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The European Proceedings of
Social & Behavioural Sciences
EpSBS

eISSN: 2357-1330

WELLSO 2016 - III International Scientific Symposium on Lifelong Wellbeing in the World

Formation of Clusters Mono Towns Located in Areas of Priority Socioeconomic Development

Antonov G.D[a]., Ivanova O.P[b]., Utrobin K.A[c]*

* Corresponding author: Utrobin K.A, utrobin_kirill@gmail.com

[a] *Institute of Retraining and Further Education, Kemerovo; Yurga Institute of Technology, National Research Tomsk Polytechnic University Affiliate, Yurga,Russia, gda-kuzbass@rambler.ru*
[b] *Kemerovo State University; Institute of Retraining and Further Education, Kemerovo; Yurga Institute of Technology, National Research Tomsk Polytechnic University Affiliate, Yurga, Russia, prof-ivanova@rambler.ru*
[c] *National Research Tomsk Polytechnic University, Tomsk,Russia, utrobin_kirill@gmail.com*

Abstract

http://dx.doi.org/10.15405/epsbs.2017.01.91

The paper describes the feasibility of creating clusters on territories of priority socioeconomic development in mono-profile towns. The authors suggest defining clusters in relation to types of business associations operating in priority development areas within mono-profile towns. The basic principles of the methodical approach were formulated to the formation of clusters in monotowns and diversification of the economy, located on the territories of priority socioeconomic development, based on international and Russian researches made to analyze the experience in the formation and functioning of clusters, their problems and risks. Most significant factors are distinguished for problem solving in mono towns to ensure the sustainable development of clusters. The cluster approach was analyzed with regard to its using in practice. The monotown of Yurga in Kemerovo Oblast (Kuzbass) is described as an example of cluster studies for a discussion of practical considerations in implementing the monotown program designed for priority development areas.

Keywords: TPSED; the Territory of Priority Socio Economic Development; cluster; mono-profile towns.

1. Introduction

Socioeconomic development of mono-profile towns depends on the functioning of their town-forming enterprises (or a group of interconnected companies). According to various estimates, 200 to 500 settlements can be referred to as mono-company towns during a period of 2008 to 2015. With a decrease in quantity of single-industry towns, included in the list approved by the Russian government, from 335 in 2009 to 319 in 2015, the number of single-industry towns in fact and town-related

problems in particular are not reduced. The following baseline scenarios can be reported for a single-industry town development: “business-as-usual”, which assumes liquidation of a town-forming enterprise and relocation of people, modernization of the town-forming enterprise with maintaining its major fields of activity, diversification of the town economy. Obtaining a status of the Territory of Priority Socio Economic Development (TPSED) within the borders of sites characterized by most difficult socioeconomic situations is a tool for single-industry towns to diversify their economy (Federal Law, 2014, & Government Resolution, 2015). Despite the fact that TPSEDs alongside with clusters and special economic zones are considered as the mechanism that promotes the economic and innovative development, the authors believe that establishing clusters as priority ("anchor") residents on territories of single-industry towns can provide a synergistic effect by benefiting from the TPSED status and the cluster approach. The economic sense of clustering is the used benefits from synergy arising from the interaction between companies in related industries located in one area, and organizations of the public and private sectors. Constructive partnerships of all stakeholders in a local economy is the defining feature of a cluster (Breault R., 2000). Despite the experience in creating clusters in the Russian Federation, there is no particular experience in structuring clusters in the context of single-industry towns within the framework of implementing programs designed to set up TPSED objects. Besides, a concept of clustering is not defined relating to the creation and development of TPSED objects within boundaries of a single location. This determines the relevance and practical importance of the study.

2. Clarifying the concept of "cluster" as the form of an organization of local businesses on territories of priority socioeconomic development in mono-profile towns

Clusters in the economic sense are concentrations of interconnected companies and firms in related industries in a particular location. And the nature of a cluster is that its members are mutually beneficial and enhance both its own and the cluster’s competitive advantage.

In the theory of M. Porter (2000), the emphasis is made on the interaction between cluster members (major manufacturing companies, complementary (supportive) industries, universities, research institutions and government bodies). A cluster is a more complex entity than a simple association of firms for joint activities, as it envisages cooperation based on membership in creating economic value in which the member companies compete.

