

# An ontological approach to the methodology of vintage analysis in the diagnosis of sustainable development of the region

Natalia Mushketova<sup>1\*</sup>, Elena Zudina<sup>2</sup>, Natalia Skiter<sup>3</sup>, and Tatyana Botiskina<sup>3</sup>

<sup>1</sup>Volgograd State University, 100 Prospect Universitetsky, Volgograd, 400062, Russia

<sup>2</sup>Volgograd State Socio-Pedagogical University, 27, Lenin Avenue, 400066, Volgograd, Russia

<sup>3</sup>Volgograd State Technical University, 28, Lenin Avenue, Volgograd, 400005, Russia

**Abstract.** Vintage analysis lays out the behavioral patterns of homogeneous groups of industries in the region throughout their life cycle in one economic event. In the context of the formation of sustainable development of the region, it is important to provide management structures with high-quality information reflecting the main specifics of the territories. Currently, information about the behavior of a group of people who show their needs and actions in relation to one indicator is valuable. It also becomes important to process the formation of such information in a certain period of time, including operational analysis - "here and now". The behavior of groups of objects considered as cohorts is investigated and evaluated in a vintage analysis. Vintage analysis is also used to identify possible problems and worrying trends in the development of the region, as well as to assess the effectiveness of adopted regional development strategies and programs. As a result of such an analysis, recommendations can be formulated to improve the development of the region and achieve the set development goals and objectives. The article reveals the methodology of vintage analysis in the diagnosis of regional socio-economic development and sustainability.

## 1 Introduction

Paying special attention to the sustainable development of the region, vintage analysis applies a methodology for comparative analysis of short and long periods of time. Identifying trends in the development of society, both households and consumers of regional products, allows you to get information about problems in the development of regional economic sectors. When searching for the main trends of sustainable development, vintage analysis includes classic tools aimed at: observing the main characteristics and identifying the main features of key indicators and parameters; an algorithm for data collection and grouping has been developed - cohort classification; regional segmentation; indirect diagnosis and comparative analysis of cohorts; formation of an information resource to substantiate conclusions and methods of action in certain territorial spaces.

---

\* Corresponding author: [shokhnekh@yandex.ru](mailto:shokhnekh@yandex.ru)

The application of the vintage analysis methodology will ensure the identification of the main problems and potentials for the development of the region, as well as in making informed decisions to improve its sustainability and prosperity.

The ontological approach to vintage analysis as the basis forming a managerial information resource for regional strategizing identifies groups of objects according to the requirements of key criteria established in spatial territorial diagnostics. The subject becomes an observer of cohorts - groups of indeterminate sets of individuals [1]. In regional corporations, vintage analysis allows you to explore:

- 1) the "input" of the cohort to meet their needs;
- 2) the cohort's "exit", justified by loss of interest, dissatisfaction with the product, loss of incentive or choice of a new, higher-quality or lower-cost alternative (discounts, high-quality materials, preferences, benefits).

The heuristic possibilities of vintage analysis are revealed in the process of identifying logical chains based on qualitative and quantitative methods of non-numerical mathematics [2].

The subject of the study can identify a broader spector of motivations and incentives for cohort behavior that ensure effective influence on the economic behavior and activity of the cohort-object. It is obvious that in regional sustainable development, interest should be shown precisely to the socio-economic satisfaction of groups of people segmented by whole criteria. In such an ontological approach, the focus is shown to search for the life cycle of a cohort, which is considered as already a mass group in the analysis of household behavior in a specific region [3-5].

