The European Proceedings of
Social & Behavioural Sciences
EpSBS

Future Academy

ISSN: 2357-1330

http://dx.doi.org/10.15405/epsbs.2018.02.6

RPTSS 2017
International Conference on Research Paradigms Transformation in Social Sciences

DIVERSIFICATION INDEXES: ARRANGEMENT AND APPLICATION POSSIBILITY FOR COMPANY TOWNS

Irina S. Antonova (a)*, Kristina A. Bannova (b), Ekaterina S. Solomahina (c)
*Corresponding author

(a) National Research Tomsk Polytechnic University, Tomsk, Russian Federation, antonovais@tpu.ru
(b) National Research Tomsk Polytechnic University, Tomsk, Russian Federation, bannovaka@ya.ru
(c) Saint-Petersburg State University of Economics, Saint-Petersburg, Russian Federation, katrinakop@yandex.ru

Abstract

The recent decade is of high priority for Russian company towns calling for significant modernization of the economy with correspondent investments. The company town economic development is considered mainly through the diversification strategy. The diversification process supposes the change of the company town structure from a single industry to diverse. The article contributes to the concept of company town diversification and the methodology of its evaluation. The authors compare “diversification” concepts at the regional level matching the objects of diversification. The article summarizes and systemizes the indexes of diversification measurement and offers to divide them into two groups – general and specific indexes. The general indexes can be implemented in different economic activities and objects whereas the specific ones focus on the micro or mezzo levels. The system of indexes for the diversification evaluation is complemented by shift-share and regional indexes. The results are figured out in a schematic way classifying the diversification indexes according to the object and the possibility to use the indexes for a company town diversification evaluation. All considered methods are compared by the range of results, possibility to assess the dynamics, and the variety of measured data. The comparative analysis made it possible to define the indexes that can be applicable for company town diversification evaluation and offer the diversification index for company towns that combines the considered measures.

Keywords: Diversification, index, company town, concentration, structural changes.

http://dx.doi.org/10.15405/epsbs.2018.02.6
Corresponding Author: Irina S. Antonova
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

1. Introduction

The development of Russian company towns in the recent decade is directly associated with the economic diversification that is stated in Russian development strategies and regulations at different levels. The analysis of contemporary researches shows that the "diversification" concept has no shared sense due to object scope variety: economy, risks, business processes, market, the higher education, transport, auditing, social care and others. The term under consideration becomes the relevant issue for pedagogics, sociology and psychology figuring out even the new terms of "social diversification" and "diversification of perfectionism" (Kononenko, 2015). Taking into account the company town as the research object, the most appropriate scope in this study is the territory and economy diversification.

International theory and practice of company town development focus basically on the core factors of the economy growth paying no attention to the specific structure share of company towns during its diversification. Clemenson (1992) has found out that the communities, which were able to diversify into other resources or industries, had increased labour force participation in the period after the resource boom between 1981 and 1986. Akpadock (1996) considers four county communities in north-eastern Ohio and suggests to attract to the regions not only the developed productions with higher value added but also the service sector, otherwise the sharp regional economy recession is highly probable. Robertson & Blackwell (2014) consider comprehensive exchange of information in different types of industries during the regional diversification in company town. Skeard (2015) considers diversification basically as the small productions development in the city. Thus, although the indexes of concentration and diversity have sufficient history of its development and use (Gini, 1921; Hirschman, 1945; Lourentz, 1948; Herfindahl, 1950; Theil, 1967; Hall & Tideman, 1967; Lerner, 1973; Linda, 1976; Hannah & Kay, 1977; Herzog & Olsen, 1977; Calkins, 1983; Sleuwaegen & Dehandschutter, 1986); they are still relevant (Esteban, 2000; Bikker & Haaf, 2002; Reardon, & Firebaugh, 2002; Micheeva, 2013; Lin & Huang, 2014; Kumar, 2016) especially for diversity measurement of company town economic activities (Calkins, 1983; Clemenson, 1992; Turgel, 2014; Carson, Carson & Henderson, 2014; Murdoch, 2016).