R. Breault (2000) defines a cluster as the cross-industrial concentration of firms that creates jobs, exports goods and services, has general basic economic needs and consolidates the public sector of economic development, legislatures at different levels, universities, colleges, educational community, funds and all other stakeholders.

A cluster is an form of the network – based agglomeration of interrelated companies, as opposed to business-related networks; it encompasses a wider range of acting parties, including supporting institutions, industrial and commercial entities (among those are manufacturers, suppliers, educational establishments and research centers). Within a cluster, connections are possible in associations in one industrial group and across different segments of industries.

http://dx.doi.org/10.15405/epsbs.2017.01.91
eISSN: 2357-1330 / Corresponding Author: Utrobin K.A
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Clusters can have such members as focal companies (core firms), key stakeholders, small and medium enterprises, suppliers, marketing agencies, retailers, trading companies, service providers, trade associations/ unions, investment companies, individual investors, financial institutions, local municipalities, firms associated with cluster participants, supporting businesses, universities, research and analytical centers. It should be noted that, in Russia, the idea of creating a network with a major player participating in it is perceived well enough; however, capabilities of small and medium-sized enterprises are underestimated.

A cluster, created at the location of a mono town with the TPSED status, is proposed as the association of organizations (not just as a single-industry cluster around one or a group of town-forming enterprises) formed for the purpose of implementing programs and investment projects aimed at diversifying the town economy according to the TPSED requirements.

3. Analysis of International and Russian Experience in the Formation and Development of Clusters

The most important factors for successful clusters' development are: quality of management (European Cluster Excellence Initiative, 2015); mechanisms and organizational forms efficient in accumulating and disseminating knowledge, with a focus on the importance of social capital (Rosenfeld S. A., 2002); there are at least 30-50 specialized companies participating in a cluster to enhance potential in perceiving needs for innovations (Kutsenko E., 2015).

To describe communities in the technologically interrelated sectors, the term "filière" is widely used in France (Toledano J., 1978) that means a form of interaction having features of innovation clusters. The term "clusters of innovation" has gained wide popularity among leaders in the public and private sectors after the clusters created in the United States, bearing the name of "Clusters of Innovation" (Council on Competitiveness, Monitor Company, and M. Porter., 2001). It clearly reflects the fact that companies around the world have to compete not only in terms of productivity but also potential for innovations.

Methodology and implementation of the cluster policy in Russia is broadly consistent with the conceptual framework constructed for similar European programs, particularly French and German programs (Kutsenko E., 2015).

Since 2012, the Ministry of Economic Development of the Russian Federation has been conducting a competitive process for selecting projects designed to develop clusters in the Russian regions. During the competition, about 100 cluster initiatives have been selected, with 25 of them favoured as pilot projects to support. During 2013-2014, 3.8 billion rubles were allocated from the federal budget to regional budgets for co-financing to support the development of clusters. For example, the innovative regional cluster in the field of information and telecommunication technologies in Novosibirsk Oblast received 269 million rubles, and the cluster of information technologies in St. Petersburg received 1.3 million rubles. The average amount of the subsidy received by a cluster was about 100 million rubles (Implementation of the Cluster Policy in the Russian Federation, 2015.).

The activity of Russian innovative clusters (Bortnik I.M., 2015) was analyzed in 2015, applying the methodology developed under the European Cluster Excellence Initiative, to show the following results:

- Clusters are primarily concentrated in the Russian regions with a high level of innovation development (out of 21 clusters, 13 (62%) are located in the regions with "strong innovators", 5 (24%) with "medium-strong innovators", 1 cluster is in the region with "average innovators" and 2 clusters with "medium-weak innovators "(AIRR Ratings, 2015);
- the number of participants are less than 50 in 13 out of 21 reported and 6 clusters have less than 30 participants;
- 11 clusters specialize in innovating sectors of economy (information technology, biopharmaceuticals and novel technologies), whereas 12 clusters can be attributed to the traditional high-tech industries, the foundation of which was created during the Soviet era (aircraft and spacecraft manufacture, shipbuilding, nuclear and radiation technologies, chemicals and petrochemicals).

