Barriers in Creating Regional Business Spatial Community

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Abstract—**The article describes the obstacles that may arise during the planning phase of the project – Regional Business Spatial Community. The authors are working on a project to prepare RBSC . It involves creating a community around a selected GIS (Geographic Information System) software available in Cloud Technology. In the design of the project, the participants should be all the entities responsible for creating the infrastructure of the region. After conducting preliminary discussions with potential participants, the authors paid attention to the barriers and problems that threaten the planned project. Therefore, in the course of the study they drew attention to the mentioned aspect. The study identifies four groups of barriers: organizational, psychological, technological and financial.**

The authors also conducted empirical research to identify the most significant barriers to the creation of RBSC . The study involved five institutions providing utilities (gas, water, internet, TV) to the residents of the city . The results showed that the most significant barriers are organizational and psychological aspects. Slightly less importance is attributed to technological and financial barriers.

I. INTRODUCTION

REGIONAL infrastructure is one of the basic elements defining life standards and security of inhabitants in a given region. The aforementioned infrastructure consists of different elements, such as: roads, telecommunication, energy and gas networks, plumbing and different ones. Creating and maintenance of the mentioned elements of infrastructure are the obligations of many different entities, for instance enterprises functioning on commercial principles, community partnerships, government or local government departments or public services. All mentioned entities are interdependant.

Admittedly, decisions about the development of self-activity, at least a part of them, can be self taken, however, huge investments often demand intercommunication among the representatives of the selected entities. The necessity of the data exchange occurs, among other things, during planning and execution of municipal investments, crisis management [1] or different types of modernising infrastructure of media situated close to one another.

The authors of the study are working on the project called Regional Business Spatial Community (RBSC) - [2]. It seems that all the projecting entities, designing, owning or maintaining media should be interested in creating a proper system which enables data exchange and undertaking the cooperation within the confines of the suggested undertaking.

For the sake of the realization of RBSC, the GIS software functioning in Cloud technology available on the market was analysed, the group of potential entieties which should be interested in the creation of the suggested undertaking was selected and the condition of their IT infrastructure was examined.

The present study was dedicated to the analysis of the barriers which were singled out during the research and can make difficult or even impossible the realization of the mentioned undertaking.

II. THE IDEA OF REGIONAL BUSINESS SPATIAL COMMUNITY BASED ON GIS IN CLOUD TECHNOLOGY

The idea of RBSC assumes the use of the Internet as the communication and spatious data exchange platform between the partners. After the analysis of GIS tools it was assumed that for the needs of the suggested project, the possible solution would be the use of Cloud Technology [3]. The mentioned technology enables a direct access to the worked out system (within the confines of the possessed entitlements) and the data content. It also enables electronic communication between the partners.

The worked out RBSC conception is based on the following assumptions:
- the GIS tool available in Cloud Technology is necessary,
- within the confines of the tool, a closed room, available for the entitled users only, is created,
- a communicator available for all the members of community functions within the confines of the room,

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1243

- all the entities responsible for the infrastructure of a given region are invited to the community,
- the owner of the GIS tool is provides with the basic spatial data (geographic data),
- the other entities provide spatial data concerning their own infrastructure,
- data provided in the GIS tool should be accurate with the dictionary system and the codes used in the internal IT systems of the users (internal integration of different types of IT systems is desirable),
- participants of the community have access to the data on the basis of their entitlements,
- within the confines of RBSC, processes and code of conduction can exist.

The aim of creating RBSC is to build a platform enabling the access to the currently updating data concerning the infrastructure of the region [2]. By means of the communication tools, it will be possible to make arrangements between the entities concerned, involving different current or being planned investments, concerning the crisis management as well [4]. Within the confines of the tool, it will be possible to create a set of procedures facilitating the selected procedures of cooperation (on the level of investment planning or crisis management for example) (see also [11]). It can also be assumed that the provided maps will be intelligent. Due to it, it will be possible to capture all the problems arising on the project level (the representatives of the concerned entities will be informed currently about it) or they will facilitate the valuation of the arranged activity, for example. The conceptual model of RBSC is shown on figure 1.

