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Applying the theory of informational flows in urbanism for a practical experiment in architecture and land use

Aplicación práctica de la teoría urbanística de flujos de información en arquitectura y uso de la tierra

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ABSTRACT:
In order to find solutions for practical urban problems we have to comprehend a wide variety of factors - economics, urban development, historical issues, demographics, and so on. Authors of the current research seek to develop a theoretical approach that sees an urban object as a combination of different informational flows. Financial transfers, traffic, people's movements, water and air flows and etc. – all these are different streams of urban information. The research gives a review of revitalization of a historical quarter in Irkutsk (East Siberia, Russia) as an example of practically applying the theory of informational flows.
Keywords: urban studies, theory, flow of information, the historic quarter, revitalization

RESUMEN:
Para encontrar soluciones a problemas urbanos prácticos, debemos comprender una amplia variedad de factores: economía, desarrollo urbano, cuestiones históricas, demografía, etc. Los autores de la investigación actual buscan desarrollar un enfoque teórico que considere un objeto urbano como una combinación de diferentes flujos de información. Transferencias financieras, tráfico, movimientos de personas, flujos de agua y aire, etc., todos estos son flujos diferentes de información urbana. La investigación ofrece una revisión de la revitalización de un barrio histórico en Irkutsk (Siberia Oriental, Rusia) como un ejemplo de la aplicación práctica de la teoría de los flujos de.
Palabras clave urbanística, teoría, flujo, información, barrio histórico, revitalización

1. Introduction

From the very beginning urban studies have been an interdisciplinary field of knowledge, which uses same scientific methods as applied in history, economics, sociology, psychology, architecture and others. This approach has been introduced in classic texts of the early twentieth century urbanists (Weber, Vandervelde, Velikhov) and it can still be found in the works of contemporary authors (Gehl, 2010; Montgomery, 2013; Glazichev, 1984; Vershinin et al., 2016; Lidin et al., 2017).

Unfortunately, this usage of different fundamentals inevitably causes serious methodological problems. To combine different principles, some of which are centuries old (theories used in architecture, history, politics) while others are in state of constant transformation in order to reflect modern tendencies (methods of economics, social psychology and cultural studies), we have to introduce some common grounds, unified point of view on various processes. Concept of a city as a combination of different informational flows might be able to become this binding idea. Traffic, human migrations, financial and resource transitions, commerce and politics - all the diversity of city life can be viewed as intersecting flows of information of different intensity and turbulence (Lidin, 2013).

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2. Theoretical Background

The concept of "information" is the heart of the informational flows theory in urban studies. This concept nowadays attracts attention of theorists from various fields of science, methodologists and philosophers. And still this enormous work of creating a general theory of information has only begun. A researcher L. Floridi (2004) in one of his first articles about the subject pointed out the lack of definition, incapability of clearly answering the question, what information is. His recent developments in the field of information studies are still not able to give precise answers, especially for application tasks (Floridi, 2011).

In our work we define information as a structural aspect of the existence of matter. Along with the substance aspect (the ability of matter to rest), and energy aspect (the ability of matter to change), information reflects the inherent ability of matter to be structured. From the viewpoint of substance matter is inert and doesn’t change without an external stimulus. From the viewpoint of energy matter is in constant movement with only relative illusion of rest. From the viewpoint of information, we see that matter is structured and its structure can either remain at rest or be changed. Neither one of these aspects can exist without the other two, but in scientific models we are allowed to analyze each one individually disregarding other aspects.

If we focus on the information aspect of matter, we consider any matter changes as movement of information. Water streams, wind flows, traffic, finances and migrations in a modern city - all these are informational flows. And in terms of information theory all of them are of the same nature, thus interacting with each other.

Just like any other flow, information flows can be characterized by two independent parameters. The first one is the flow rate, it characterizes the amount of information flowing through the cross section of flow per time unit. In we measure the quantity of information, created by humans, it by far exceeds anything created by nature (with the exception perhaps of such powerful streams as volcanic eruptions). The amount of information transferred by a common urban freeway is much higher than, for instance, the information flow of a river. In the same way simple sunlight carries much less information than cellular networks and the Internet. From this point of view of a modern city looks like an endless eruption of an “information volcano”.

