual network of the cluster can change rapidly, transform itself, and the process of its development is provided by formation of a structure capable to correct productivity proportional to metamorphosis in resources of influence. It has been established that the peculiarities of the internal virtual network of functioning of the tourism and hotel and restaurant business cluster are: a mandatory orientation on the multiplication of the flows of operations in different functional directions; a fast process of absorption by the network of all metamorphosis occurring at the passage of the life cycle stages. According to the results of the research it is proved that the structure of virtual networks of tourist and hotel-restaurant clusters should scale horizontally and vertically. The cluster's internal network is based***

*on organizational development. Therefore, systematic routing of the organizational development of the cluster and its networks is obligatory within the internal networks of the cluster.*

**У попередніх дослідженнях доведено, що кластеризація економіки об'єктивно вважається базисом, що забезпечує умови для появи якісно нової організаційної специфіки регулювання розвитку учасників — інтегративної. Ця специфіка заснована на різних організаційних типах внутрішніх фізичних, віртуальних мереж та інноваційному підході до маршрутизації їх розвитку та полягає у відмові жорсткої детермінованої ієрархії систем. Така специфіка маршрутизації орієнтована на оперування великими масивами даних та використання: обчислювальних ресурсів; серверів, сховищ та баз даних, мереж, програмного забезпечення, аналітики та інтелектуального аналізу даних через Інтернет. У межах дослідження увага акцентована на тому факті, що хмарні сервіси не просто трансформують внутрішні мережі кластера туризму і готельно-ресторанного бізнесу, а підвищують гнучкість їх структури, спрямовують організаційний розвиток, забезпечують економію завдяки її високій масштабованості та оптимальних маршрутів передавання даних у мережах зв'язку. У дослідженні доведено, що формування та розвиток кластера пов'язані із паралельним розгортанням його фізичних та віртуальних мереж, що здатні масштабуватися. За таких умов кластер та його мережі є динамічним утворенням. При цьому внутрішня віртуальна мережа кластера може швидко змінюватися, трансформуватися, а сам процес її розвитку забезпечується формуванням структури, що здатна коригувати продуктивність пропорційно до метаморфоз у ресурсах впливу. Встановлено, що особливостями внутрішньої віртуальної мережі функціонування кластера туризму і готельно-ресторанного бізнесу є: обов'язкова орієнтація на множинність потоків операцій за різними функціональними напрямками; швидкий процес поглинання мережею всіх метаморфоз, що виникають при проходженні стадій життєвого циклу. За результатами дослідження доведено, що структура віртуальних мереж туристичних і готельно-ресторанних кластерів повинна масштабуватися горизонтально і вертикально (підвищувати продуктивність і збільшувати додаткові ресурси без структурних змін центральної ділянки). Внутрішня мережа кластера базується на організаційному розвитку. Тому в межах внутрішніх мереж кластера обов'язковою є системна маршрутизація організаційного розвитку кластера та його мереж через роботу з інформацією, спрямованою на формування бачення майбутнього розвитку та реалізацію планових організаційних змін.**

*Key words: cluster, tourism, hotel-restaurant business, internal network, cloud service.*

*Ключові слова: кластер, туризм, готельно-ресторанний бізнес, внутрішня мережа, хмарний сервіс.*

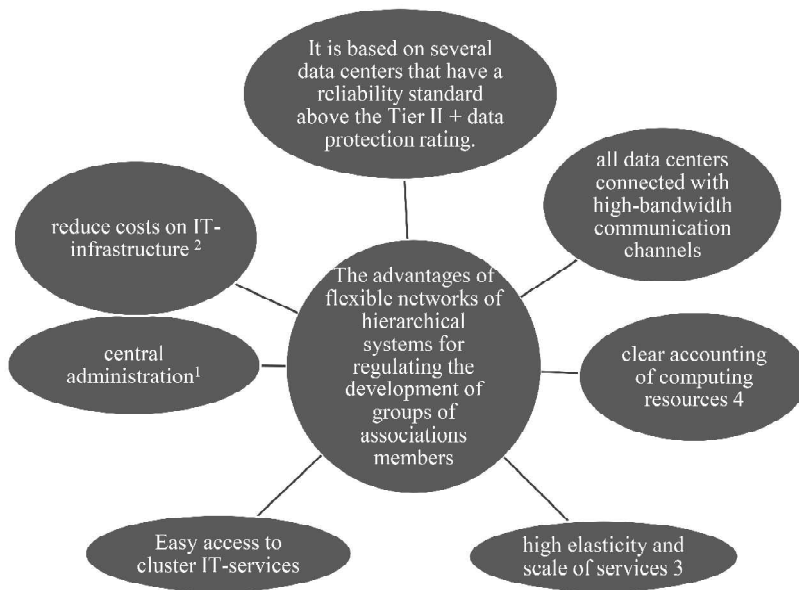
## PROBLEM-SETTING AND ITS RELATION TO IMPORTANT SCIENTIFIC OR PRACTICAL OBJECTIVES

