THE PROBLEM OF PROVIDING FOOD RESOURCES IN URBAN AGGLOMERATIONS (THE CASE STUDY OF THE KUZBASS AGGLOMERATION)

L. L. Zobova* and V. A. Shabashev

Kemerovo State University,
6, Krasnaya Str., Kemerovo, 650043 Russian Federation

* e-mail: llzob@mail.ru

Received February 07, 2016; Accepted in revised form March 20, 2016; Published June 27, 2016

Abstract: Urban agglomerations are the result of a process of spatial competition for resources. To analyze the functioning of specific urban centers, it is necessary to make a distinction between the process of agglomeration and the state of agglomeration in the spatial structure. This paper shows the interrelation of the process of urban agglomeration and the agglomeration of the production activity as its economic foundation. The study reveals the connection between the urban agglomeration process and the agglomeration of the production activity with the purpose to ensure food supplies. The authors analyze the background, causes, opportunities, goals and challenges of the Kuzbass urban agglomeration. The specifics of the Kuzbass agglomeration lie in a significant level of urbanization and in having two core cities in the region. This gives grounds to describe the Kuzbass agglomeration as a conurbation. The relationship between the two centers within the conurbation is an under-researched problem. The specifics of the Kuzbass agglomeration (conurbation) also lie in its in-between location and close proximity to the neighboring agglomerations. On one hand, its location exacerbates a competition for resources, but on the other hand, it is the basis for the solution of certain internal problems, such as food supply security. Usually, an urban agglomeration is accompanied by a reduction of the rural population, and thus, by a decrease of the opportunities for agriculture. The Kuzbass agglomeration's location allows for a solution to the problem of food security not only due to the development of its own agricultural sector, but also due to the agrarian sector in the neighboring agglomerations.

Keywords: agglomeration, urban agglomeration, conurbation, food market

DOI 10.21179/2308-4057-2016-1-186-196 *Foods and Raw Materials*, 2016, vol. 4, no. 1, pp. 186–196.

INTRODUCTION

One of the trends of modern spatial structure is described by the term "agglomeration". An analysis of the economic phenomena can only be based on a clear understanding of the applicable categories. The variety of the definitions of "agglomeration", its content and its various aspects, are predetermined by a difference in the methodologies that describe the definition. Often, the research lacks the consideration of the dynamics, does not differentiate between the process of agglomeration and the state of agglomeration. There is no a clear differentiation between the concept of urban agglomeration and agglomeration of cities. An internal contradiction within the process of agglomeration, the contradiction between two tendencies – the concentration of economic activity and its dispersion – has not been described. Agglomeration is often not seen as a competition for the use of local resources. The purpose of this research is to identify and describe the specifics of the Kuzbass agglomeration from the point of view of the methodology of economic theory. The emphasis is placed on the analysis of the relationship between the process of cities' agglomeration and the agglomerations of production activity to ensure food supplies. The process of cities' agglomeration is based on the influx of new resources – territories, investment, human resources, infrastructure development. There is a redistribution of the population of the region in favour of the city. As a result, a reduction of the agricultural sector in the region takes place, and consequently, food dependence increases. This paper gives theoretical grounds to the actions of regional authorities to solve the food supply challenge under the conditions of internal and external agglomeration competition.

OBJECTS AND METHODS OF STUDY

The process**s** of agglomeration and the state of agglomeration characterize patterns of the functioning of the economic space, as well as representing the result of the patterns of the functioning of the economic space. International studies have described and explained the causes and conditions of the agglomeration process [1]. Any spatial structure is

based on economic practicability and is subject to certain spatial patterns [2]. The subject of this research analysis is the urban agglomeration as an economic category and the Kuzbass agglomeration as a real functioning spatial formation. As of today, scholars haven't clearly defined the relationship between the categories "the process of agglomeration" and "the agglomeration" as a state. There is a certain lack of analysis of what causes the urban agglomeration as a competition for resources. The basis of this study are the findings of such prominent international scholars as A. Marshall, P. Krugman, M. Fujita, T. Mori, H. Ogava, D. Harvi.

The paper analyzes the patterns and features of the functioning of the Kuzbass agglomeration. The analysis is based on theoretical conclusions. The research pays particular attention to the problem of food security in the following conditions: 1) the reduction of the rural population of the region; 2) the increase of competition for resources from neighboring conurbations; 3) the increase in international economic sanctions.

The analysis of the Kuzbass agglomeration has been carried out in the framework of the RHSF Grant "The development of a management system of social and economic development of the urban agglomerations in the Kemerovo region".

RESULTS AND DISCUSSION

A. Marshall emphasized a crucial role of external influences (externalities) in the formation of economic agglomerations. Once an industry finds its niche on the market, it will probably keep it for a long time: so great are the benefits from close proximity to other industries [3]. Industrial agglomeration, as well as urban agglomeration is the result of a "snowball effect", in which an increasing number of agents are going to benefit from a wide variety of activities and a high degree of specialization. M. Fujita and H. Ogava also pointed at the connection of urban agglomeration and the agglomeration of firms. The agglomeration's capacities grow from the interaction between a preference for diversity of products and transportation costs. In this model, the city can be both monocentric and polycentric [4].