Since a large portion of Russian clusters are created on the basis of former Soviet enterprises engaged in the traditional high-tech industries (aerospace systems, nuclear technology, etc.), one of the features that characterizes these clusters is small and medium-sized businesses involved in small numbers, while abroad they are an active part of the created clusters. However, among those innovative clusters selected by the Russian Ministry of Economic Development and Trade there exist some variations in clusters:

- the clusters that include actors nearing to large companies (the aerospace cluster in Samara);
- the networks that unite the related small and medium-sized enterprises (the information and pharmaceutical clusters in St. Petersburg and Novosibirsk);
- the associations of enterprises concentrated around Research and Development Establishments (Pushchino Biotech innovative territorial cluster) and leading universities (the cluster “PhysTech XXI” in Dolgoprudny);
- the clusters formed into Closed Administrative-Territorial Units (Sarov, Zheleznogorsk);
- the clusters created on the basis of large agglomerations.

According to the results of surveys conducted to determine a degree of influence on the regional and national economies in whole, the following clusters take the first place: Kamsky innovative regional production cluster in Tatarstan, St. Petersburg and Novosibirsk region clusters of innovative communication and information technologies, as well as the aerospace cluster in Samara and the petrochemical cluster based on Bashkir refineries.

In terms of intensive interactions among the cluster participants, namely, the number of participants in joint projects, the number of joint innovative projects and business-related projects, the following clusters can be distinguished: the nuclear innovation cluster of Dimitrovgrad in the Ulyanovsk region, the multi-disciplinary cluster in the Tomsk region, Zelenograd microelectronics cluster (Moscow) and the lighting cluster in Mordovia.

http://dx.doi.org/10.15405/epsbs.2017.01.91
eISSN: 2357-1330 / Corresponding Author: Utrobin K.A
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According to the criterion "professionalism' used to rank managing companies, the first place goes to Tomsk multi-cluster, Kaluga region pilot innovative cluster for Pharmaceutics, Biotechnologies and Biomedicine, the nuclear innovation cluster in Dimitrovgrad, the cluster in the Novosibirsk region and the innovative cluster of rocket engine-building in the Perm region.

The relationship is identified between cluster funding through the Russian Ministry of Economic Development, the level of integration of its members and the degree of influence of a cluster on the regional development, and it can be concluded that there is no significant correlation between the amount of support and cluster management quality (Bortnik I.M., 2015).

In addition to the success of Russian clusters, it is required to highlight the problems arising in connection with their development. Thus, the development of clusters is limited by not only lack of knowledge, inability to use the world experience in a local environment, difficulties in finding investment, obsolete and worn out fixed assets, personnel problem, and commitment to getting quick results, but also weak elaboration of strategies in terms of setting priorities. Almost all industries in a particular territory are often chosen as the key points of growth that leads to the dissipation of energy, lack of available resources for implementing all projects in life.

The most significant problem is the low capacity of clusters participants for innovation growth, as the economy remains weak in perceiving the need for new technologies. Among the important reasons for this are: quality of the institutional environment and specific internal organization of industrial markets. As a rule, companies are willing to invest in innovations only if innovations are created and new products are launched onto the market during a period of one year. This period is not enough for truly break-through innovations. Even innovation –oriented enterprises are poorly built in cooperation that relates to the creation of new knowledge, technology transfer, interactions with scientific organizations. In addition, we should not exclude the existence of barriers between the fields of research, innovation, education and the real economy, which causes the disparity between industrial sectors to grow with reference to their levels of technology development and the polarization of regions relative to their innovative activities involvement.

In addition to the problems and limitations occurring in the cluster development in the Russian Federation, it is necessary to systematize risks, existing in regard to the cluster policy and cluster formation. For example, international experience shows that, when clusters are formed exclusively at the initiative of a government, one of the main risks is neglecting trends in business development, as well as its economic interests. In this case, there emerges a "large-scale building site in the open field at the instigation of officials with a focus on trendy topics" (Saraev V., 2014), resulting in an artificially-built cluster, which operates only as long as it is supported by the government. This happens because of artificiality of some cluster initiatives being considered by regional authorities as an instrument of state support; in Russian clusters, horizontal relations and communication is weak, and cooperation among participants is not developed.