Anthropogenic informational flows have another important difference from the natural ones. It considers the second characteristic of information – its quality. However, determining quality of information in a certain flow (as well as the flow itself) is quite subjective. All available methods of assigning some value to information and its flow only take into consideration interests of the subject that uses it. This creates a certain dilemma, because relevance, adequacy and verity of the information become dependent from the interests of a particular interpreter (Fisher et al.,

2011; Floridi & Illari, 2014). In other words, we tend to identify quality of a whole lot of some information and its flow with the small bit, that became useful for the subject to make a decision or take some action. The rest of the flow is considered irrelevant “noise” or even false information.

Besides teleological and use orientated criteria for information selection, its quality is highly determined by the context in which the information is perceived. Anthropogenic information appears to us as a great combination of different signs and symbols that don’t have any specific meaning on their own, but have been woven into some cultural context that we can understand (decode). This nature of signs and symbols that have meaning only because people have agreed to assign this meaning to them has been a subject of philosophical research for many French postmodernists (Baudrillard, 1976). We can apply both teleological and contextual ways of selecting information to the analysis and design of some urban environment.

Let's imagine some urban space (city, town fragment agglomeration of cities, and so on). This space contains some natural objects and people that intercommunicate in some ways. Therefore, new information is being created in the space. We can assume that the intensity of the produced informational flow will be equal to

$\Delta Q / \Delta t$

where Q is the quantity of produced information and t is time. Let the quality of produced information be k_i and the total flow of quality information be I. Let's assume that in our simplest case quality of produced information doesn't change in time. Then, the volume of the total flow of quality (useful) information would be

$I = k_i * \Delta Q / \Delta t$ (1)

People who visit our space consume the produced information in various forms and quantities. Based on our previous formulas, the total volume of consumed useful informational flow will be

$C = k_c * \Delta F / \Delta t$. *(2)*

where F is the quantity of consumed information, k_c is its quality and C is the total volume of the flow of consumed quality information.

If volumes of produced and consumed informational flows are not equal, we get excessive volume D

$D = k_i * \Delta Q / \Delta t - k_c * \Delta F / \Delta t$ *(3)*

We can see from the equation (6) that excessive volume of informational flow can have positive or negative value. This means that our space can become an "exporter" or an "importer" of information. In our further calculations we will call this excessive volume the potential of the space.

Now let's view two different spaces A and B that have information intercommunications – they exchange informational flows. In our example their potentials are not equal

$D_A \neq D_B$ *(4)*

Thus we get

$D_A - D_B = (k_{iA} * \Delta Q_A / \Delta t - k_{cA} * \Delta F_A / \Delta t) - (k_{iB} * \Delta Q_B / \Delta t - kc_B * \Delta F_B / \Delta t) \neq 0$ *(5)*

Let the potential of difference spaces be U. And it is obvious that this variable is the driving force of the information exchange between the spaces (population migrations, investment flows, cultural influences, and etc.).

Let's change the equation (5) a little

$U = (k_{iA} * \Delta Q_A / \Delta t - k_{cA} * \Delta F_A / \Delta t) - (k_{iB} * \Delta Q_B / \Delta t - kc_B * \Delta F_B / \Delta t)$ *(6)*

As seen from the equation (6), after subtracting potentials we get a difference in two cases:

1) Levels of consumption of information in A and B are close, but in A information is produced with a much higher intensity. In this case information starts to migrate from A to B. A massive flow of people, finances and cultural values from Europe (space A) to Africa, Asia, America and Australia (space B) during an expansion in the XV-XIX centuries can be viewed as a historical example.

2) Both spaces produce information with approximately same intensity, but level of consumption in A is higher than in B. For example, a few last decades show a constant flow of information from South America, Africa, Asia (space A) to Europe and North America (space B) such as news, oil products, refugees' migrations.