According M. Fujita, to understand the causes and patterns of the spatial distribution of economic activity, in particular the formation of large economic agglomerations, as well as regional specialization and trade, it is necessary to make at least one of the following assumptions:

(1) The territory is variegated.

(2) There are external effects in production and consumption.

(3) Markets have inherent imperfect competition.

Thus, the economic basis of urban agglomerations is an industrial cluster or the agglomeration of firms. An agglomeration of small firms is possible as well.

The agglomeration process always has inner contradictions. The struggle between centripetal and centrifugal factors reflect a placement of the productive forces. Centripetal forces tend to "draw" the population and production into the agglomeration, and centrifugal, on the contrary, tend to break these agglomerations. Bulk savings on the industrial volume of production, consumption, and transportation are challenged by the dispersal forces in the form of, for example, the expansion of agricultural lands [5]. Thus, the agglomeration of the city as a process is a manifestation of the centripetal process of the concentration of population around the major cities, which due to endogenous or exogenous factors, have become the core (center) of the spatial structure. Agglomeration (concentration) of production generates self-reproduction. Companies place their production in locations with easy market access, at the same time, the market access improves in locations where production is concentrated. There is an urban effect (when the concentration takes place in one location, and there is a conurbation) and a localization effect (proximity effect).

Many countries have passed and are going through the stage of the geographic concentration of economic activity. Theoretical models of the "new" economic geography, starting from Krugman's model, show that with primitive and costly transportation technology, the economic activity will be distributed more evenly, so that each region could provide their own consumption, without depending on international or inter-regional trade. With the development of transportation, globalization, and the removal of other trade barriers, the concentration of production increases. At the same time, structural changes in the economy reduce the share of the agricultural sector and increase the share of industry, and then the share of the service sector. Manufacturers rush to use the benefits of scale – production and people move to the big cities, the periphery begins to consume the goods imported from the center. Only with a further decrease in transportation costs does the productivity, income and standard of living on the periphery start catching up with the "center" [6].

The spatial structure of the Russian Federation follows the global trend, which manifests itself in an increase in the share and role of metropolitan areas and, accordingly, the manifestation of the opposite tendency – a decrease of the share of developed territory. As of January 2016, the urban population of Russia was 73.9% of the entire population. 62.5% of the urban population lived in metropolitan areas, which comprise 45.1% of the total Russian population. Overall, there are about 52 urban agglomerations in Russia. The Kuzbass agglomeration is among the urban agglomerations with the maximum number of townships within the city boundaries. There are 8 townships there. The urban population is 84.9% of the Kemerovo region. As of today, the rural population continues to decline: it moves into the cities, and the mortality rate of the rural population is higher than its birth rate. In Russia, only 55% of the rural population work in the agricultural sector, the remaining 45% work in industry, transportation, the service sector and other "urban" sectors of the economy. 17.9% of the rural population of Russia lives in areas of urban agglomeration. As a result of the development of urban

agglomerations, a new category – the rural-urban population of urban agglomerations – has emerged.

The global experience shows that metropolitan areas are quite stable. Having emerged for objective reasons (like the attractiveness of the densely populated areas for businesses and jobs), they continue to function and adapt to changing internal and external conditions. In other words, the dynamics of the development of regions and cities depend on their previous history. If for some reason there was a major city in a specific location (eg., Novosibirsk), even if the initial reasons that led to the concentration of people in this place disappear, the city will continue to exist and develop. By creating a market potential, the city remains economically attractive. The downside of this mechanism is that, once settled, an inefficient allocation of resources within the country becomes stable over the long term [7].

Thus, the result of the agglomeration process in the region is the economic space compression, i.e. the concentration of economic activity and population in large agglomerations. Meanwhile, ten years ago, a significant part of the governments of the developing world has been concerned about the increased migration to cities. Such "mega-cities" of the Third World are dysfunctional, they hinder the economic progress. Another pitfall in the process of urban agglomeration is uneven geographical development. The authors of the book "The Siberian Curse: How Communist Planners froze Russia" (in Russian translation "The Siberian burden. Miscalculations in Soviet planning and the future of Russia") point out that the Russian authorities should subsidize those wishing to leave the uninhabitable areas of the Far North (Siberia), and should switch to the shift work mode instead of supporting artificially created megacities [8]. The problem of the necessity and the ability to manage the urban agglomerations remains essential and challenging. If this issue is recognized, then we have to address the challenge of the necessity and ability to manage the agglomerations, and to determine the subjects and spheres of the management.