2. Problem Statement

The "freedom of speech" concerning the diversification term causes indexes pluralism. The key indicators of the diversification index become the concentration of business and social activity, investments and taxation that are measured separately. The most widespread course in diversification evaluation is focusing on labour force as the core factor to measure the concentration that is shown in researches by Clemenson (1992), Christiaensen, Weerdt & Todo (2013), Carson, Carson & Henderson (2014). The other popular course of diversification study implies the banking operations as shown in Lin & Huang (2014) who measure the bank income and its diversification (concentration). Nevertheless almost all indexes of different research areas are cross functional. In this case, the article suggests defining the main approaches to the "diversification" concept, methodizing the index system of diversification and offering the indicator of diversification by emergent business activity.

http://dx.doi.org/10.15405/epsbs.2018.02.6
Corresponding Author: Irina S. Antonova
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

3. Research Questions

This article focuses on the different measurements of diversity and concentration as the opposite side and concluding the ability to use each of the indexes for company town diversification. The essential limits for using the considered indexes are the official statistical data base, using criteria and factors to evaluate the diversity. The variety of methods to evaluate the diversity and concentration forces was systemized as the diversification indexes according to the possibility to evaluate the dynamics and to apply them for the company towns. The results of the analysis will allow identifying the weak points of the existing methods for company town diversification evaluation and the suggestions for its improvements.

4. Purpose of the Study

The purpose of the study is to collect, systemize and analyse the variety of methods measuring the diversity and concentration of different activities and volumes to define the application possibilities and justify the choice the methods to develop the dynamic approach for company town diversification assessment. The basic principles, factors and concepts of the approach are presented in the previous works (Antonova, Pchlintsev, & Vavilov, 2016; Antonova, Koptelova et al. 2016). Thus, this research is going to specify the diversity measurements itself and enforce the arguments on the dynamics approach.

5. Research Methods

The research contributes to the methodology of diversification measurement by collecting, analyzing and systemizing the different indexes and coefficients of concentration and diversification. The authors consider the indexes and coefficients of concentration and diversification to arrange them by the sphere of application, define the ability to detect the dynamics and the range of the results. The list of concentration and diversification indexes and coefficients that are under consideration are introduced in table 01 and are as follows:

- **Concentration Ratio (CR_k)**

$$\boldsymbol{CR_k = \sum_{i=1}^{k} Y_i} \ ,$$

where Y_i – share of element i in total summary of elements; k – the number of firms that is chosen arbitrary.

CR is one of the most frequently used measures of a concentration. *Bikker& Haaf* (2002) estimate CR_3, CR_4, CR_5 for 3, 4, and 5 largest banks of mortgage market. *Meilak* (2008) measures 12 largest merchandise export categories of each country. *Hannah& Kay* (1977) use the ratio to estimate the share of 100 firms (CR_{100}) of production performance. Considering the type of market competition, some researchers are modifying this index to compare the top corporations and its concentration in the market (Linda, 1976) of the major companies. Linda index combines ranking of the hugest companies with the concentration of 2-3 companies within the districted number of the large companies. Although the *CR* can

http://dx.doi.org/10.15405/epsbs.2018.02.6
Corresponding Author: Irina S. Antonova
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

be easily used for identifying and analysis in dynamics of the data of town-forming enterprise, this ratio fails to estimate the small and medium business (SMB) at the early stage of their development.

- **Herfindal-Hirshman Index (HHI)**

$$HHI = \sum_{i=1}^{n} Y_i^2, i = 1, \dots, n$$

where Y_i – the share of element i in the total volume; n – the total number of elements.

HHI is the second of the most widespread indexes of concentration that is used in a variety of fields including banking, production, and social sectors. *HHI* index represents the key tool of monopoly power estimation due to antitrust laws in the USA. Thus, Y_i can be considered not only in terms of company share in production at the market but even as business and social-economic activities in a town and in a country in general. It may detect the concentration of investments, labour or taxation in a town including town-forming enterprises and medium and small business. Moreover, this index is universal and gives the result even if the list of elements includes 0. That makes this index more preferable than indexes on the basis of logarithm. It is possible to estimate the dynamics of this index, but it is difficult to define the contribution of different elements into the result.