Risks in Russia, when implementing the cluster approach, coincide with the risks pointed out by foreign experts. In particular, T. Munn-Venn and R.Voyer (2004) highlight the most significant risks faced by foreign governments in formulating and promoting the development of clusters: changes in macroeconomic conditions, weak innovation activities of clusters due to lack of mechanisms for

producing and adapting new knowledge, insufficient maturity of internal and external scientific and technological relations, causing a reducing synergistic effect from clustering, as well as inefficient methods used for management.

Along with this, it is important to highlight risks possible due to opportunistic behavior of cluster members, and risks associated with staff acquisition (shortage of experts with skills required for the operation of enterprises participating in a cluster), logistics and marketing. There are also groups of risks produced by the authorities. For example, infrastructure risks that arise from inadequate provision of cluster participants with transport, energy, public-service and other infrastructure; institutional risks that arise from uncoordinated actions according to scientific, technical, industrial, regional, socio-demographic, educational policies; resource risks associated with ineffective budget planning or deficit financing.

4. Methodology of Research

In developing principles of the methodical approach to the formation of clusters to be located in single-industry towns with the TPSED status, in our opinion, the following provisions of theoretical concepts and research should be considered: the possibility of more efficient internal compliance on the basis of inside information; the regulation and coordination of economic activities of participants resulting from the organization of an internal corporate financial market (based on the concept of internal capital markets); efficient networks, including suppliers, consumer and technological cooperation networks, and manufacturers (D. Ernst); advantages of industrial networks, commodity chains, supply chains and value chains (E.Yourdon, M.Cristopher, T.J.Galpin and M.Herndon, M. Garrett.

5. Results of Research

TPSED establishing in mono towns is aimed at creating conditions for attracting investments and avoiding dependence on a single industry. Due to the implementation of projects that have a multiplier effect, there appears the opportunity to improve the quality of life through building a new social infrastructure, providing employment and strengthening the tax base. The creation of a sustainable system capable to attract investments and implement investment projects aimed at improving standards of living, in turn, will ensure the implementation of programs designed to foster sustainable economic and social development in the long term. Besides, TPSED can solve the problems of attracting high-tech enterprises in the manufacturing sector with high added value, growing competitiveness of an area by creating conditions favourable for attracting investors to the region, including foreign investors. Priority development areas are declared to facilitate the creation of new, modern, export-oriented productions, to decrease unemployment by reallocation of existing human resources, to promote the growth of tax and non-tax revenues (for example, appearance of new taxpayers).

TPSEDs are created within the boundaries of single–industry towns with the most difficult social and economic situation. For example, the Yurga urban district (hereinafter referred to as the monotown of Yurga) is included in the list of mono-profile municipalities of the Russian Federation (mono towns) and falls into, depending on the risk for deteriorating its socioeconomic status, the category 1: Mono-

http://dx.doi.org/10.15405/epsbs.2017.01.91
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profile municipalities of the Russian Federation (monotowns) with the most difficult socioeconomic conditions (including the problems associated with the functioning of town-forming enterprises). In the period from 2000 to 2008, the rate of unemployment increased from 1.6% to 2.1% in the monotown of Yurga in Kemerovo Oblast. The rate was 3.6% in 2009, and by 2016 it almost doubled to 6.4%. In 2016, the management of the town-forming enterprise Yurga Machine Engineering Plant planes a two-time reduction of work force and announces the layoff of more than 1,750 employees. This indicator is rated as one of the highest among all urban districts in the Kemerovo region and higher than an average value of 17.4% in the region (while the regional rate is 2.3%). LLC Yurga Machine Engineering Plant has formidable difficulties in obtaining purchase orders, resulting in significantly reduced overall production. There are no sufficient internal resources for pumping up the town's budget.

In single-industry towns, working out a program for creating and developing the TPSED objects needs for feasibility evaluation of economic activities which can become internal points of growth. This feasibility can be evaluated only with employing the cluster approach. The cluster approach is one of the ways intended to improve competitiveness and economic development of territories. In addition, in the clustering theory, the priority is currently given to the restructuring process taking place in regional economies; economy diversification is particularly supported.