According to experts, the international experience in the management of agglomerations involves two trends. The first one is the need to improve the efficiency of infrastructure management: the citywide infrastructure, transportation, utilities and business infrastructure. The second trend is the need to improve the efficiency of public administration. In other countries, a lot of attention is paid to the role of coordinating tools, to "soft" horizontal management structures. Thus, these two trends are interconnected in a constant conflict, and the attempt to optimize the first leads to solutions that reduce the efficiency of the second trend, and vice versa [9].

The creation of metropolitan areas is associated with a complex population movement within the city and between cities. It is necessary to track the population's movement, its intensity, its daily and seasonal variations, the ratio of the topography to infrastructure. But local governments are not always able to control and manage the dynamic changes taking place in the urban territory. The data and knowledge, which are currently widely used to make strategic decisions, are often cumbersome, inadequate, rapidly changing and may lead to wrong decisions. Therefore, we need modern geospatial technologies. They allow us to analyze complex information, including the risks and problems of the functioning of urban agglomerations, which in turn, helps to save time and money. New digital technologies have recently been introduced in the practice of urban planning. International research on the issues of geospace is paying more and more attention to the problems of the creation and functioning of the "smart" cities. The June 2015 issue of the journal "Geospatial World" published an article "SMART DATA FOR SMART CITIES" [10].

As for the need to improve the efficiency of infrastructure management, there are obvious tools such as the coordination of strategic plans, the programs of the development of the transportation and municipal infrastructure with the programs of territorial planning. Individual infrastructure facilities must be coordinated with each other.

International experience in the management of agglomerations gives scope for decision-making. The efficiency of public administration, both in Russia and in other countries, is based on two models. The first is a unitary one-tier model, with the management structure designed as a municipality on the entire territory of the agglomeration. Another one is a contract model, when the agglomeration area includes a number of municipalities, such as the agglomeration of New York, with over 2.000 municipalities which coordinate each other's activities. A two-tier model has a certain "above-municipality" level (either voluntary or mandatory). France is an example of a two-tier model, where the law requires 16 urban agglomerations to create another "above-municipality" management level and to delegate to it the general powers for the development of these agglomerations. Paris is another example of a two-tier model of state-municipal management, where one territory has both municipal and state jurisdictions, among which some functions are divided [11]. The US also encourages the creation of joint structures, which have general plans of development: transportation development, social and economic development. The Federal budget generously funds such inter-municipal structures, and the funds are mainly assigned to the development of inter-municipal infrastructure. In other words, the municipalities agree on joint problem solving. In Russia the problem of the management of depressed areas, including, mono-cities and economically "shrinking" territories, has not been solved.

The assessment of the current problems of Russian urban agglomerations is possible on the basis of international experience, paying special attention to the possible problem of competition amongst agglomerations. D. Harvi emphasizes that competition between cities is one of the determining factors in the evolution of capitalism. The competition of cities leads to an uneven geographic development [12]. The toughest competition takes place between global cities. Some urbanists believe that in the future cross-country competition will be reduced to a competition between

the largest cities. The theory of agglomeration of cities holds that agglomeration development tends to increase competition, and especially the competition for resources. The competition for resources means a competition for investments, for which agglomerations should create certain conditions, both institutional and social. Cities must have a certain quality level, they have to be comfortable for living.

The comparison of the neighboring agglomerations of the Siberian Federal District shows that the city-cores of agglomerations follow the global trend (Table 1).

Table 1. The key indicators of Novosibirsk, Kuzbass and Tomsk, Altai agglomerations (2009) [13]

Agglomeration	Population (thousands, persons), 2010 yr.	Percentage of urban population, %	Number of cities in the region, 2010 yr.	Population density per 1 km^2	The immigration rate per 10 000 population, persons	The immigration rate per 10 000 population. Urban population, persons	The immigration rate per 10 000 population. The rural population, persons
Novosibirsk	2 649 900	75.7	14	14.9	136.11%	128.80%	-19.1%
Kuzbass	2 820 600	84.9	20	29.5	77.82%	77.57%	78.2%
Tomsk	1 043 800	69.3	6	3.3	137.21%	125.22%	-7.1%
Altai	2 490 700	53.4	12	14.9	-4.80%	7.50%	-19.0%

The development of agglomerations and the concentration of population in them is influenced by transport and an environmental component. The transport component is more explicit, whereas the environmental component is veiled. The transport component is very significant in the functioning of agglomerations. Its development has an impact both on the size of the urban agglomeration, and the quality of its functioning. The analysis of the role of the transport component in agglomeration requires the addressing several theoretical issues:

– When and under what circumstances will the level of transport accessibility and transport development of the territory be sufficient for a successful actual agglomeration of cities;

– What should be or could be a critical share of the transport component to achieve a certain level of agglomeration;

– The transportation component of the process of urban agglomeration can be analyzed on the basis of qualitative and quantitative characteristics;

– The impact of the transportation component is, firstly, centrifugal, i.e., the more developed the transportation network in a particular area is, the greater potential for development it has. Secondly, the larger are the developed areas, the stronger the centripetal connections become, thus facilitating the process of agglomeration of cities [14].