Local Government Entities

GIS - ERP etc.

...

GIS in Cloud

GIS - ERP etc.
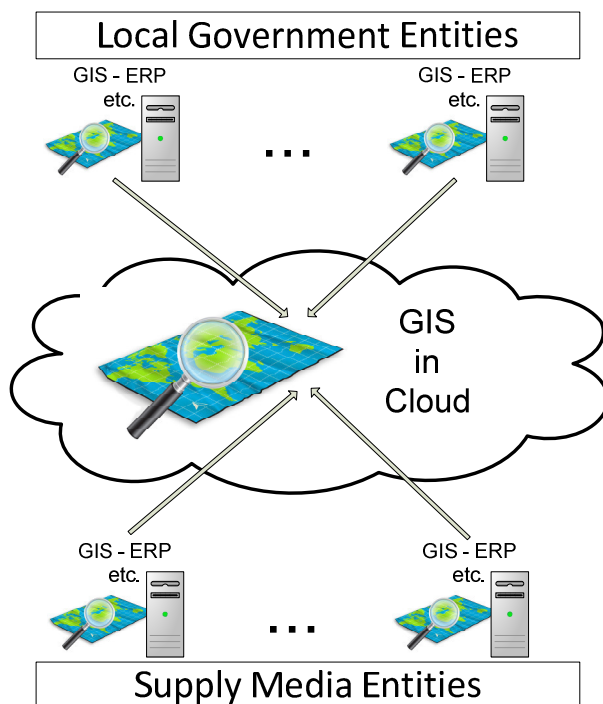
...

Supply Media Entities

Figure 1. The conceptual model of RBSC
Source: [2]

Technological basis for the suggested project should be GIS tool available in Cloud Technology. Within the confines of the tool, the GIS software for visualisation, as well as actualisation of maps and project purposes should be enclosed. The supplier of the device should also provide the layers of maps which describe geographical object of the region. The demand of map intelligence means that the necessity of the description of link between individual layers of maps may be necessary. Intelligent maps would facilitate the process of infrastructure designing (pointing at all the potential conflicts in the infrastructure and enabling the preliminary valuation) – [5].

The use of Cloud technology system solves the problem of localization of the constructed system. The provider of GIS system in Cloud technology indicates the rules of access for the entitled users (the example is [6]).

RBSC are assumed to have limited territorial access of interaction. Usually they can apply to singular agglomeration, second level administrative units, however, only in the case of big systems they can include whole regions. As a result, one elaborated system can be duplicated in future for users from a different region. Generally, individual regions should be closed rooms. However, it may occur that some entities such as telecommunication enterprises can work in many regions. Then, the software supplier should decide the rules of using many rooms.

While creating electronic communities [7], the possibility of using GIS software only is not enough. GIS tools must be complemented with communicators which enable electronic consultation between the partners. It is vague especially in the case of these regions where the management or units responsible for designing and maintenance are outside the region. Due to this fact their share in the works of the agreement team (organized, among other things, during undertaking municipal infrastructural projects) is made more difficult. Another element which can be joined to the system is the tools used for designing processes (based on, for example; BPMN [8], BPML, UML, OWL and different ones). The mentioned tools enable to describe the procedures which would be conducted within the designed system. Introducing them can become the development of RBSC project.

The planned project originally should include all the entities responsible for the regional infrastructure. They can be, among the others, public administration offices, state or local government agencies, companies that provide utilities (municipal and commercial), and, to a limited extent, other social organizations and companies performing service functions with respect to infrastructure managing entities in the region.

Practically, in the initial stage of the project, a limited number of entities can join. Only with the development of the project other partners can join.