- **Rosenbluth Index and Hall-Tideman Index (HT)**

$$HT = \frac{1}{2\sum R_i q_i - 1},$$

where R_i – the rank of company i by market share; q_i – share of company i by sales at homogeneous market. Rosenbluth and Hall-Tideman indexes are generally considered together. The basic difference between them is that *Hall & Tideman (1967*) offered to rank the market share of a company by sales whereas Rosenbluth Index does not imply such ranking. *HT* index makes it possible to measure the concentration of company town economic activities by dispatched goods, employment, investments, and taxation showing the opposite rate of diversification.

- **The Multigroup Entropy Index or Theil Index (E)**

$$E = \sum_{i=1}^{n} Y_i \ln \frac{1}{Y_i},$$

where Y_i – share of element i in the total; n – number of elements.

The entropy shows the inverse concentration: the higher its value, the lower the concentration. The former statement makes this index relevant for the rate of company town diversification assessment. The index ranges between [0; $\ln$n]. On the one hand, this index is hard to interpret and is of rare use *(Reardon & Firebaugh*, 2002). Moreover it fails when element Y_i equals *0*. On the other hand, it allows standardization the results with positive and negative smoothed values that can be easily depicted at the matrixes.

http://dx.doi.org/10.15405/epsbs.2018.02.6
Corresponding Author: Irina S. Antonova
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

- **The Hannah and Kay Index (HKI)**

$$HKI = \left(\sum_{a=1}^{n} s_i^{\alpha} \right)^{\frac{1}{1-\alpha}}$$

where *s* - share of element *i* in total summary of elements; α – the elasticity parameter for entry or exit of the bank from the general group, $\alpha > 0$ and $\alpha \neq \mathbf{1}$. Although *Hannah & Kay* (1977) offer to use this index for the banking sector, it may be widened for other sectors of economy, including economic activities of company towns. *Bikker & Haaf* (2002) underline that α is optional and allows alternative views on this measure that makes it ambiguous.

- **The Gini Coefficient (G) and the Lorentz Coefficient (L)**

$$G = 1 - 2\sum_{i=1}^{m} x_i cumy_i + \sum_{i=1}^{m} x_i y_i$$

where x_i – the share of group *i* in the total; y_i – the share of group *i*; $cumy_i$ – the cumulative income share; *m* – the number of groups.

$$L = \frac{\sum_{i=1}^{m} |d - p|}{2}$$

where *d* – share of *i* group in total; *p* – group frequency in the total amount of characteristic in a multiple relationship; *m* – the number of groups. The index ranges between [0; 1] and basically shows the relative proportion in population income. These indexes are often considered together and are two of the most difficult to calculate due to the necessity of an adequate background for grouping. That makes the index to be hardly used for measurement of economic activity diversification in company towns.

- **Coefficient of Variation (CV)**

$$CV = \frac{\sigma}{a} * 100\%,$$

where σ- standard deviation, *a* – arithmetical mean.

CV is a general statistic indicator that shows the standard deviation of the mean value. The deviation can be significant (*CV*>33%), average (10%<*CV*<20%) or insignificant (*CV*<10%). *Borenstein & Rose* (1991) and other researchers use this index for prize discrimination measure. Nevertheless, *CV* makes it possible to estimate the deviation of economic activities in the company towns as the measure of concentration or diversification. If *CV* is considered insignificant, that will imply the low diversity of economic activities in the town, whereas company towns at the prime stage of the diversification process will have significant deviation.

- **Dominant Firm or Competitive Fringe Model (DF/CF)**

$$K = \frac{DF}{CF},$$

where *DF* – dominant firm market share; *CF* – competitive fringe market share.