The transportation component includes the level of transportation tariffs and the level of the development of the transport infrastructure, which in turn is divided into the level of the development of the transportation network and the accessibility of the territory for the development of the transportation network. There are some unsolved theoretical problems. Many researchers use the indicators of transportation availability and accessibility, which reflect the level of transportation services. They depend on many factors: the size of the transportation network; its throughput and carrying capacity; the street configuration; available detours. Though the indicators of the development of transportation services in the area are known: the density of the network per 100 km^2, the availability and accessibility of the transportation services per 10 thousand people, (the generalized index, Engel – Yuzuru Kato's formula), there is no generally accepted definition of the notion "transportation accessibility of the territory". We believe that the development of the transportation network on the territory must be preceded by the territory's accessibility to transportation. The determination of the subjects for which the territory's transportation accessibility is important, and the purposes of the availability of the transport services, are two important characteristics of the transportation accessibility of the territory. The second phase of the analysis is to determine the methods of the calculation of the transportation accessibility of the territory. There are several methods of calculation:

– The average value of the time spent on the movement of goods and passengers in the region, depending on the configuration and density of its transportation network;

– Cargo shipping;

– Passenger transportation.

The summarizing criteria of transportation accessibility is the accessibility of the agglomeration periphery based on time spent. This issue requires government efforts and very considerable financial expenses. The theory has not completely resolved the problem of the optimum ratio of internal and external transportation accessibility and the development of transportation services in the region.

Why is it important to distinguish between the concepts of the development of transportation services and the transportation accessibility of the territory? The impact of the transportation component is not a linear process, it is temporal in nature, i.e., it impacts at the initial stage of the formation of agglomerations and during the agglomeration's functioning (especially in the conurbation). In its turn, the agglomeration's already existing transportation network (i.e., the process of the agglomeration itself) may facilitate or impede the effect of agglomeration. It is also necessary

to understand the consequences of the transportation accessibility and the level of the cities' development in the agglomeration within the country, at the interregional level and within the region.

For the territory of the Russian Federation, increasing transportation accessibility is one of the priorities. Under current regulations in Russia, 90% of workers in large cities (agglomerations) should not spend more than 45 minutes on a one-way commute from home to work, or vice versa.

The effect of the transportation component on the agglomeration process is nonlinear. Therefore, it is important to recognize not only its possible beneficial effects, but also its possible adverse effects. In particular, the reduction in transport costs may lead to a concentration of production in large markets and around them. This can have a negative effect on the development of agriculture in the region. Currently in Russia, only 12% of the rural population have relatively easy, not more than 2-hour transport accessibility, to the developed centers, but 40% of the rural population are deprived of easy access to cities. The analysis of the development of transportation services in the agglomerations – competitors in the SFR allows us to conclude that the differences are probably due to the features of the natural landscape of the area, or due to the locations of economic activities (Table 2).

Table 2. The potential of transport services development on the territory of SFR [14]

Region	The density of the network per 100 km²:		Transportation services per 10 thousand people:	
	Automotive network	cars+railway+water networks	Automotive network	cars+railway+water networks
Novosibirsk region	8.941 km/100 km^2	9.035 km/100 km^2	580.067 km/10 thous. persons	658.616 km/10 thous. persons
Tomsk region	2.216 km/100 km^2	4.039 km/100 km^2	648.451 km/10 thous. persons	1164.155 km/10 thous. persons
Kemerovo region	14.531 km/100 km^2	16.904 km/100 km^2	507.122 km/10 thous. persons	589.951 km/10 thous. persons
Altai region	22.13 km/100 km^2	23.554 km/100 km^2	1558.911 km/10 thous. persons	1659.255 km/10 thous. persons
Krasnoyarsk region	1.118 km/100 km^2	1.569 km/100 km^2	925.226 km/10 thous. persons	1298.638 km/10 thous. persons

We should note that city competition has both positive and destructive consequences. The higher the competition is, the more unstable the society becomes; the competition is rather the way to a crisis. The government should create conditions for smoothing the competition, but without destroying it. In many countries today, the agglomerations overlap, and social and other ties between them are very strong. International experience provides many examples when the two regions were approximately equal and symmetrical, but gradually one region accumulated small initial benefits and turned into a commercial core, while the others became de-industrial peripheries. The formation of urban agglomeration reveals the presence of a core-city and an agglomeration area which includes satellite towns. The peculiarity of the agglomeration process in the Kemerovo region is the presence of the conurbation, i.e., historically formed two centers of gravity – Kemerovo and Novokuznetsk. It provides a basis for introducing a new concept of "Kuzbass agglomeration" [15] (Table 3).