Intensity of the informational flow I_{ip} between two spaces depends directly on the potential difference. However, there is always some resistance R between the spaces formed by different barriers: transportation costs, immigration restrictions, customs and other difficulties. Intensity is in reverse dependence from this resistance

$I_{ip} = k * \Delta Q_{ip} / \Delta t = U / R$ *(7)*

In conclusion, we should mention that the structure of the informational flow can be viewed on various scales, both dimensional (separate buildings or groups of buildings, districts, cities, urban agglomerations, regions, countries, groups of countries) and temporal (eg. commuting). However, interpretation of information and ranking its value in the process of urban analysis and design and making decisions remains subjective on any scale. A huge theoretical problem lies in the lack of any models, that can aid us in ranking information according to its importance for decision making and its "context" importance.

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3. Results and Discussions

3.1. Politics

A project of revitalization of a district in the historical center of one of major cities in Eastern Siberia, Irkutsk, is a positive example of solving urban problems using the theory of informational flows.

First reconstructions in the district were carried out for political reasons. In 2009 Dmitriy Mezentsev, a known associate of Vladimir Putin (he had first worked with Putin in St. Petersburg City Hall and had been head of Putin's first election campaign in 1999) became the Governor of the Irkutsk region. At the same time Irkutsk was coming to its 350th anniversary and received funds from the federal budget for the preparations. It was the Governor’s decision to allocate some of the funds for reconstruction of the district under the cadastral number 130 – a wooden slum in the historical center of the city. At that time the district was in a state, that perfectly reflected the attitude of former city authorities to wooden buildings - rotten buildings were nearly falling apart and had been last renovated in the XIX century. There was no centralized sewage and cesspits were organized right in the backyards. Pool of tenants also matched the surrounding well. Federal money was used to clean up the district – residents were relocated to new apartments, water and sewer networks were set up, the few houses catalogued as monuments of wooden architecture were restored, while the fate of the others was up to the new project of the district regeneration to decide.

3.2. Architecture

The project of regeneration for the district was developed by an initiative group of Irkutsk architects (E. Grigoriev, A. Makarov, M. Meerovitch). They proposed a concept of replacing old houses with new ones using same traditional materials (wood logs) and same construction technologies. This concept seemed quite controversial, considering the negative image of the former development. Somehow, however, step by step the project found support and approval during public discussions and negotiations with the local authorities.

The historical principle of founding settlements on traffic crossroads became the basis for the suggested urban structure. Traditionally cities in the Siberia have been built as a system of perpendicular flows: meridional – going along the major rivers – used as main traffic arteries during the development of Siberia, and latitudinal – perpendicular to the rivers – showing inland expansion. If a traffic artery ran on land (like the "Northern Silk Road") a settlement grew according to the same principles: the residential zone gradually stretched along the artery with perpendicular passages connecting the main streets.

Same linear structure of city elements formed along the informational flows was used in the project not only on the scale of the city, but also on the districts scale. The authors understood, that if they applied the scheme, they had to take into consideration topography, the rose of wind, traffic and other characteristic of the district. The district number 130 has the shape of an elongated triangle, with its vertical parallel to the bank of the Angara river. The prevailing winds blow in the same direction (toward the lake Baikal). The district is sandwiched between two major traffic arteries, the Third of July street and Sedov street. At the same time, it is located on a steep slope towards the river. The soil in the area is formed by layers of river sediments, while the layers of sand, clay and gravel are also located on a slope. This means that groundwater flows in a direction perpendicular to the long axis of the district.

In accordance with this historical approach, the authors of the project created a longitudinal and a transverse pedestrian axes and reproduced traditional terraced buildings. The longitudinal axis became a promenade located on the place of former gardens and farm yards of the second row of the districts estates. This walkway followed the changes in relief and was designed to emphasize it. This connected the image of the promenade to the old curved streets of Irkutsk (that had been forcibly straightened in the second half of the XIX century). The value of the walkway in the informational flow was enhanced by placing cycle tracks and trails for mothers

with strollers on both sides of the road. The addition of planting and numerous sunshades above the level of the first floor together with diversified paving (stone piece materials with wooden inclusions) created different informational context along the street.

To provide an easy access to the pedestrian area two bridges were introduces, one over the Sedov street and the other over the Third of July street which surrounded the district with intense traffic. They were designed perpendicular to the promenade and were intended to connect on the roof of a 4-storey car park (with two floors underground and two floors above-ground). The first bridge has been completed in November 2011 and almost immediately it became an iconic place because of the magnificent panorama view from it. Unfortunately, the second bridge has still not been built. This creates a problem that the pedestrian flow through the renovated district cannot access the banks of the Angara river without crossing a loaded road. Thereby, the completed project lacks the potential to enhance both its quantitative and qualitative parameters.