This clear model cannot by easily used for concentration and diversification estimation for company towns because the model considers only a homogeneous product for both dominant company

http://dx.doi.org/10.15405/epsbs.2018.02.6
Corresponding Author: Irina S. Antonova
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

and competitive fringe that was stated by *Kahai, Kaserman & Mayo (1996)*. The fulfilment of this condition means measuring only the basic company town industry since both companies will represent it with a high probability.

- **Bank Income Diversification**

$$\boldsymbol{DIV = 1 - (SHNET^2 + SHNON^2)},$$

$$\boldsymbol{SHNET = \frac{NET}{NET + NON}},$$

$$\boldsymbol{SHNON = \frac{NON}{NET + NON}},$$

where *NET* – net interest income; NON – non-interest income; SHNET is the ratio of net interest income to net operating revenue, and *SHNON* is the ratio of non-interest income to net operating revenue. DIV measures the degree of diversification.

This index is offered by *Lin & Huang* (2014) and shows that the higher the value, the more diversified the income. On the contrary, *DIV=0* means that all revenues come from a single source (complete concentration) and *DIV*=0.5 represents an even split between net interest income and non-interest income (complete diversification). This index can be used for company towns only if a town-forming enterprise is considered as *NET* and others – as *NON*. Moreover, the *DIV* itself is quite interesting because it represents how to convert the concentration, measured as *HHI* ($\boldsymbol{SHNET^2 + SHNON^2}$), into the diversificasion. Thus, the authors may figure out the proper diversification index that represented in section "Results".

- **The Diversification Coefficient**

$$\boldsymbol{\rho_{\omega,\omega^{MDP}} \geq \frac{DR_{(\omega)}}{DR_{(\omega^{MDP})}}}$$

where $\boldsymbol{DR(w) = \left[p(w)\left(1 - CR(w)\right) + CR(w)\right]^{-1/2}}$; $\boldsymbol{p(w)}$ is the volatility-weighted average correlation of the assets in the portfolio; $\boldsymbol{CR(w)}$ is the volatility-weighted concentration ratio (CR) of the portfolio; *w* – the weights of a portfolio; *MDP* – most diversified portfolio.

Choueifaty, *Froidure, & Reynier* (2013) offer to measure "Maximum Diversification" portfolio invariance properties using the index. They presented the new mathematical properties of the diversification ratio and the most diversified portfolio (*MDP*), and investigated the optimality of the MDP in a mean-variance framework. This index can be hardly applicable for company town diversification measurement.

- **Localization Coefficient**

$$\boldsymbol{LQ_i = \frac{S_i^r}{S_i^N}}$$

where $\boldsymbol{S_i^r}$ - the share of industry in regional production structure; $\boldsymbol{S_i^N}$ – the share of industry in country production structure.

http://dx.doi.org/10.15405/epsbs.2018.02.6
Corresponding Author: Irina S. Antonova
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

Hackman & Oldham (1975) calculated this index as the share of sector *i* in region *r* compared with the corresponding national economy indicator. The localization coefficient is widely used at the regional level of research as the characteristic of a regional specialization. *LQ*>1 stands for a specialized sector.

- **Hackman Coefficient**

$$\boldsymbol{I_{HAC} = \frac{1}{\sum_{i=1}^{M}(LQ_i * S_i^r)}}$$

where $\boldsymbol{S_i^r}$ - the share of industry in regional production structure; $\boldsymbol{S_i^N}$ – the share of industry in country production structure.

The index I_{HAC} is developed by *Hackman* (1975). The amount of the regional localization coefficients is weighed by the share of the relevant sector in a common regional indicator. It shows how closed the regional indicators are to the structure of the corresponding indicator for national economy. The coefficient value ranges between [0;1], I_{HAC}=1 shows the complete match between regional and national structures. Both Localization and Hackman coefficients can be used for industry competitiveness in the company town for considering the proportions of local economy in the regional one.

- **Territory Diversification Coefficient**

$$\boldsymbol{TK = \sum_{i=1}^{n}(\left|\frac{100}{N}\right| - D_i)}$$

where N – the number of elements in total; D_i – the weight of element i in per cent.