Table 3. The Kuzbass conurbation [16]

Agglomeration	Population, 2015 yr.	Cities of agglomeration	Centre of agglomeration	Population 2015 yr.	Population density per 1 km^2
Kemerovo agglomeration	660 thousand	Kemerovo, Berezovsky, Topki, Kemerovo region	Kemerovo	549 thousand	1 866
Novokuznetsk agglomeration	1200 thousand	Novokuznetsk, Novokuznetsk district, Mezhdurechensk, Myski, Osinniki, Kaltan, Kiselevsk	Novokuznetsk	550 thousand	1 322

The prerequisites for the formation of the Kuzbass agglomeration are: a developed network of automotive roads; existing industrial relations; infrastructure development along the highways; the intense interaction between communities; the back-and-forth migration (related to work, education, cultural and recreational life); the land around the cities available for development; the cottage neighborhoods in the city's vicinity; the regular transportation services between communities; the so-called "hidden urban

population", permanently residing in cottages in the rural areas. The process of agglomeration of cities not only involves the city itself, but municipalities and settlements as well. As a rule, the development of agglomerations is a mutually beneficial cooperation between their actors to enhance the effectiveness of the different services.

As part of the RHSF grant "The development of a management system of social and economic development of the urban agglomerations in the Kemerovo region", we conducted a survey of the population of the agglomeration of Kemerovo. We surveyed 697 people in the Kemerovo agglomeration and 1023 people in the agglomerations of Novokuznetsk, by the method of a quota stratified sampling questionnaire. That allowed us to infer the boundaries of Novokuznetsk and the Kemerovo agglomerations, to estimate the systematic linkages and interactions between the populations of the agglomerations (the population's commutes), and to estimate the sources of the socio-economic effects of agglomeration. The boundaries of the social space of the Novokuznetsk agglomeration as a socio-territorial community have been formed, as evidenced by the high degree of homogeneity in the responses and evaluations given by the surveyed people from different cities.

The local identity is characterized by a positive attitude towards their place of residence. The residents of the agglomeration name common problems, such as: the poor state of roads, the growth of drug addiction and alcoholism, the poor lighting of backyards and streets. There is a high level of internal interactions within the Novokuznetsk city agglomeration: the people often visit neighbouring villages to receive social and economic services, or to deal with every day matters. Such socio-economic services as: education, trade, consumer services, mass cultural and sporting events are of the highest demand. The satisfaction of the social and territorial needs of the population of Novokuznetsk and the Kemerovo agglomeration is average based on their level of social well-being and quality of life. The ecology in the region is the biggest concern of the population of the Novokuznetsk agglomeration. The most important indicators of quality of life for them are: environment, transport infrastructure development and the development of recreational facilities. The material needs of the population of the Kemerovo and Novokuznetsk agglomeration, such as: food and clothing, and the need for a stable circle of close friends and relatives, are satisfied. However, such needs as: clean air (water), a good health care system, the recognition of professional and social achievements – have not been met at a satisfactory level. The residents rated their financial situation as average; and half of the population believe they can improve their well-being in the next year or two and they are confident about their future.

The residents of the Kemerovo agglomeration have a strong local identity. Satisfaction with the environmental conditions and with the transportation network contributes the most to the assessment of their quality of life, whereas the crime rate contributes the least to this assessment. The Kemerovo agglomeration has poorly formed social space boundaries. The quality of life in the center of the agglomeration – Kemerovo – is higher than in the other localities of the agglomeration. Development of the social relations of the community is at an average level which allows us to predict further development of the metropolitan area as a socio-territorial community. According to the survey, personal cars are the most popular means of transportation in the Novokuznetsk agglomeration; public buses take second place, cabs are in third place, and trains are in fourth place. The frequency of commutes varies from once a week to once a month. The most popular socio-economic services are: education, trade, and consumer services.

The analysis showed that for the development of the Kemerovo agglomeration's transportation network the most important projects are: the construction of a bypass road and the third bridge over the river Tom', the repair of the roads which connect Kemerovo, Topki, and Berezovsky; the creation of the industrial logistics parks in Topki, which will connect Topki with the federal highway 53 and with Kemerovo. In the construction sector the priority projects are: the modernization of the factory that produces construction materials, which will improve the supply of the Kemerovo agglomeration with building materials; the construction of the agricultural products processing complex.

For the development of the Novokuznetsk agglomeration's transportation network the most important projects are: the construction of a bridge across the river Kondoma, the construction of a shorter road to Mezhdurechensk, which will reduce the distance between the cities of Osinniki and Kaltan; the construction of a road linking the south of Kuzbass with Khakassia. This road will also link the Kuzbass conurbation with Central Asia and Altai. In the construction sector the priority projects are: the building of an advanced-processing complex for raw materials (coal, ore, polymetals), turning them into primary and secondary products; the creation of a cluster of the advanced processing of agricultural products.

To form a conurbation of Kuzbass, it is necessary to upgrade the road Novokuznetsk – Leninsk-Kuznetsky and to turn it into a highway.