The supplier of the tool can be both a commercial company and the relevant departments of the State Geodetic. This second type of entities can provide the basic layers of maps. The suppliers of communicators and business process design tools can be commercial enterprises or groups of users working on the project. Using spatial data is done on the basis of reciprocity. Operators shall provide each other their spatial data and/or lexical systems and codes for the managing items of infrastructure. Most of the companies that form the infrastructure use in their business different IT systems, such as: MRP/ERP/BI, CAD/CAM, CRM, GIS. The used systems can be at different levels of internal integration. Taking part in RBSC should favor making work on the integration of internal integration and then support the integration of data available in GIS systems. The mentioned integration should not only allow the exchange of data between different systems, but also the creation of a coherent dictionaries systems and codes used in scale of enterprises, as well as in and RBSC. Each participant of RBSC receives appropriate permissions to use the data depending on several factors. These factors include, among the others: the existing law on the rights of access to data, the scope of services of its own data, the scope of the purchased rights (access to selected functions of the created system can be determined on a commercial basis). RBSC is meant a social enterprise rather. Admissibility of commercial solutions stems more from the need to maintain the system and the need to finance its development.

Preparing the project, it was taken into consideration that it is complex, both organizationally and technologically. Therefore, its conduction would be a multistep process. Its launch and eventual success will require overcoming many barriers.

III. TYPOLOGY OF BARRIERS

RBSC is a complicated undertaking mainly due to a large number of potential users coming from different organizations. Another problem that hampers the realization of the suggested project is of the environment system. It consists of several independent entities, none of which has decision-making powers to others. Environmental data binding components are only specific state legislation created by local law (enacted by local governments - concerning, inter alia spatial region), and the sense of community of interest (ie, projects that require collaboration infrastructure entities forming regions).

RBSC Organization should be treated as a project on two levels: organizational and technological. Its implementation should be carried out according to the methodology used in IT Projects.

Generally, IT Projects are carried out in several stages: the planned projects, analysis, modeling, verification and implementation. For each phase other measures are taken. Also at the various stages, various difficulties and obstacles, which should be overcome, are recorded.

In the case of RBSC the project is currently in the planning stage. Hence the occurring barriers must be overcome. Otherwise, the proposed project may never move to the implementation phase. The barriers existing in the planning stage can be divided into four basic groups:
- organizational,
- psychological,
- technological,
- financial.

A. Organizational barriers

Organizational barriers are the major obstacle to undertake the RBSC project. If they are not overcome, it will not be possible to undertake further work.

Analysing organizational issues, the following questions should be undertaken:
- defining the RBSC environment,
- identifying the processes and their targets in the RBSC environment,
- examining the sense of common interests of entities operating in the RBSC
- environment,
- identifying the relationship between the entities,
- suggesting the potential leaders of the project,
- identifying mechanisms to study the needs of users.

Defining the RBSC environment RBSC consists in determining the geographical impact of the system and determining the entities, which in the first instance must be acquired for the project. It is necessary to indicate whether there are entities that should definitely join RBSC.

The geographical scope may be a single or a set of contiguous administrative units. The problem is that the jurisdictions of individual organizations or their selected organizational units will not always perfectly overlap. It seems that the key factors for the success of RBSC will be adequate local government units. They have a real impact on the planning of spatial order, and may also initiate investment in infrastructure of an individual administrative unit. Moreover, they are responsible for crisis management. Their important asset are also the laws requiring them to collect specific type of data. These data can be collected on paper, but more and more frequently GIS are used. In addition, local government units may raise relatively greatest confidence.

The second group of entities represents companies supplying the media. Their importance lies in the fact that they design, build, and operate certain types of media in the region. They can affect the development of the region (still developing its infrastructure), as well as collect data on the course of networks providing a specific type of media. Very often their representatives are invited to the consultation, which are organized in order to arrange routes of particular media. On a smaller scale, access to these systems may also include sub-contractors involved in the construction,

maintenance or improvement of existing infrastructure networks.

When determining the environment of a project, as independent entities should also be considered IT companies providing IT tools, such as GIS systems, MRP / ERP and other Web and Cloud Services, and Business Procesess Modeling Tools. The closer the integration of information systems is assumed to be, the role of IT vendors will be greater.