Turgel (2014) suggests using this coefficient for both production and employment structure diversification. The coefficient shows how homogeneous the industries are in company town economy. This diversification coefficient can be calculated both for assessment of an industry performance and an employment diversity by economic activities in company towns.

- **Coefficient of Production per Capita**

$$\boldsymbol{K_p = (\frac{I_r}{I_c} * 100) : (\frac{P_r}{P_c} * 100)}$$

where I_r – regional industry output; I_c – country industry output; P_p - regional population; P_c – country population.

The Coefficient of proportion per capita (*Uscova*, 2008) considers production K_p as the relation between the weight of the regional industry in relevant country industry and the weight of a regional population in the country population. The weight of regional industry can be changed by core industry of company town considering in dynamics.

Trying to evaluate the dynamics and the structural shifts on the territory different authors develop shift-share indexes. The shift-share analysis is conducted by the following indexes that are given in table 2. This method is used to the regional growth measurement and describes the dynamics of structural changes that makes the method be applicable for structural movements of company town economy for diversification process can be seen as the structural shift of company town economy.

http://dx.doi.org/10.15405/epsbs.2018.02.6
Corresponding Author: Irina S. Antonova
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

Table 01. Structural shifts assessment

Index	Formulae	Citation
Salaee Coefficient of Relative Structural Disparities	$k = \sqrt{\frac{\sum\left[\frac{(d_{i1} - d_{io})}{(d_{i1} + d_{io})}\right]^2}{n}}$ where d_{i1} d_{io} share of industry i in in the indicators comparable years' structure; n – the number of industries.	Love (2003)
Ryabtsev Index	$I_R = \sqrt{\frac{\sum(d_1 - d_0)^2}{\sum(d_1 + d_0)^2}}$ where d_0 - specific weight of the first object's structural element; d_1- the similar element's specific weight of the second object's structure.	Elkhina (2014)
The Coefficient of Relative StructuralS	$\sigma = \sqrt{\frac{L}{2} * \sum(d_1 - d_0)^2}$ where L - the number of dominant groups; d_0- specific weight of the first object's structural element; d_1- the similar element's specific weight of the second object's structure.	Kazinets (1981)
National Component or National Effect	$NS_{ir}^t = E_{ir}^{t-1} * \frac{E_N^t}{E_N^{t-1}}$ where Er - the part of a regional indicator's growth; E_N - the growth of a national indicator.	Herzog & Olsen (1977)
The Effect of Industry Structure	$MS_{ir}^t = E_{ir}^{t-1} * \left(\frac{E_{iN}^t}{E_{iN}^{t-1}} - \frac{E_N^t}{E_N^{t-1}}\right)$ where Er - the part of a regional indicator's growth; E_N - the growth of a national indicator.	Esteban (2000)

6. Findings

The analysis of the methods of diversification measurement shows the vast number of indexes and approaches to estimate it. The authors consider the complexity of methods and possible application to company town diversification assessment and have suggested the following structure of considered indexes represented in figure 01.