The analysis revealed a multi-level conflict of interests between participants in urban agglomerations. First of all, there is a clash of interests within the agglomeration: different cities, competing with each other as producers and as receivers of government and private investments. Another conflict of interests is between the interests of cities and large owners of means of service production (the latter, in some cases, are not interested to locate the production and services' facilities wanted by the city; or they wish to develop industries in which the city is not interested; or they are unwilling to dismantle the existing ones that are undesired by the city). There is a competition between the cities for regional budget funds and for labour resources. In addition, there is a group of external

contradictions: between the cities (which may act as a defender of regional interests, and can have their own interests) and the regions; between the interests of the region and of each town individually.

The relationship of the two centers within the conurbation is an interesting and unexplored problem. The agglomeration processes require a new system of public administration, a multi-functional system of local government. Another peculiarity of the Kuzbass agglomeration is that it experiences the impact of both external and internal competitive forces. First, it has a central position between the agglomerations of Novosibirsk and Tomsk. Thus, for the border settlements of the Kemerovo region, the centers of the neighboring areas' agglomerations have become the center of gravity (based on transportation accessibility criteria – the maximum commute time to the center of any metropolitan area is 1.5 hours).

Kemerovo is the administrative center of the region, and the core of the Kemerovo agglomeration. This creates the conditions for competition between Kemerovo and Novokuznetsk. We consider parties to be the competitors if they perceive each other as competitors. This means that each of them have the assurance that the other party will remain their competitor in the perspective period.

Not only material resources, but also labour resources are the objects of competition between two metropolitan areas in the Kuzbass agglomeration. The competition between the municipalities takes place around the federal and regional funding, around foreign investments; around large and medium-size businesses, around various investment projects; around the quality of labour resources (they try to achieve this by better health care, education and social benefits). The competitors use official and unofficial methods (lobbying, petitions, reputation, etc.).

Such apparent and veiled competition between the two largest cities in the Kemerovo region provides a basis to put forward a number of fundamental theoretical problems, the solution of which can contribute to the effective functioning of the conurbation. The theoretical problems are as follows: is the competition of the actors in the conurbation continuous? is this competition a driving force for economic development? what is the ratio of the competition and cooperation forces, i.e., what tendency prevails at present and in the future? is it possible to measure the level of the competition? In contrast to the competition, the agglomeration processes of cities are focused on cooperation, integration, co-ordination and co-evolution (a predetermined or planned and coordinated development).

The algorithm of the formation of the social and economic policy of the Kuzbass agglomeration inclus:

– the identification of the urban agglomeration population's needs in goods and services;

– the determination of the list of goods and services for the population, which should be provided at the level of urban agglomerations, including inter-municipal cooperation;

– the determination of the goods and services produced by the enterprises within the urban agglomerations;

– the determination of the qualifications of workers in the agglomeration's enterprises;

– the identification of the structure and composition of the job market in the metropolitan area;

– the determination of the technological capabilities, moral and physical depreciation of the fixed assets of the enterprises in the urban agglomerations.

The analysis of the formation of the Kuzbass agglomeration helped to identify the prospects for the formation of the following required clusters: mechanical engineering; the advanced processing of agricultural products; the advanced processing of extracted raw materials (coal, ore, polymetals), and waste disposal. It is possible to build an environmental (ecological, environmental and economic) cluster, which may be the key to resolving the contradiction between the economic development of the territory and its environmental well-being. This is important for the Kemerovo region, in particular for the Novokuznetsk (Southern Kuzbass) agglomeration.

For the formation of the ecological cluster within the boundaries of the agglomerations we propose the following algorithm of decision-making: 1) the assessment of the conditions for the development of the ecological and economic clusters in the metropolitan area; 2) the identification of the least developed elements in the agglomeration's infrastructure for their further development; 3) an analysis of the causes of the underdevelopment of the respective elements of the agglomeration's infrastructure; 4) recommendations and specific measures for the design of an environment of ecological and economic cluster in the metropolitan area boundaries; 5) the assessments of the environmental, economic, social effects on the ecological and economic development of the clusters. The desired effect should be the improvement of the quality of the environment, and the reduction of the negative anthropogenic load, which is the result of greening, without reducing the scale of economic activity. The ecological and economic cluster should generate greater positive effects than the costs associated with its development [17].

The development of the local agriculture and food trade affects the food security, regional markets, and hence the urban agglomerations. Agriculture requires large areas of land. One of the defining characteristics of the urban agglomerations is that a built-up area (urban) in the metropolitan area must exceed the area of agricultural land. In addition, one of the industrial characteristics is a inverse correlation of the population density and proximity to the agricultural markets [18]. Then the problem of food supply comes up. If the proportion of the rural population in urban areas decreases, how should the problem of food supply be addressed? A priori, through the use of exogenous sources, thereby creating a dependence on other regions and on food imports.