The layout of the entities in the environment of a project enterprise should undertake the roles of particular entities. This will enable determining the objectives of the created community and to the basic processes carried out within its framework. In the course of the future formalization of processes, it will be possible to define RBSC functionality. Examining the sense of community of interest among potential participants RBSC is to determine the levels of cooperation that can be implemented using the proposed Community. In the future, it may be a basis for the negotiations on extending the scope of activity of the system.

Determining the relationship between the entities has to indicate that the mutual obligations of individual entities. What is results from the state law, local regulations, and what should be considered good business practice that should be encouraged, or in extreme cases, force the participants in their mutual relations.

The problem of every project is to create a suitable leader (integrator) of the project. In an environment where most companies are independent of one another it is a difficult task, taking into account the interests of the various participants. Generally for potential leaders, originators may be created, local government units or agencies designated by them, possibly IT companies providing IT Tools.

For the proper functioning of the created system it is necessary to create a mechanism to study the needs of users. It is a condition of the development of the system and may be a mechanism winding up the need for cooperation in this environment.

Taking into account the foregoing, the most serious potential organizational barriers include:
- lack of developed cooperation mechanisms or dislike between the identified entities in the researched environment,
- lack of widely respected leader,
- lack of knowledge of the proposed project,
- unclear legal provisions controlling the cooperation between these entities,
- marginality of the region for which RBSC is developed in the activity of suppliers of the individual infrastructure elements.

These elements can effectively prevent the adoption of this project.

B. Psychological barriers

Psychological barriers are a kind of supplement of organizational barriers. In the planning phase of the project, the key issues to be considered can include:
- a sense of common interests of potential participants in the project,
- self-independence,
- interests of individual entities operating in the environment.

The main problem is to develop a sense of common interests. At the stage of individual regions, it can be difficult especially when the provider of individual media are corporations, for which the region is of marginal importance. Investments for a given region are not of primary importance for their business. In contrast, the supervision over an infrastructure functioning in the region is held by units at a relatively low level in the hierarchy of the organization. Even more difficult situation may occur when supervisin over infrastructure can be taken over by an outsourcing company, whose only task is to maintain the infrastructure tools without permission for their development. Then, a tendency to participate in the proposed project may be relatively small.

Another element is the question of self-independence. Creating the infrastructure of individual media in the region could have signs of some kind of internal competition. The course of individual types of media is defined by the rules. Therefore, individual entities may be willing to act on the principle of the first in the game. Who is the first to take certain design and construction actions, can be given priority in the selection of the course of their own network. Other entities will be forced to adapt to a fait accompli. This type of phenomenon will occur, especially in those regions where there is no tradition of co-operation or where the local government has failed to practice cooperation with providers of media.

The phenomenon can still be affected by the internal systems of interest groups. Not all organizational units within individual companies may be interested in such a high level of IT system integration, fearing an increase in the level of internal control (external as well). Single IT service providers, for which in the event of realization of the proposed project may run out of space, can also be threatened.

To sum up the basic psychological barriers include, among others:
- too close corporate systems and closeness to cooperation among providers of media in the region,
- lack of tradition and willingness to cooperate,
- mutual dislike or distrust to cooperation between potential participants RBSC,
- negative attitudes of managers and selected organizational units of individual entities,
- disregard of project proposals,

- lack of knowledge about the range of costs and potential effects of the project,
- diversionary activities of external entities interested in maintaining the current status quo.

These barriers can have a particularly strong role in the initial stages of starting up the project, where there is still relatively large uncertainty about the potential effects of the project, whereas the current rules of functioning have been violated.

C. Technological barriers

Technological barriers are associated with the preparation of appropriate solutions for IT technology [9]. On the one hand, the proposed solutions should provide an appropriate level of quality of services provided. The indicators should include, among others: the appropriate scope of the data collected, clear and understandable rules of visualization, high level of intelligence of the implemented tools and system security.