In previous research, the authors have proved that economic clustering is objectively considered the basis that provides conditions for the occurrence of qualitatively new organizational specificity of regulation of participants' development — integrative, based on different organizational types of internal physical, virtual networks and innovative approaches to routing of their development consists in refusal of the rigid determinative hierarchy of systems. Such specificity of routing is oriented on the operation by large numbers of structured and unstructured data requires use: hardware resources and multiaccess (or access is intended for many users); servers, storage and databases, networks, software, analytics, and intellectual analysis via the Internet (cloud services) is possible. In particular, cloud services not only transform internal networks of tourism and hotel-restaurant cluster but increase the flexibility of their structure, direct organizatio-

nal development, and provide economy due to their high scale and optimal data transmission routes in their communication networks.

## ANALYSIS OF RECENT STUDIES AND PUBLICATIONS

Among the scientists, whose work the solution to the problem of studying internal and system routing networks of tourist and hotel-restaurant business clusters was initiated, we located: Tomchuk O., Tserklevych V., Hurman O., Petrenko V., Chymosh K., Koval L., Popovich O., Bukhta S., Hurman O., Komarnitskyi I., Muzychenko-Kozlovs'ka O.V. and Muzychenko-Kozlovs'kyj A.V. At the same time, the disclosure of the mentioned issue is limited either by forming an information database of such networks on tourist, hotel and restaurant activities or by studying peculiarities of business migration in cloud services. Thus, we orient in our research where we already mentioned principles, methods, and forms of regulation of clusters with the application of routing methods [2], and also



**Figure 1. Advantages of flexible networks of hierarchical systems of regulation of development of associations participants groups**

Note:

1 cloud IT-infrastructure of participants and whole cluster can be administered centrally, from a single workstation, with the efforts of one specialist.

2 for cluster cloud services use, cluster members need access to the Internet. You do not need to create your own IT-infrastructure in every presence place to pay for the expert's services on the server and network equipment. The cost of cloud services can be evenly divided among all cluster members and can be attributed to operational rather than capital costs.

3 there is an opportunity to reallocate the volumes of computing resources and services provided between the cluster members in an operative order, to easily provide scalability of cloud services.

4 the fee from the cluster participants is charged only for the resources used, free services can be used

Source: Developed based on [2; 3].

formed the concept of cluster routing in cloud environments [3]. By the content of the specified sources, it is possible to realize the description of internal networks and allocate peculiarities of system routing of clusters.

**FORMULATION OF THE OBJECTIVES**

The purpose of the article is a description internal networks and peculiarities of system routing of tourist and hotel-restaurant business clusters.

**PRESENTATION OF THE MATERIAL OF THE STUDY, SUPPORTING THE SCIENTIFIC RESULTS OBTAINED**

The internal physical network of associations is not new in economic science. A typical example is the global financial network of the Templar order, whose infrastructure, already in 1096, contained elements that use the modern banking system. In addition, today there are: Networks of offshore jurisdictions; networks of international religious and charitable organizations (for example, an international network of charitable organizations "Caritas" etc.); networks of educational institutions, etc. Therefore, if we consider the internal physical networks of the of tourist and hotel-restaurant cluster they have the properties of locality (due to strict connection to parameters of tourist attraction or sources