The international practice shows that there is a shift in the paradigm of development towards ensuring food security. Some countries have developed urban food strategies to support a healthy and prosperous community through the reengineering of regional food and agricultural systems. For example, in Canada,

urban food strategies are developed with the participation of multidisciplinary teams (local authorities, non-profit organizations and universities) to provide a wide range of food products and rural planning. Such teams include agrologistics specialists, farmers, retailers, and even website designers [19].

Food security means a stable supply of basic foodstuffs from own national resources, regardless of force-majeur circumstances. Currently, food imports in the RF is about 40%. The share of food in total volume of imports is 12.8%. The total volume of food imports to our country is $7.5 billion. Food imports into the United States, Canada and Australia combined are $1.5 billion [20]. Agriculture as part of the Kuzbass agglomeration can be evaluated in a controversial way. Its development is affected by negative economic and institutional factors: market price fluctuations, the international sanctions, and some technological backwardness of the agricultural industries. The food supply in the region is characterized by negative features:

– a high degree of depreciation of fixed assets;
– a lack of government support for the AIC (agri-cultural-industrial complexes);
– processing and procurement companies that ignore the interests of agricultural producers;
– a large number of resellers and a consequent rise in food prices;
– a lack of investments in innovation;
– an under-development of the rural infrastructure.

In the process of agglomeration, the rural population and the number of agricultural workers decline. This is not necessarily a negative trend, as a reduction in the number of employees may be an evidence of the use of new high-performance technologies. The Kuzbass agglomeration, with its high level of urbanization, on first glance has less opportunity for food self-sufficiency compared to neighboring areas (Table 4). However, the geographical location of the Kemerovo region – its proximity to the areas with developed agriculture – gives it an opportunity to receive food products at the lowest transportation costs.

In the Kemerovo region depends on imports of the following products: canned fruit and vegetables – 90%; confectionery – 60%; cheeses – 89%; cereals – 50%; juices – 70%; mayonnaise, sauces – 100%; Beer – 90%; vodka – 30% (Table 5).

In the Kuzbass agglomeration, 14 municipal districts have the necessary resources for the growing and processing of agricultural products. The agricultural production in the Kuzbass territorial agglomeration is unevenly distributed. A large share of the profitable and efficient agricultural enterprises is located in the Yaschkinsk, Topkinsky, Prokopyevsk, Izhmorsk, Promyschlennovsk and Leninsk-Kuznetsky areas. Thus, successful agribusiness is concentrated mainly on the territory of the Kemerovo agglomeration. The least successful agricultural enterprises are in the Chebulinsk, Tyazhinsky and Tisulsky regions. It is necessary to take into account the self-supply (the amount of goods manufactured in the village for itself and the production in private farms). In the Kemerovo region in 2013, private farms produced 51% of all agricultural products including: potatoes 83.55%, vegetables 79.35%, and milk 55.8%. The level of food self-sufficiency of the region is calculated as the value of its own production per person and indicates the level of its possible ability to meet the food needs of the population. Based on this index we can analyze the external economic ties in the region, and can give a picture of the specialization of agricultural production (Table 6).

The level of self-sufficiency has shown positive results in dynamics (Table 7). However, food consumption in the region does not meet nutritional standards. Moreover, a large range of food is not produced in the region.

Table 4. The agricultural production in the agglomerations in the SFD in 2012 at current prices, mln. roubles [21]

Agglomeration	Crop production	Livestock production
Novosibirsk	21398.9	34635.6
Kuzbass	16792.8	20594.7
Tomsk	6041.8	13534.4
Altai	45333.3	48964.1

Table 5. The level of food imports in the agglomerations of SFD (% of prev. period) 2009 [16]

Agglomeration	Share of a/c in the structure of the GRP %	Food self-sufficiency	Imports of food products and agricultural raw materials for their production. In % of prev. period	Imports from the CIS countries. Food and agricultural raw materials for their production, in % to previous. period	Turnover of retail trade Foodstuffs (% of retail trade turnover), %
Novosibirsk	13	1.3	93.25%	55.45%	90.42%
Kuzbass	9	0.7	120.63%	55.25%	109.69%
Tomsk	5	0.5	81.93%	101.22%	101.12%
Altai	24	2.4	81.04%	86.25%	118.45%

Table 6. The coefficient of food self-sufficiency in the agglomerations of SFD [21]

Agglomeration	Grain products	Meat and meat products	Milk	The average value *Kc*
Novosibirsk	3.0	0.4	0.4	1.3
Kemerovo	1.5	0.2	0.2	0.7
Tomsk	1.0	0.3	0.2	0.5
Barnaul	6.1	0.5	0.6	2.4

Table 7. The dynamics of self-sufficiency of the population of the Kemerovo region in agricultural products, % [22]