Undertaking the project such as RBSC, it is necessary to assume that there are solutions available on the market which enable technical development of the system and achieving its full assumed functionality while maintaining economic rationality of the project.

In this case, among the others, the following issues should be analysed:

- analysis of commercially available IT tools (GIS application, instant messaging, BPM Tools),
- analysis of the IT systems used by potential participants in the project,
- possible integration of the systems used by potential RBSC users,
- analysis of potential and planned developments of previously used IT systems,
- providing an adequate level of security of IT systems,
- possibility of data flow between (system rooms) for entities operating in many regions.

On the IT market there are many different types of tools: GIS, instant messaging, BPM Tools. Requirements for GIS is a tool available in Cloud Technology for creating maps of the region, together with the use of technology of intelligent design. Intelligent solutions can be based on semantic technologies for defining the relationship between the various leyers (classes of objects in spatial databases). They can be an independent software which, however, must be compatible with the used GIS system.

Communication within the community may be also provided by the commercially available enterprise instant messaging (eg Microsoft Lync). Unlike traditional communicators they enable the smooth functioning of corporate they network, they have a high level of security and allow the integration of systems (eg ERP, GIS).

BPM Tools the expected part in the future. A prerequisite for its use is to create a community and define the basic processes that will be implemented in its framework. Its use will depend, inter alia, of information systems that will be used among community participants. Moreover, the question arises whether the participants would be interested in such a high level of integration. However, already at the planning stage, it is necessary to take into account this type of opportunity.

Another technological indicator of the discussed project are internal IT systems used by potential participants in the project. The point is the systems of MRP / ERP and BI, CRM, CAD / CAM types, various types of business systems and others. They are systems that will provide data on real events, and therefore create a description of the current state of the slice of reality. In addition, they will create the basis for the code, lexical and semantic of the planned project. Hence, the question of mutual integration of these systems will be crucial. IT Systems used by potential participants in the project are continuously being improved. Therefore, the suggested solution should not constitute any restrictions in this regard.

An important issue is the problem of security of data available in the system. On one hand, it is a technological challenge for manufacturers of IT solutions, on the other hand, an adequate level of safety should encourage increased willingness to cooperate in the planned community.

To sum up, the basic technological barriers include:

- The scope of the internal computerization of potential participants in the proposed project.
- The level of internal integration of IT systems.
- Ability of integrating GIS tools with the available instant messaging and BPM Tools.
- Ability to integrate all systems envisaged in the planned community,
- Providing an adequate level of safety.

From a technological point of view, planning, designing and implementation of the proposed system is feasible. The thing is, it is to be more economically rational, and therefore it is important to use as much as possible systems which can be duplicated.

D. Financial barriers

RBSC is a project in which it is difficult to determine the primary beneficiary. Moreover, the assumption is not to create a sense sricto economically effective project, but first of all, it has to be useful for the participants of it. Despite this, at its creation, and then the exploitation, economic rationality should be kept. In many cases of planned projects, financial considerations were the main reason for the failure of the project. RBSC is an extensive project and requires the cooperation of many entities. Therefore, it seems to be a cost demanding project.

In practice, the drawn up solutions should include, in the widest possible range, the ones which can be duplicated (thus, relatively cheap). On the other hand, the implementation of all the planned functionality of the system

can be decomposed into a number of stages and thus, extend it in time.

It can be assumed that analyzing the financial issues of the planned project the following issues should be considered:
- sources of project financing,
- the range of payments for the use of the created system,
- entities responsible for the functioning of the system.