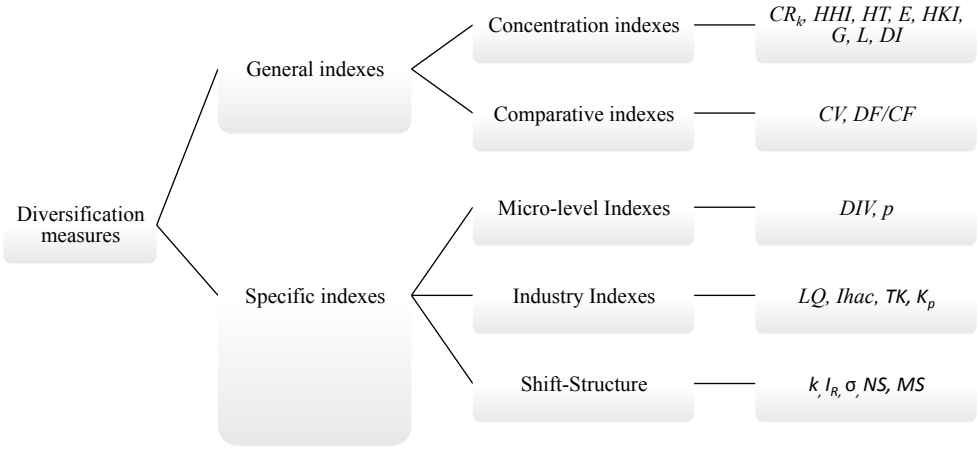

Figure 01. Diversification measures groups

The first group of indexes reflects the mass phenomena and is called “general indexes”. The authors offer to subdivide this group into concentration and comrarative indexes. Concentration indexes are the most widespread and useful coefficients that can be easily implemented in different objects including company town economic activities. The only limit is the statistical data base, for instance,

http://dx.doi.org/10.15405/epsbs.2018.02.6
Corresponding Author: Irina S. Antonova
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

entropy (E) can be calculated only if the stutistics has no 0 in values. Comparative indexes focus on the difference between companies including standard deviation and the difference between top and major companies (Linda and Lin & Huang indexes). The second group reflects characteristics of a specific objects. This group comprises the indexes of a micro-level (financial assets and certain companies), an industry, comparing the share of regional industry in country and a shift-share, detecting the dynamics of the structural changes of an industry in comparison to the national level.

During the analysis of the considered application to the company town diversification measurement, the authors came to a conclusion that the indexes option directly depends on the available statistics at the medium level (cities and towns). The statistics about Russian towns and about company towns is not open for wide audience. The authors define four basic points to compare indexes that can be applied for company town diversification measurement: the range, the type of elements, dynamics consideration and application possibility. The results are given in table 3.

Table 02. The comparative analysis of diversification indexes

Index	Range	Dynamics Evaluation	The objects of measurement	Application for Company Town Diversification Measurement
1.General Indexes 1.1 Concentration Indexes				
CR	[0; 1]	-	Different	+ Considering town-forming enterprise
HHI	(0; 1]	-	Different	+ Considering dispatched goods, employment, investments, and taxation by economic activities or by companies
HT	[0; 1]	-	Sales of the companies	+ Considering dispatched goods, employment, investments, and taxation by economic activities or by companies
E	[0; lnn]	-	Different	+ Considering dispatched goods, employment, investments, and taxation by economic activities or by companies
HKI	[1/$s_{1;}$ n]	-	Companies (banks) and the elasticity of new company entry	+ Considering dispatched goods, employment, investments, and taxation by all companies in town
G, L	[0; 1]	-	Different by uniform groups of elements	+ Considering dispatched goods, employment, investments, and taxation by all companies in town
1.2 Comparative Indexes				
CV	[0; 100%]	-	Different	+ Considering economic activities and companies
L	(0; +∞)	-	Top companies and major companies	-
K	[0,5; +∞)	-	Dominant firm and Competitive fringe	-
2. Specific Indexes 2.1 Micro-level Indexes				
ρ_{w*w}^{MDP}		-	Financial assets	-
DIV	[0; 0,5]	-	Interest and non-interest income (banks)	+ Considering core and other industries
2.2 Industry Indexes				
LQ	[0,5; +∞)	-	Regional data	+ Considering company town data

http://dx.doi.org/10.15405/epsbs.2018.02.6
Corresponding Author: Irina S. Antonova
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

I_{HAC}		-	Regional data	+ Considering company town data
TK	[0; 100%]	-	Regional data	+ Considering company town data
K_p	[0; +∞)	-	Industry data	+ Considering core industry data
2.3 Shift-Share Indexes				
k	[0; 1]	+	Industry data in different periods	+ Considering core industry data
I_R	[0; 1]	+	Industry data in different periods	+ Considering core industry data
σ	[0; 0,5]	+	Industry data in different periods	+ Considering core industry data
NS_{ir}^t	(0; +∞)	+	Industry data in different periods	+ Considering core industry data
MS_{ir}^t	(0; +∞)	+	Industry data in different periods	+ Considering core industry data

Considering all existing indexes of concentration and diversification, the authors are arguing for using the following diversification index to measure the variety of economic activities in different company towns:

$$\boldsymbol{DI = 1 - HHI = 1 - \sum_{i=1}^{n} Y^2{}_i}$$

where Y_i – the share of element i in total volume; n – total number of elements.