## 2 Materials and methods

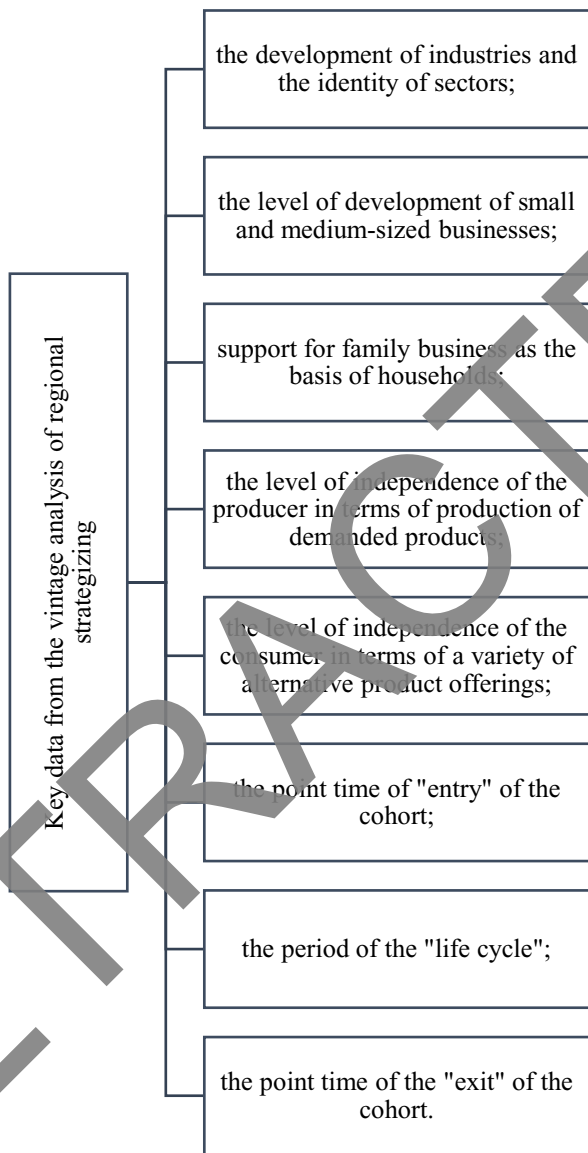
In the process of searching for confirmation of the research hypothesis, methods of induction, deduction, analytical and synthetic approach and non-numerical mathematical tools were used. A study was also organized and conducted, during which the expediency of using the methodology of vintage analysis in the diagnosis of sustainable development of the region was substantiated. In addition, methods of analogy and logical inference were used to form the necessary indicators and main conclusions.

## 3 Results

Vintage analysis of regional development is a research method that allows you to assess the dynamics of development of a certain region over a certain period of time, taking into account changes over time. Vintage analysis is based on comparing data from different time periods to identify trends and patterns in the development of the region. To conduct a vintage analysis of regional development, it is necessary to collect data on various indicators of regional development for different years or periods. These data are then analyzed using statistical methods and tools to determine the main trends and changes in the development of the region.

It is obvious that in the sustainable development of the region as an economic system, there is an interest in: 1) the development of industries and the identity of sectors; 2) the level of development of small and medium-sized businesses; 3) support for family business as the basis of households; 4) the level of independence of the producer in terms of production of demanded products; 5) the level of independence of the consumer in terms of a variety of alternative product offerings; 6) the point time of "entry" of the cohort; 7) the period of the "life cycle"; 8) the point time of the "exit" of the cohort. All these indicators and many others will help to level the barriers in managing the sustainable development of

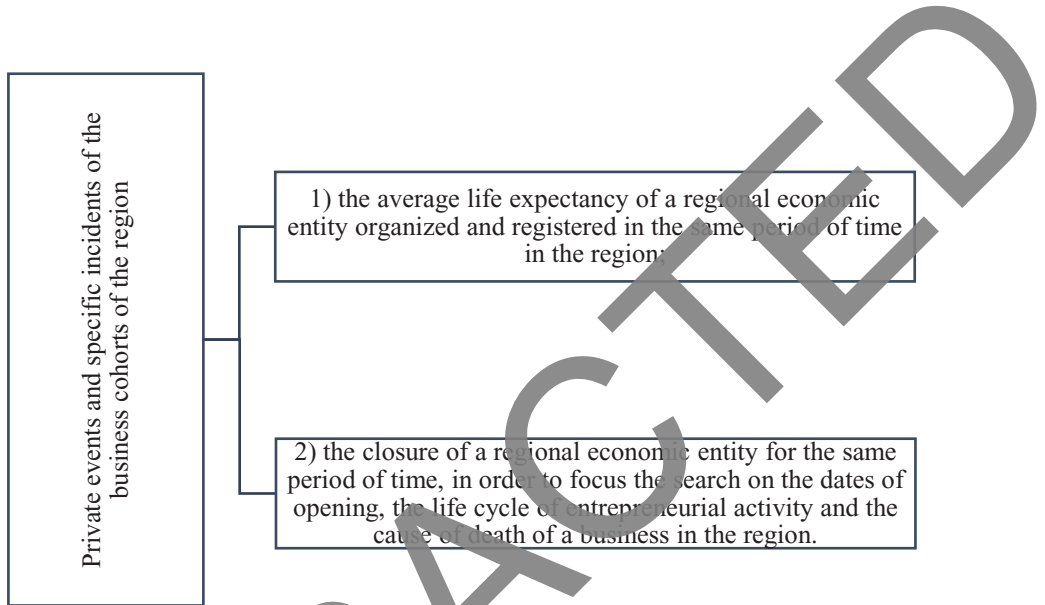
the region, aimed at improving the quality of life and expanding equal access to existing economic and non-economic benefits [3-7] (Fig. 1).