Drawing up the proposed project requires work and commitment of many people from different organizational units. The primary objective of the project is to create a useful system. Therefore, at least the initial phase of the project can be financed from different types of funds. Only after activation of the project, it is possible to specify the rules for the financing of the system and to determine the extent of the payment for the selected system functions It is also important to define the principles of financing the development of the system in the future. Considering the fact that the system should be largely made up of duplicated tools, the need for payments to certain suppliers of IT services should be taken into account. Taking into consideration the issues presented above, the main financial barriers for the implementation of the project include:
- the need to pay the installments for the use of the system,
- reluctance to pay multiple suppliers for the use of similar IT services where some operators are already using systems with similar functionality,
- legal problems that might arise for certain entities (referring especially to the units of public administration), related with the possibility of the use of commercial systems,
- height and multiplicity of the charges for the use of the system,
- lack of decision-making powers to bear the costs for the use of IT tools selected at the regional level (referring mainly to corporations with head offices outside the region).

The presented barriers are just some of the problems to be dicussed before starting the project. The results of empirical research on the barriers to the implementation of RBSC in Częstochowa provide further points of the article.

IV. THE EMPIRICAL RESEARCH

In order to verify practically the issues brought up in the article, the authors conducted a study determining the most significant barriers connected with the formation of RBSC. The theoretical bases for the creation of RBSC and pilot studies in the area of information resources of such projects have been presented in previous publications written by the authors [2] [10].

Five entities with their own technological infrastructure, where resources are distributed and therefore can be managed through GIS systems, functioning in the region of Częstochowa were researched. Obtaining a larger study

sample was relatively difficult because the entities are often a part of larger entities. People working in local offices are not authorized to provide information, and reaching the management requires complex formal procedures. Among the entities of Częstochowa region who have agreed to participate in the study are:
- Silesia Board of Amelioration and Water Division of Czestochowa,
- Polish Oil and Gas Company SA Upper Silesian Sales Department. Upper-Silesian Region. Customer Service Czestochowa,
- one of the nationwide providers of cable television, broadband internet and telephone services (did not give the permission for the use of the name),
- Częstochowa City Hall,
- Water and Sewage District Czestochowa SA in Częstochowa.

The research was carried out by notifying the appropriate application to the management of the enterprise. A representative of the board usually passed conducting the research on relevant departments. Additionally, a conversation with a representative of the company providing solutions in GIS Cloud was conducted. Representatives of the company have to prepare their own proposed solution within the confines of this concept. These studies are a pilot, expected to be extended in the future.

Research questionnaire, which was used in the study contained 16 questions divided into 6 main areas:
- Area 1 - (Questions 1-2) on the business nature of the entity,
- Area 2 - (Questions 3-5) on the level of computerization of the entity,
- Area 3 - (Questions 6-8) on willingness to cooperate with other entities,
- Area 4 - (questions 9-11) concerning the use of GIS,
- Area 5 - (Questions 12-15) for the local business communities - such as RBSC,
- Area 6 - (Question 16) concerning barriers to the creation of RBSC.

The study was conducted in April 2014. They will be a part of a larger project. For the purposes of this study only that part of the results that directly corresponds to the subject of the article (technology, level of computerization, barriers of accessment to RBSC) were taken into account.

Most subjects (4 out of 5 respondents) declared being a unit independent in decision making. This means that in spite of belonging to the structure of larger organizations or networks, they have autonomy and can take specific initiatives (e.g. accession to RBSC). Only the provider of cable television declared that they could not make decisions for themselves, and the management is done through the control panel.

The condition for the establishment a local business community (or joining such a project) is to have an appropriate level of computerization. The use of ICT solutions (information and communication technologies) is

the basis of RBSC. All the researched entities declared that they meet the basic requirements in this area, namely: they have broadband internet access, they use ERP and GIS. Unfortunately, no company has made a full integration of these systems. In the majority of cases (3 to 5) between ERP and GIS systems, only a simple (using files), or semi-automatic data exchange is possible. The other two entities (Water and Sewage and the City Hall) has integrated only some of trade systems.

The third group of questions contained in the form of research related to willingness of the entities to cooperate on the platform RBSC. Three entities (water, drainage, gas works) are interested in permanent cooperation, particularly in the area of investment planning and in crisis situations. A representative of the City Hall sees such a need only temporarily, in the implementation of the relevant investment. Internet, television and telephony supplier sees no need for such cooperation.