of resources, locations) and limited mobility of participants entrepreneurs [1; 6; 4]. At the same time, with the emergence of cloud services, the process of evolution of internal networks of different types of business associations from the local development of individual participants to the flexible networks of hierarchical systems of regulation of groups of participants within a cluster with partial migration of regulation systems into cloud services began. The result of this was the emergence of virtual hierarchical systems of different types along with internal physical networks. It is especially relevant for the clusters that have appeared in the domestic sphere of tourism and hotel-restaurant business, in connection with the numerous advantages of such flexible networks of hierarchical systems of development regulation (Figure.1). The importance of such advantages is caused by the fact that the subjects of economic activity of tourism and hotel-restaurant business are connected resources used to satisfy the needs of the population in rest, recuperation, and public catering. The factor behind the success of clusters is their property, to facilitate the systematic development of the participants (based on integration management). The logical proof of the judgment is the integration of different aspects of the activity of independent cluster participants into a single aggregate (system). The clustering of the economy is considered an objective basis

that provides conditions for the emergence of a qualitatively new organizational specificity of management of its participants — integrative. Or it is based on different organizational types of physical, and virtual networks and innovative approaches to organizational development. In addition, it is the refusal of a rigid determinative hierarchy of management systems.

This specific management is focused on the operation of large numbers of structured and non-structured data, and therefore requires the use of:

- computing (hardware) resources to which multi-access is possible (or access is intended for many users);
- servers, storage and databases, networks, software, analysis, and intellectual analysis via the Internet (cloud services).

At the same time, cloud-based services accelerate innovation, increase the flexibility of the cluster structure and provide economy due to high scale. The best access to computing services can be provided by full or partial migration of cluster control systems and regulation systems by the participants of territorial associations (by cities, villages, settlements) into cloud services. An additional advantage of migration in public networks is the presence of nodes and hubs that connect its participants and external data stores and provide free data circulation and the ability to determine the optimal data path in such

networks (for remote regulation or development routing). All cloud services types migrated by the cluster members transform their internal networks and form the possibilities for routing their traffic can be divided into three types: Infrastructure as a Service; Platform as a Service; Software as a Service.

Note that the use of cloud services by participants forces a qualitatively new system property of the cluster, which provides the effect of synergy and integration of its elements. The effect of synergy is provided by a certain system of internal networks of a cluster, which have specific properties, in particular [1; 2; 4]:

1. they are specific sets of formal or informal agreements (within one or several tourist attractions);
2. arrangements aimed at the implementation of certain actions on the routing development to achieve a common goal;
3. arrangements aimed at the joint use of data and resources of internal networks to achieve a common goal;
4. arrangements aimed at joint use of the competence of the cluster participants to achieve the common goal.

Therefore, parallel use of physical and virtual networks in the sphere of tourism and hotel-restaurant business provides: 1) mobility of participants' business activity due to the creation of a single point of regulation and a single network of communication; 2) creating a regulatory environment that is not geographically restricted (data can be quickly moved between different clouds using voice mail, conferencing, personal communication control panels, IVR); 3) creating a data traffic route system where all cluster participants are present. Use of any cloud service for participants requires only registration and authorization. To create an account, just sign in to Google, Twitter, or Facebook, and then add a phone number and password for data security.

As a result of these features, the internal network organizational structure of tourism and hotel-restaurant business increases the opportunities for its participants using synergy and the integration of its elements. However, this does not guarantee the flexibility of the organizational structure and the ability to adapt quickly to changes in the environment. The described qualities are formed exclusively due to:

- 1) the possibilities of quick access to the resources of the network participants, based on a variety of internal methods of connection such as nodes (connection methods of linear type) and hobble (methods connection of the same type of network participants). This is possible in cloud services;
- 2) providing a rational cost structure based on effective corporate governance and forming a system of protection against failures in cloud services for small, medium, and large businesses.