It is obvious that single-industry clusters can be formed based on one or a group of town-forming enterprises. Moreover, they are capable to be more resilient to the possible impact of the risks associated with cluster-related environments due to their internal structuring. However, inefficient functioning of clusters can lead to their decline in consequence of weak diversification of the regional economy.

When using the cluster approach to the program developed for the formation of TPSED within mono towns, the factors (Bortnik I.M., 2015), identified while studying national experience, should be taken into account for sustainable cluster development, in addition to international experience of cluster management under the European Cluster Excellence Initiative (2015).

We suggest a methodical approach to the formation of clusters in the framework of applying TPSED status to monotowns, with the basic principles being as follows:

- When selecting clusters capable of developing in priority development areas within monotowns, enterprises and their concentration should be assessed upon their specifying with regard to their core, complimentary and supporting activities, since a potential for innovations is dependant on these indications. This is also important for encouraging internal competition, especially in the field of innovation, enabling the choice of the most efficient actors, flow of labor and investment. The priority, when making a decision as to support a particular mono town located within an area with the TPSED status, is given to the clusters that operate in sectors with economic performance exceeding the average level in the country;
- Using the networking strategy for the purpose of taking advantage due to the ability to networking coordination, adapting to changing conditions, rapid response to changing market conditions, specialization, cost reduction;

- Creating attractive conditions for qualified workforce and innovative entrepreneurship in a urban environment in order to avoid the dominance of town-forming enterprises and diversify the town's economy;
- Setting up specialized managing companies meant to perform functions to manage clusters, including coordination of participants strategies, interaction with the government bodies in order to build effective communications within and among clusters, as well as development of vocational competence, training, determination of areas for cooperation among participants, promotion of inter-industrial relationships;
- Using outsourcing, i.e., clustering through cooperation with a number of independent companies involved to intensify competition among them around the core businesses – town-forming enterprises and large factories. In this connection, certain conditions are required for the formation of clusters within a certain area - a network of competing suppliers and contractors, research institutions and agencies. The practice of individual business process outsourcing is one of these conditions, as it forms a market for many potential participants to enter the cluster - existing organizations and start-ups.

Perspective development of clusters under TPSED agreements motivate enterprises to adopt a strategy based on the model of "open innovation"(Kutsenko E., 2015), i.e. the use of incoming and outgoing flows of knowledge to strengthen innovation processes within companies. It is important not only to attract third parties for problem solving as a result of outsourcing, networking, and customer involvement, but also to involve employees in the production of innovations.

Phasing of Cluster Formation:

The First Phase: in the organizational period when clusters are planned and projected, first it is necessary to determine what certain types of interaction the enterprises – participants are in need of to formulate reasons in motivating the clustering: joint supplies, distribution and marketing; shared cost-effective supply chains; implementation of a unified scientific and technical policy; experience and innovation transfer; agreed actions aimed at maintaining and expanding market positions. The choice of core activities is advisable to justify on the basis of analysis made not only upon the results of market research, but also the prospects for the development of markets.

The Second Phase includes: the determination of main activities of the cluster in the context of its long term strategy; the involvement of organizations actively working on the market, primarily marketing and engineering companies, and supply chains, etc.; the procedures required for joint decision-making and common approaches to management actions inside the cluster; the formulation of principles of management for successful development of the entire network of enterprises.

Formation and development of networks (related to production and business) is based on a combination of core competences of large enterprises, medium-sized enterprises and a number of small firms (complementary, supporting, service companies). Autonomy of objects not included in the company, combined with clear rules of corporate interaction initiates the occurrence of sustainable synergies in the networks.

The networking structures are supposed to have the following features: sustainable cooperation, the need for which is determined by the complexity of final products, employing knowledge-intensive

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technologies with a long research and development cycle to make them. The network-driven cooperation is related to the activity of participants of not only production, but also marketing (economic feasibility for launching new products and their placing on the market), scientific and technical, sales and service (dealers, leasing companies, service centers, recycling, etc.), and financial institutions.

The main network feature is mainly the production and sale of specific assets, i.e. components, technologies, know-how and other intangible assets, which are made according to the order of a managing company of the whole chain. This requires the use of special network forms to organize the network involved in the research and production cycle. Networks are characterized by cooperation (common value creation, not just market exchange), with a special role of internal infrastructure, interpersonal relations and knowledge transfer.