Types of products	1990 yr.	2010 yr.	2014 yr.	Not produced
Grain	59.7	120.3	> 100	Sugar, salt, margarine, canned meat, canned fish, cheese dependence on imports of fishery products for processing 70%
Potatoes	104.7	110.7	> 100	
Vegetables	78.3	98.0	> 100	
Meat (cattle and poultry for slaughter)	69.4	45.2	About 85%	
Milk	72.6	57.5	About 90%	
Eggs	99.7	90.3	About 95%	

One of the priorities of the Kuzbass conurbation's functioning is the creation of high-capacity complexes for processing agricultural products. To ensure food security, a cluster of advanced processing of agricultural products will be created. In March of 2016, Novokuznetsk began a construction of the agrocomplex "Ariant-Siberia". The agrocomplex will include the largest cattle-breeding facility for 270 thousand heads and will be producing 45 thousand tons of meat per year. The agricultural complex will include: a feed milling plant with the capacity of 40 tons per hour, an elevator for grain storage of 80 thousand tons, a meat processing plant, which will produce 300 kinds of products from fresh meat to sausages and deli meats, totaling 100 tons a day, as well as the logistics center, which will deliver the products in the "Ariant" retail chain. The possibility of construction of the road to bypass the southern capital of Kuzbass is being looked into. The road will connect the Novokuznetsk and Prokopyevsk districts. By the end of 2017 an electric substation with a capacity of 16 megawatts will start operating. It will supply electric power to the agrocomplex and villages of the Prokopyevsky district. The agrocomplex will receive water supply from local artesian wells [23].

To ensure food supply to the Kuzbass agglomeration, it is necessary to align the internal transportation accessibility of the region with the external inter-regional transportation links. Based on the degree of accessibility, there are four types of areas in the Kuzbass agglomeration. The economically well-developed territories, which are the Yurga, Kemerovo, Topki, Promyshlenovsky, L-Kuznetsky, and Prokopyevsky regions, comprise a group that are mostly oriented to external interactions. And thus, the Kemerovo agglomeration has a good transportation capacity. We can't say the same about the transportation capacity of the Novokuznetsk agglomeration. Though the city of Novokuznetsk is an area open for external economic interactions, the greater Novokuznetsk area has the semi-enclosed type of economic interactions. Most of the open areas shape an elongated zone in the north of the region, stretching along the Trans-Siberian railway line and along the federal road. The semi-closed areas make up a large part of the territory of the region. The areas that are closed to external connections are located on the south of the region. The taiga takes more than half of these areas, and a significant part of the roads are rural roads which are not accessible. Overall, the areas that are actively open for external connections comprise 22.4% of the territory of the Kemerovo region, moderately open –16.5%, semi-open – 38.9%, and closed – 19.4% [24]. This shows that most of the territory consists of semi-closed areas, and the farther from the center of the Kemerovo agglomeration the areas are, the less is their level of openness to external interactions. The road network density in the Kemerovo region is lower compared to other Kuzbass regions that have the same population density, but much less economic capacities. Insufficient density of the road network and its uneven distribution in the region reduce the level of the transportation accessibility and consequently, food supply opportunities.

The inter-regional transport accessibility is crucial for the development of the food market of the Kemerovo region. The Novosibirsk region, the Tomsk region and the Altai region bordering the Kemerovo region differ in transport accessibility. Some districts of the Tomsk region and the Altai Republic are isolated. Districts of the Novosibirsk region, the Altai Territory and the Republic of Khakassia consist mainly of closed areas, except, the semi-closed ones situated on the border with the Kemerovo region. The development of the road network in the Kemerovo region is moving south, and the connection with the Novosibirsk region is limited to one railway and one road.

This analysis allows us to infer the following. The formation of the urban agglomerations is an objective process that occurs as a result of spatial competition for resources. The formation of the urban agglomerations

is a contradictory process that incurs, on one side, the concentration of economic activities and the growth of urban population in space; on the other hand, the decrease of the rural population, and hence the decrease of agricultural production. As a result, a problem of food dependence comes up. The regional authorities have to create conditions to solve the problem of food supply in terms of internal and external competition between the agglomerations. For successful functioning of the Kuzbass agglomeration, the problem of food security is extremely important given the following circumstances: the decrease of the rural population of the region; the increase of the competition for resources between neighbouring conurbations; the increase of the international economic sanctions. The problem of food supply can be resolved both by developing local resources and by taking advantage of the competition with the neighbourhing agglomerations.

ACKNOWDGMENTS

The research has been carried out as part of the Grant RHSF – Kuzbass №15-12-42003-a (P) "The development of a management system of social and economic development of the urban agglomerations in the Kemerovo region".

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Please cite this article in press as: Zobova L.L. and Shabashev V.A. The problem of providing food resources in urban agglomerations (the case study of the Kuzbass agglomeration). *Foods and Raw Materials,* 2016, vol. 4, no. 1, pp. 186–196. doi: 10.21179/2308-4057-2016-1-186-196.