**Fig. 1.** Information indicators of vintage analysis of regional strategizing.

In the search for points of influence of effective impacts on medical, educational, economic, environmental and other spheres, the expediency of using cohort movement analysis is manifested, since the focus shifts to group causes of spikes or falls in fertility, mortality, and migration of the regional population. Attention is also focused on the heterogeneity of the cohort. Here, under the initial assumptions, homogeneous cohort groups are identified [8-12].

An important component is the study of events and specific occurrences combined into cohorts, as a series of passing accidents or accidents, including values: 1) the average life expectancy of a regional business organized and registered in one period of time; 2) the closure of a regional business in one period of time, where the search concentration is focused on the opening dates and the life cycle of entrepreneurial activity (Fig. 2).



**Fig. 2.** Components of economic private events and specific incidents combined into business cohorts.

Vintage analysis in the context of data generation for managing changes in the life cycles of cohorts as key indicators of regional strategizing is carried out in the field of temporal and spatial fields. That is why the conditions of the digital economy will also affect sustainable development. In fact, all transformations in production processes are currently taking shape in the field of digitalization, artificial intelligence, and cognitive assistants, which affects the structure and quality of the process of accumulating analytical support.

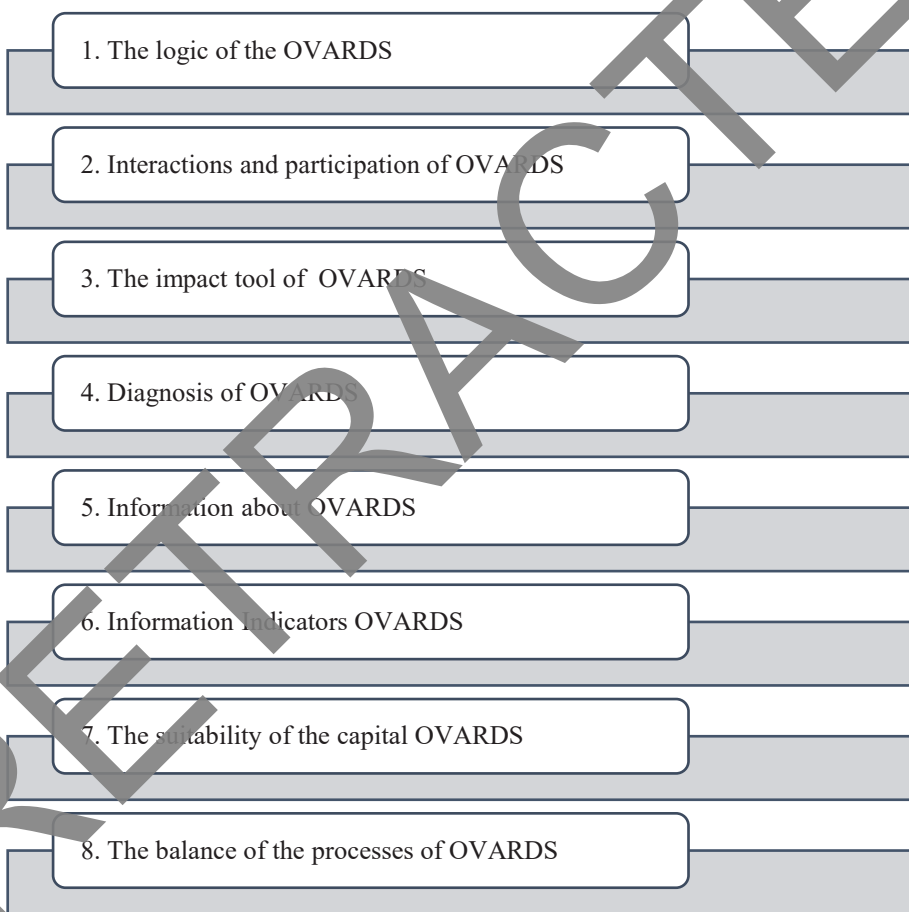
The digital transformation of economic relations in the process of production, distribution, exchange and consumption affects the formation of the basic objective economic law. New communications integrated into the structure of the cohorts under study ensure the regional development of completely new approaches to thinking and views in the management of the region, sector, industry, business, household, finance, public associations and structures.