This index makes it possible to consider all advantages of *DIV* and *HHI*. In order to evaluate the dynamics of the structural changes, it can be also used the least square fitting for the period of 5 years. This period is explained by the Russian Government Resolution "About distinguishing criteria of Russian Federation company towns and its classification depending on the risk of deterioration of their socio-economic wellbeing" of 29.07.2014 where the basic criteria of company town is when the average number employed in the company (group of companies) is more than 20% during last 5 years.

7. Conclusion

This article results in the deep analysis of the vast variety of diversification and concentration indexes and offers the classification of the existing indexes, comparative analysis and conclusion on the possibility to use these indexes to evaluate the diversification of company town economic structure. The comparative analysis of indexes revealed that all indexes excepting shift-share do not permit to study the diversification in dynamics considering the past statistical data. Nevertheless, the shift-share indexes are focusing in structure moving in general and do not indicate the tendency in diversity or concentration. The authors come to the conclusion that the complex analysis of the structural changes in company towns should be used in the combination of different indexes. Thus, it is suggested to use the combinational diversification index (DI) to evaluate the diversification process in a company town joining it with the least-square fitting for a 5-year period.

http://dx.doi.org/10.15405/epsbs.2018.02.6
Corresponding Author: Irina S. Antonova
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

Acknowledgments

The reported study was supported by RFBR, research project No. 16-36-00294 mol_a "The dynamic approach to effectiveness evaluation of diversification of a company town economy".

References

Akpadock, F. (1996). Diversification trends of the regional economy of mill-town communities in northeast Ohio, 1980-1991. *Community Development*, *27(2),* 177-196.

Antonova, I. S., Pchelintsev, E. A., & Vavilov, D. D. (2016). Dynamic Approach for Diversification Effectiveness Evaluation of Berezovsky Company Town. *In III International Scientific Conference on Information Technologies in Science, Management, Social Sphere and Medicine (ITSMSSM 2016)*, May 2016, Tomsk Polytechnic University, Tomsk, Russian Federation (pp. 328-331). Atlantis Press.

Antonova, I.S., Koptelova, K.S., Negodina, O.A., Spitsina, L.Y., Popova, S.N., Vavilov, D.D. (2016). Investment Attractiveness of Closed-end Real Estate Investment Funds in Russia: Factor Score Evaluation*, Education, Management, Computer and Society (EMCS 2016),* 37 904-907.

Bikker, J. A., & Haaf, K. (2002). Competition, concentration and their relationship: An empirical analysis of the banking industry. *Journal of Banking & Finance*, *26(11),* 2191-2214.

Borenstein, S., & Rose, N. L. (1991). *Competition and price dispersion in the US airline industry (No. w3785).* National Bureau of Economic Research.

Calkins, S. (1983). The new merger guidelines and the Herfindahl-Hirschman Index. *California Law Review*, *71(2),* 402-429.

Carson, D. B., Carson, D. A., & Henderson, A. (2014). Mobilising labour in remote 'boom' towns for economic diversification: the case of Tennant Creek. *Northern Institute Research Brief Series, (5),* 1-14.

Choueifaty, Y., Froidure, T., & Reynier, J. (2013). Properties of the most diversified portfolio. *Journal of Investment Strategies*, *2(2),* 49-70.

Christiaensen, L., Weerdt, J., & Todo, Y. (2013). Urbanization and poverty reduction: the role of rural diversification and secondary towns. *Agricultural Economics*, 44(4-5), 435-447.