There may be other types of a flexible network of participants' development management systems that work

**Table 1. Systematization of basic differences in organizational development within internal networks and routing of development and other types of networks**

The juxtaposition elements	Organizational development based on the model:	
	flexible networks of hierarchical systems of regulation of the participants' development, which are conducting joint work	other types of flexible networks of the participants' development control systems, which are working together
The purpose of existence	Creating opportunities to benefit for all participants of the tourism and hotel-restaurant business sphere	Development in favor of several dominant participants, the main enterprise (subject to participation in the financial-industrial group or consortium) or the parent company (within the holding)
Involved in the structure	Voluntary	Voluntary
Composition of elements	Alternating	Relatively alternating
Key participants	Enterprises, their interconnected complexes, which conduct joint work, organizations, institutions in other spheres of activity	The composition of the participants depends on the association form
A means of security increasing	The system of defense against the failures is aimed at mutual dependence and mutual relations between the participants	Interdependency and interrelation with other participants is based on different methods of coordination
The link to a certain territory and resources	Gravity to parameters of tourist and hotel-restaurant business attraction and cloud services.	Location is significantly less important if transport and communication accessibility and connectivity of participants are provided.
The driving force of development	Innovation	Exceptional performance

Source: Developed based on [2—4].

together (in particular, those that are consolidated on a virtual private network based on a public Internet network or local VLAN), without a system of protection against failures and the ability to quickly access the resources of the network. Thus, the model of internal networks and routing of cluster development distinguishes several basic traits that form discrepancies in organizational development, compared with other network models of participants' development conducting joint work. The systematization of the defined differences in organizational development is shown in Table 1.

Defined in the table of differences in organizational development in the application of flexible networks of hierarchical systems of regulation of cluster development and other types of networks (industrial-financial groups, associations, etc.) they are basic, but not unified. Other differences are also formed by the organizational form of association. In particular, participation and joining the internal network of clusters is voluntary, each participant offers unique competencies, and the conditions of participation can be reviewed. The enterprise's participation in other types of internal networks is also voluntary, but in some cases, it is limited in time. In the clusters of tourism and hotel-restaurant business, the key participants are variable, and the key participants are enterprises, interconnected complexes of enterprises that work together or serve separate segments of the service sector and related organizations, and institutions in other spheres of activity. In other internal networks, the composition of elements is relative-permanent (as defined by the agreement), and key participants are determined by the

**Table 2. The process of forming the internal mayor structure of the tourism and hotel -restaurant cluster**

Typology of functional direction	Functional direction characteristic	Organizational specificity in the direction
technological	provides identification and next choice of technology type and cloud technology, which can be created and applied within the tourist and recreational cluster based on fundamental knowledge	determines the necessity of interaction means of 'independent participants' application in the field of fundamental science and developers of complex technological solutions, and manufacturers
organizational and production	provides a choice of type of tourist services series production by complex efforts of cluster members	the hobble unite producers is formed based on research and experimental plans of participants in the field of fundamental science
marketing	it defines the possible demand for each service or technology infrastructure, positioning cluster members as a market enterprises group	defines dealers ("nodes" of marketing networks) to create conditions for the effective operation of the cluster
investment	provides for monitoring of the perspective of the object on the service (or product) creation the definition of a set of organizational projects and their alternative variants, realized by the cluster, and estimation of risks	it will be appropriate to create a special engineering company or group within a cluster (hobble)
personnel	assumes the training of people able to work in conditions of high uncertainty, cross-cultural interaction, and technological flexibility of production	it will be appropriate to create within a special company cluster for training personnel or their group (hobble)

Source: Developed based on [1—3; 5].

association form. For example, in vertical concerts, the key participants of the domestic network are a group of companies that cover the whole cycle from purchasing materials and raw materials to manufacturing and selling one type of tourist service. In horizontal concerts, internal networks unite similar firms with different clients. In holdings, the key participant's number in the internal network is limited by the parent company and its subsidiaries. The means of increasing the security of internal smaller clusters is a system of protection against failures, aimed at mutual dependence and mutual relations with other participants. As for other associations, relations and relations with other participants are based on different methods of coordination.

Important features and results of the development of internal networks of tourism and hotel and restaurant business.

The results of the development of internal networks are shown in the uneven and diverse development networks of participants. This is not the case with the networks of other associations (characterized by several leaders and a large number of business entities dependent on them, are outsiders or are followed by leaders).

The peculiarities of the development of internal networks are shown in the dynamics of networks. The cluster's internal networks are dynamic entities. Such a network can change quickly, transform itself, and the process of its development is provided by the formation of a structure that can correct productivity proportional to metamorphoses of resources of influence (in contrast to other internal networks of associations).