The key problem of the moral suitability of all types of capital, including intellectual capital, is raised in the focus of a functional and managerial approach. It is the presence of morally suitable and innovative capital that determines the competitiveness of the region, its ability to produce demanded products and form active regional markets on the terms of turnover of safe technologies and environmental products [13-21].

The evidence of the desire for balance in economic, social and environmental processes in the region justifies a vintage approach to the analysis of groups of people, processes, events, phenomena and situations (intentional, accidental). However, at the end of the 20th century, a new trend appeared - socio-economic development, which puts man at the head of the main indicators of sustainability as an agent who emotions and influences the conditions of regional balance.

That is why it is important to take into account the expediency of identifying cohorts based on the emotional background of agents influencing their subjective and then objective decisions in justifying regional long-term and short-term forecasts for the harmonization of regional industrial markets and in strategizing socio-economic development.

The main components of the ontological approach to the methodology of vintage analysis in regional diagnostics of sustainability (OVARDS) are presented in Fig.3.



**Fig. 3.** The main components of the ontological approach to the methodology of vintage analysis in regional diagnostics of sustainability (OVARDS).

To objectively substantiate the processes of promoting sustainable development in the region, the ontological approach to the metrology of vintage analysis involves the identification and diagnosis of cohorts as deterministic groups of private units that carry out the facts of economic life. Obviously, it is possible to apply an indefinite set of qualitative

and quantitative indicators to describe the management system of a region both at the level of region-forming and municipal-forming systems, and a cohort of micro-families of households.

## 4 Conclusion

Summing up, it can be concluded that there are some contradictions and difficulties in the practical application of vintage analysis to identify the main cohorts that affect the sustainable development of the region. Undoubtedly, the application of an ontological approach to the methodology of vintage analysis will make it possible to more clearly identify subjectivity and objectivity in the management component of the system, as well as provide more reasonable indicators and parameters for describing "entering the cohort", "life of the cohort unit", "leaving the cohort", "death of the cohort itself".

In any case, it is necessary to diagnose the key data in the vintage analysis of regional strategies:

- 1) cohorts of sectoral development and the level of development of small, medium and large businesses;
- 2) conditions for the development of cohorts of family microbusiness, forming households;
- 3) the level of independence of the choice of the structure and volume of production of demanded products by the producing cohorts;
- 4) the level of independence of the consumer cohorts in terms of a number of alternative product offerings;
- 5) stimulating various cohorts to "join the target group";
- 6) monitoring the period of the "cohort life cycle";
- 7) the causes and time of the cohort's "exit".

In general, it is advisable to study the events and specific incidents of a general cohort group through the analysis of a series of planned, accidental incidents or stimulating events.