Entities interested in cooperation agree on the scope of the data that should be on the RBSC platform. The most important task in this area is to place the cadastral maps of infrastructure objects. This will help to streamline and accelerate processes of investment and planning the course of the subsequent parts of the network (gas, water, land reclamation). The most important part of the form of the research were questions that directly relate to the barriers to RBSC creation. These correspond directly with the theoretical considerations set out in the previous paragraph of the article.

The most important barrier to be considered is the organizational factor. This is indicated in the responses in all five forms. Respondents fear of who would organize a platform for cooperation and how they would define the powers and competences of the entities involved in the project.

Another important barrier is the psychological aspects (3 replies to 5). Respondents are concerned about the security of resources and the way of their share. Enterprises treat data and information as a resource of great strategic importance. The mechanisms to protect data are rooted in the mentality and psyche. RBSC in some way, destroys these behaviors, which may be unacceptable, even taking into account the common interests of the users of the platform of cooperation. Indication of technical barriers occurred in two cases. Main barriers of creating Regional Business Spatial Community are shown on figure 2.
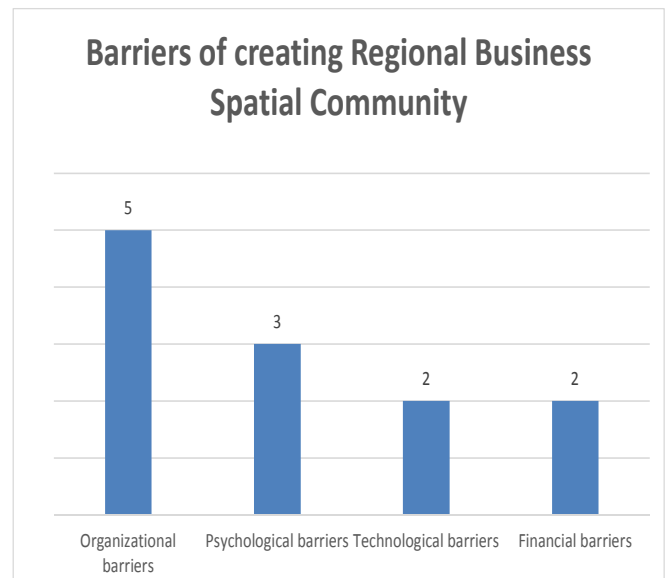

Figure 1. Main barriers of creation RBSC

Respondents believe that the integration of data on a common RBSC platform can be difficult due to the different formats of the data contained in the systems and incompatible software. Number of problems in this area will accumulate together with joining of other entities to the project. In two cases, respondents also related to the financial barriers. In the assumption, RBSC would exist as a separated entity.

Debatable would be platform budgeting, maintaining the necessary IT infrastructure, software or service.

V. SUMMARY

Inherent feature of the information age is the formation of the various communities that communicate using information and communication technologies. Factors affecting the formation of such communities are common interests, science, origin, occupation, etc.

The idea of RBSC is a new concept which indicates the possibility of the formation of business communities, based on ICT. Such communities can be formed only on the condition of cooperation and common benefit. A factor influencing the creation of RBSC may be having and infrastructure development of companies on a common geographical area. The article focuses on companies operating within the city, which provide utilities for the residents (water, gas, the Internet, etc.). The infrastructure possessed by these entities usually takes the form of a network. Networks of different companies often intersect, or are a barrier for itself. Creating a business community, which in cooperation would make specified information resources available, could help to improve the planning, development, and infrastructure repairs. As a survey among companies supplying the media revealed, there is a potential willingness to cooperate in this area.

The rise of RBSC, however, involves the occurrence of certain barriers. In the theoretical part of the article, four main areas of their occurrence were pointed out: organizational, psychological, technological, and financial. The study among potential participants and beneficiaries of RBSC confirmed these considerations. Surveyed companies have declared that the biggest problem may be psychological and organizational barriers. However, technical and financial aspects were considered less important.

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