Several “focal points” were also introduced in the system of public spaces within the renewed district. The project created an amphitheater, a multi-functional shopping and recreational space, a network of interconnections between the promenade and the river bank, the main streets and the main city square.

The early concepts considered preserving residential function of all the one-storied buildings in the district. First floors of the two-storied buildings were intended to be used for placing accommodation, touristic and cultural services with residences for their owners on the second floor (just like traditional Siberian buildings with grocery stores on the ground level).

The roof of a multifunctional underground center was designed to accommodate different objects such as trading booths, cafeterias, aviation’s museum, parking lot, ice rink, medical center, police, engineering services, and so on. It was designed as a public space in the form of an amphitheater on the crossroads of major pedestrian axes.

Traditional for Irkutsk image of a building set on the relief with a retaining wall made of natural stone prompted the design solution for the renovation. In the district number 130 most of the buildings were been placed on a semi-subterranean podiums with an open front showcase facing the promenade. This decision made it possible to place all the modern premises that do not fit into traditional wooden houses into this semi-subterranean space. The podium accommodated all modern functions essential for the commercial success of the project that could not have been placed in the small space of historical wooden houses. These basements placed under the buildings (where possible) were considerably larger than the regular ones, allowing modern technology to function normally without distorting the "historical appearance" of the district.

Considering all these innovations, one can say that from the very beginning the district was designed as an area of an active information consumption, attracting much greater people flow than before.

3.3. Commerce

Like it always happens with serious conceptions, the project of revitalization of a district in Irkutsk has experienced significant changes during its realization.

Federal money compensated only a small part of the expenses, while private investors should have covered the costs of restoring the historic buildings. Initially the idea was to engage artists, sculptors and musician to be the first developers. These representatives of th creative class were inspired by the purpose of revitalizing the past. They were also promised to get much lower prices for the land, if they agreed to build their workshops in the style of the old wooden buildings of Irkutsk. However, representatives of small and medium-sized businesses reacted much quicker to the beginning of the project. They were much more active during fund investments and the first new building in the district was a restaurant in the "old Siberian" style

with its own brewery.

The price of areas in the district showed a rapid growth and the project looked more and more as an attractive field for investments. The brewery that had been named "Hop Inn" flourished. Finally, realization of the project became a potentially interesting enterprise for more solid, but less mobile strata of big business.

Significant changes to the original design during construction is another well-known practice in modern Russian development. After the investors had purchased some land they immediately and consciously changed the project to fit their economic interests – added new floors to the buildings, used cheap artificial materials instead of the natural ones listed in the project. These alterations distorted not only the shape of the buildings, but their whole image. The culmination of this process became building a few above-ground floors for the designed underground center. A totally alien volume made of concrete and glass grew on the place originally designed to become an outdoor amphitheater, which was supposed to become a public space for cultural events and mass recreation (i.e. a place that concentrated informational flows).

All the meetings and negotiations that the group of authors held to explain that these alterations to the design lead not only to changes in the intended style and “spirit” of the district, but also reduce its attractiveness, resulted in nothing – getting immediate profit from the development was more important to the investors. Any argument about the theory of informational flows and possibility to increase the potential of the area was considered irrelevant. As a result, all the diversified functions, that had been present in the original concept, were reduced to commercial and recreational ones, that could return the invested funds in the shortest period of time.

And yet, in many ways the project achieved its main purpose of restoring the historical environment of a wooden city. The revitalized district created new informational context and became one of the main city attractions for townspeople. This resulted in a surge of activity and made the project a financial success: the planned time for investments payback has been reduced from 8 to 4 years. First years of exploitation raised more than 300% profit for the investors. It was originally planned that the city will receive about 200 new jobs after completing the project. But in reality right after the completion there were about 600 new jobs, in 2014 the number grew up to 1500 and by the middle of 2015 the number was ten times bigger than the original plan – about 2000 new jobs.