## References

1. V. A. Kalashnikov, M. V. Ivanov, *Economics: Yesterday, Today, Tomorrow* **12(8-1)**, 7-15 (2022)
2. V. I. Kuznetsov, *Kazan Socio-Humanitarian Bulletin* **3-4 (6)**, 15-16 (2012)
3. N. N. Steeter, A. V. Shokhnekh, N. Ya. Denisova, *Economics and Entrepreneurship* **4(53)**, 354-356 (2023) DOI: 10.34925/EIP.2023.153.4.068 EDN: HWETDC.
4. A. S. Fimofeeva, Cohort analysis in product and marketing analytics. In the collection: *Spring days of HSE science. Collection of reports of the international conference of students, postgraduates, and young scientists*, 502-506 (2017)
5. A. V. Shokhnekh, R. V. Kalinicheva, A. N. Akhrameev, *Audit and Financial Analysis* **5**, 264-268 (2014)
6. A. V. Shokhnekh, V. S. Telyatnikova, L. I. Nasonova, et al., *Cognitive approach to the strategic development of small business in the digital economy system: basic methods, principles, justification, results: a collective monograph (AETERNA, Ufa)*, 2018)
7. A. V. Shokhnekh, G. I. Sidunova, A. A. Sidunov, et al., *Audit and Financial Analysis* **5**, 332-338 (2016)
8. A. V. Shokhnekh, *Audit and Financial Analysis* **1**, 33-37 (2016)

9. A. V. Shokhnekh, Y. V. Melnikova, T. A. Dugina, et al., E3S Web of Conferences **161**, 02002 (2020) DOI: <https://doi.org/10.1051/e3sconf/202016102002>
10. L. A. Mikhailova, MIR (Modernization. Innovation. Development) **8(4)**, 585-591 (2017)
11. I. V. Kulikov, The method of transfranchising – selka, aimed at finding commercially important information. Redirect Science, pp. 15-22 (2020)
12. The official website of the franchise. Electronic resource.
13. A. Yu. Boskhomdjieva, T. M. Shpilina, Trends in the Development of Science and Education **51-4**, 25-28 (2019)
14. A. N. Inkin, T. E. Orlovskaya, B. M. Musaeva, Musaeva B.M. Specialists and performatives in the organization of small business in Russia. Bulletin of the Academy of Knowledge, pp. 169-177 (2021)
15. A. V. Shokhnekh, N. N. Skiter, A. F. Rogachev, et al., J. Adv. Res. Law Econ. **7(7)**, 1854–1857 (2016) DOI: 10.14505/jarle.v7.7(21).33 EDN: NVMFGV.
16. E. A. Posnaya, O. I. Ditsulenko, A. M. Kolesnikov, A. V. Shokhnekh, *Features and advantages of loaning of high technology corporations*, European Proceedings of Social and Behavioural Sciences EpSBS. Krasnoyarsk Science and Technology City Hall. Krasnoyarsk, pp. 402-408 (2020)
17. Y. V. Melnikova, E. A. Posnaya, B. A. Bulach, A. V. Shokhnekh, S. V. Tarasenko, E3S Web of Conferences **161**, 01105 (2020)
18. A. R. Nabiyeva, V. S. Kurnosov, S. Antonova, E. V. Popova, T. I. Krishtaleva, Managing Technology Upgrading in Small and Medium-Sized Enterprises: Insights from Russia. Industry Competitiveness: Digitalization, Management, and Integration, pp. 327–337 (2019) [https://link.springer.com/chapter/10.1007/978-3-030-80485-5\\_39](https://link.springer.com/chapter/10.1007/978-3-030-80485-5_39)
19. A. V. Shokhnekh, O. A. Mironova, N. M. Boboshko, et al., Regional mechanisms of provision of economic security on the platform of infrastructure’s innovational development. In: Popkova, E.G. (ed.) Growth Poles of the Global Economy: Emergence, Changes and Future Perspectives. LNNS, vol. 73, pp. 143–150. Springer, Cham (2020) DOI: [https://doi.org/10.1007/978-3-030-15160-7\\_13](https://doi.org/10.1007/978-3-030-15160-7_13)
20. O. S. Glinkskaya, A. V. Shokhnekh, O. V. Prokopova, I. S. Skorikova, The forecasting approach to strategic development of economic subjects. In: Popkova, E.G. (ed.) ISC 2018. LNNS, vol. 57, pp. 829–835. Springer, Cham (2019) DOI: [https://doi.org/10.1007/978-3-030-00102-5\\_89](https://doi.org/10.1007/978-3-030-00102-5_89)
21. A. V. Shokhnekh, Econ. Entrepr **10(135)**, 928–931 (2021) DOI: <https://doi.org/10.34925/EIP.2021.135.10.176>