Peculiarities of functioning of the internal network of tourist and hotel-restaurant clusters: obligatory orientation on the multiplier of operations flow in different functional directions and the fast absorption process by the internal network of all metamorphosis.

For example, a mandatory orientation on the multiplication of flows of operations in different functional directions (Table 2). For example, a joint organizational interaction between at least four large groups — manufacturers, enterprises, and organizations in the field of fundamental science and developers of complex technological solutions, dealers, and others (forming network "nodes" and "hobble", their basis) is envisaged.

To ensure a good relationship between the mentioned components the existing cluster core (routing structure) is available. At the same time, the described is not inherent to other associations where the outlined functions are realized by the participants independently of each other, and their connection is supported legally (effective agreements). Fast process of absorption by the internal network of all metamorphosis, connected with transformation of the internal network to stages of the cluster life cycle in the existing process. It forms a different specificity of organizational development (as for other associations, their existence may determine by written agreements). At

the same time, we state that the problems that arise in the outlined area can systematize in the models of cluster cooperation organization.

The virtual network structure of tourism and hotel-restaurant clusters functioning in regions should scale horizontally and vertically (increase productivity proportional to additional resources by system components and increase additional resources by small structural components without structural changes of the central node with organizational regulation). The cluster's internal network should be based on organizational development. Therefore, within the framework of the internal networks of the cluster, it is necessary to systemically route the organizational development of the cluster and its networks, through the operation of information aimed at forming a vision of future development and realization of planned organizational changes, at that virtual network structure of their functioning should be horizontally and vertically scaled.

Routing of planned organizational changes is possible with one of three changes of the of tourism and hotel-restaurant cluster (change one or one in the process of improvement of the organizational system of regulation and launch processes of scaling):

1) mechanical provides growth, based on the constant increase of cooperation, processes of commercialization, and introduction of innovative ideas in the sphere of tourism and recreation and temporary involvement personnel for solving problems arising (including external consultants). The scenario outlined can be applied at the

beginning of cluster creation since it aimed at minimizing the costs of organization and does not guarantee the professionalism of the human capital involved;

2) expert — development, based on the opinion of expert groups, as of which qualified human capital of the cluster can be used. The scenario creates a high probability of forming a vision for changes based on the authority of individual participants of the tourism and hotel-restaurant cluster or managers, regardless of the state of the external environment. It is expedient to use it for optimization processes of self-financing of activity. It includes the introduction of "internal taxes" from the participants to maintain the regulatory bodies by developing the cluster and financing the costs of optimization of operational activities;

3) system or development that allows binding all organizational changes of the tourism and hotel-restaurant cluster development provided that the external environment and internal regulatory influence consider in interaction. The model is based on a systematic description of the activity and requires an organizational regulation system.

## CONCLUSIONS AND PROSPECTS FOR FURTHER RESEARCH

A study of peculiarities of the internal network structure of tourist-recreational clusters functioning allows us to state that:

1. The formation and development of the cluster are related to the parallel deployment of its physical and virtual networks capable of scaling. Under these conditions, the cluster and its networks are dynamic entities. At the same time, the internal virtual cluster network can change quickly, and transform itself and its development process is provided by forming a structure that can correct productivity proportional to metamorphosis in influence resources.

2. Features of the internal network of functioning of the tourism and hotel and restaurant business cluster are: a mandatory orientation on the multiplication of the flows of operations in different functional directions; a fast absorption process by the network of all metamorphosis arising during the period of the life cycle.

3. The virtual network structure of tourist and hotel-restaurant clusters functioning should scale horizontally and vertically (increase productivity and increase additional resources by small structural components without structural changes of the central site with organizational regulation). The cluster's internal network is based on organizational development. Therefore, within the internal networks of the cluster, systematic routing of the organizational development of the cluster and its networks is obligatory, through the operation of information aimed at forming a vision of the future development and realization of planned organizational changes, and virtual network structure of their functioning should be horizontal and vertically scaled.

## PROSPECTS FOR FURTHER RESEARCH

Formation of network structure of functioning of tourist and hotel-restaurant clusters in regions.

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