Clemenson, H. (1992). Are single industry towns diversifying?. *A Look at Fishing, Mining and Wood-Based Communities*, *4(1).*

Elkhina, I. A. (2014). Structural shifts and structural distinctions of economic systems in Russia. *Bulletin of Saratov State Social and Economic University*, *4 (53).*

Esteban, J. (2000). Regional convergence in Europe and the industry mix: a shift-share analysis. *Regional science and urban economics*, *30(3),* 353-364.

Gini, C. (1921). Measurement of inequality of incomes. *The Economic Journal*, *31(121),* 124-126.

Hackman, J. R., & Oldham, G. R. (1975). Development of the job diagnostic survey. *Journal of Applied psychology*, *60(2),* 159.

Hall, M., Tidemanf, N. (1967) Measures of concentration. *American Statistical Association Journal, 62 (1),* 162–168.

Hannah, L., Kay J. A. (1977) *Concentration in Modern Industry*. L.: MacMillan Press.

Herfindahl, O. C. (1950). *Concentration in the steel industry*. Columbia University.

Herzog, H. W., & Olsen, R. J. (1977). Shift share analysis revisited: The allocation effect and the stability of regional structure. *Journal of Regional Science*, *17(3),* 441-454.

Hirschman, A. O. (1945). *National power and the structure of foreign trade*.

Kahai, S. K., Kaserman, D. L., & Mayo, J. W. (1996). Is the "Dominant Firm" Dominant? An Empirical Analysis of AT&T's Market Power. *Journal of Law and Economics*, 499-517.

Kazinets, L. S. (1981). Growth rates and structural shifts in economy: indicators of planning and statistics. *Economics*.

Kononenko, O. I. (2015). The diversification category in the context of perfectionism personality's psychology. *PEM: Psychology. Educology. Medicine, (3-4).*

Kumar, B. (2016). An Overview of the Banking Sector Consolidation in India: A Conceptual Framework. *SSRN Electronic Journal* (September 7, 2016). Retrieved from https://ssrn.com/abstract=2835870 or http://dx.doi.org/10.2139/ssrn.2835870

Lin, K. L., & Huang, Y. L. (2014). Is the Diversification of Bank Income the Bright Side or Dark Side? A Global Perspective. *Management Review*, *33,* 117-120.

Linda, R. (1976). *Methodology of concentration analysis applied to the study of industries and markets*.

Commition of the Eiropean communities.

Lerner A. P. (1973) *The Concept of Monopoly and the Measurement of Monopoly Power. Readings in Welfare Economics*, Macmillan Education UK.

Love, I. (2003). Financial development and financing constraints: International evidence from the structural investment model. *Review of Financial studies*, *16(3),* 765-791.

Meilak, C. (2008). Measuring export concentration: the implications for small states. *Bank of Valletta Review*, *37,* 35-48.

Micheeva, N. N. (2013). Regional dynamics structural factors: measurement and assessment. *Spatial economics*, *(1),* 11-32.

Murdoch, III, J., (2016). Specialized vs. diversified: The role of neighborhood economies in shrinking cities, *Cities* http:// dx.doi.org/10.1016/j.cities.2016.12.006

Reardon, S. F., & Firebaugh, G. (2002). Measures of multigroup segregation. *Sociological methodology*, *32(1),* 33-67.

Robertson, S., Blackwell, B. (2014). Mine lifecycle planning and enduring value for remote communities. *International Journal of Rural Law and Policy, 1.*

Russian Government Resolution "About distinguishing criteria of Russian Federation company towns and its classification depending on the risk of deterioration of their socio-economic wellbeing" of 29.07.2014. URL: http://government.ru/media/files/41d4f68f6a0c7889b0a7.pdf

Skeard, J. (2015). Come Hell or High Water: Identity and Resilience in a Mining Town. *London Journal of Canadian Studies*, *30(1),* 90-109.

Sleuwaegen, L., & Dehandschutter, W. (1986). The critical choice between the concentration ratio and the H-index in assessing industry performance. *The Journal of Industrial Economics*, 193-208.

Theil, H. (1967). *Economics and information theory.* Amsterdam.

Turgel, I. D. (2014). *Russian monofunctional cities: from survival to sustainable development*. Directmedia.