Now let’s view some of the financial results of the project for the state budget (Perelygin 2015). The average payback period of funds invested from the budget on municipal, regional and federal level was calculated as five years. It gave the shortest payback period to the budget of a federal subject in Russia (Irkutsk region): after two years of exploitation all the investments returned as additional taxes. Direct taxes to the municipal budget are expected to return the investments in about six and a half years. And still it is the city itself that benefits most in the aspect of economical and prestige growth from the reconstruction of the district. If we take into consideration all the secondary economic effects and intangible assets, we can narrow down the payback period to the city budget down to three years. If we add social contributions on the level of the federal budget, we also get a quite short payback period (about five years). And while doing these calculations we should remember that expenses on relocating people from old and dilapidated housing are not counted as investments and the budget implies no return for them.

In general, we can indicate the financial outcome from the project as positive. Especially if we compare it to the financial situation in Russia and even worldwide.

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4. Conclusions

Summing up, we can say that the most impressive results of the project lie in changing people opinion about historical wooden buildings. It became quite ordinary first for the people of Irkutsk and then the inhabitants of the surrounding towns and cities to view wooden houses as

something beautiful, well-organized - prestigious even. During the revitalization of the district №130, owners of dozens of old buildings in the center of Irkutsk decided to restore their properties as well. Everybody decided that having an office, a restaurant or a hotel in a carefully restored wooden building is fashionable and profitable. Today this positive experience is being analyzed by the authorities and experts in other cities – Krasnoyarsk, Ulan-Ude, Samara – that plan to use its methods for revitalization of their own historical environment. One can say that this project has created a much more intense production of information in Irkutsk resulting in a difference of potentials between Irkutsk and other cities. And now according to the theory we are ought to observe a new informational flow between these spaces.

Bibliographic references

Baudrillard, J. (1976). L'Échange symbolique et la mort. Paris: Gallimard.

Fisher, C., Lauria, E., Chengalur-Smith, S. & Wang, R. (2011). Introduction to Information Quality. Bloomington IN: AuthorHouse.

Floridi, L. & Illari, P. (2014). The Philosophy of Information Quality. NY: Springer.

Floridi, L. (2004). Open problems in the philosophy of information. *Metaphilosophy, 35*(4), 554-582.

Floridi, L. (2011). The philosophy of information. Oxford [England]. New York: Oxford University Press.

Gehl, J. (2010). Cities for people. Washington – Covelo – London: Island Press.

Glazichev, V. (1984). Social-and-ecological interpretation of an urban environment. [Socialno-ekologicheskaja interpretazija gorodskoj sredi]. Moscow: Strojizdat

Lidin, K, Meerovich, M, Bulgakova, E. & Zabelina, S. (2017). Information flows balance and price of real estate. *Journal of Advanced Research in Law and Economics Spring, 2*(24), 496-504.

Lidin, K. (2013). Structure of Information Streams as Social-Psychological Factor of Territories Development. *Studies of the industrial geography commission of the Polish geographical society, 22*, 10-120.

Montgomery, Ch. (2013). Happy City: Transforming Our Lives through Urban Design. NY: Farrar, Straus, and Giroux.

Perelygin, Y. (2015). Projects of modernization (revitalization) of the historical environment of cities: Irkutsk, Ulyanovsk, St. Petersburg, Samara, Krasnoyarsk. Web article, URL: http://www.slideshare.net/mosurban/ss-49166932

Vandervelde, E. (1903). L'Exode rural et le retour aux champs. Paris: Alcan

Velihov, V. (1928). Bases of municipal economy. The general doctrine about the city, its management, finance and methods of economy [Osnovi gorodskogo hozjaistva. Obshee uchenie o gorode, ego upravlenii, finansah I metodah hozjaistva]. Moscow – Leningrad: Gosizdat.

Vershinin, V.V., Murasheva, A.A., Shirokova, V.A., Khutorova, A.O., Shapovalov, D.A. & Tarbaev, V.A. (2016). The Solutions of the Agricultural Land Use Monitoring Problems. *International journal of environmental & science education, 11*(12), 5058-5069.

Weber, M. (1922). Die Stadt. - Wirtschaft und Gesellschaft, Kap 8. *Grundriss der Sozialökonomik, III*, 513-600.

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