A cluster, including a managing company as its core and a network of enterprises, has a number of advantages over structures operating within the strict legal framework: freedom of "entrance" and "exit" from the network and cooperation relations; more efficient cooperation ties develop and grow stronger; less efficient ties decline and disappear (without any legal problems); unlimited number of participants, unlimited chains of relationship (technological, economic, financial); opportunity for participants to integrate their resources in a range in investing projects aimed at creating new and upgrading existing productions and relationships; transaction costs are minimized.

According to the proposed phase-related mechanism for cluster formation, the boundaries of clusters gradually expand as new companies emerge and enter production and business networks. This mechanism has the advantages: first, this makes possible to avoid failures and errors in determining the fields of activity; secondly, functioning as a part of the network helps companies identify problems of interaction, points of contact, perspective directions for joint activity, "equalize" the characteristics of merged entities, and master the patterns of relationships.

6. Appraisal of research results and their testing in practice (the case study: the monotown of Yurga in Kemerovo Oblast)

We have analyzed the program, based on the cluster approach, designed for the monotown of Yurga in Kemerovo Oblast, pretending to obtaining TPSED status. Three clusters are defined: a machine-building cluster, an agriculture cluster and a cluster dealing with construction materials. Small businesses interacting with medium–sized enterprises form the machine-building cluster, using a part of manufacturing facilities of the former town-forming machine engineering plant. The construction materials cluster is planned to use a major company TechnoNICOL as its base. In addition, in the long term, the territory of the former town-forming machine engineering plant is planned for the creation of a transport and logistics cluster due to the convenient and advantageous geographical location (Yurga is located on the river Tom in the middle between Kemerovo, Tomsk and Novosibirsk, the regional centers in the Siberian Federal District; railways, oil and gas pipelines, and lines of high-voltage transmission are available for use). The possible formation of scientific and educational cluster is being analyzed, including the scientific and technical center, an affiliate of the national research university. However, in our opinion, there is no need to form a separate scientific and educational cluster. The

scientific and technical center of the national research university should be involved in cooperation with industrial and logistics companies, and enterprises of all sizes, which are merged to create the machine-building, transport and logistics, construction materials, and agricultural clusters.

The positive results of cluster formation in Yurga may include: an increase in the number of taxpayers and the tax base; the appearance of a convenient tool for relationships among small, medium and large businesses; an increase in the city budget revenues; the town's economy diversification, the use of excess manufacturing facilities on the territory of the former town-forming enterprise. Among the limiting factors in Yurga can be identified: the low quality of business environment (before TPSED status obtaining), the weak development of business associations (chambers of commerce, industry associations), which are often unable to meet challenges relating to the development and promotion of priorities and interests of regional businesses.

Table 1. Projected Figures for the Clusters formed within the framework of TPSED in the monotown of Yurga in Kemerovo Oblast

Parameter	Without TPSED status	With TPSED status (during the first 5 periods)	With clusters formed
Number of Enterprises, pc.	2839	2889	Over 3000
Number of People Employed	35 600	38 100	40 000
Personal Income Taxes payable to Municipal Budget, RUR	574 609 000	945 208 000	1 172 057920
Insurance Fees from Salary Funds, RUR	1 334 860 907	567 124 799	431 014 847
Budget Revenues, RUR	912 464 200	1 465 377 000	1 817 067480
Municipal Budget Debts, RUR	183 122 000	0	0
Town Maintenance Costs, RUR	1 201 803 400	1 201 803 400	1 201 803 400

The forecast indicates that using the cluster approach to the TPSED program developed for the monotown of Yurga makes possible to identify optimal areas for clustering. However, it is important not only to determine the optimal clusters for monotowns, but also to set up a specialized organization for their management.

7. Conclusion

The feasibility and potential were analyzed for clusters creating on the territories of priority socioeconomic development established in monotowns. The main principles of the methodical approach were formulated to the formation of clusters within the boundaries of single-industry towns in the areas of advancing socioeconomic development, with the formation phasing according to the concept of clusters based on the networking strategy with outsourcing to create effective networks. The case study is described to demonstrate the results of using the methodology in the context of creating clusters in sites with the TPSED status.

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