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## ASSESSMENT OF COMPETITIVE ADVANTAGES OF IT SYSTEM INTEGRATOR COMPANIES TAKING INDUSTRY FACTORS INTO ACCOUNT

**Purpose.** To evaluate competitive advantages of IT system integrators in Ukraine. To investigate the influence of industry factors on the formation of competitive advantages using cases of the mining and fuel & energy industries.

**Methodology.** The empirical basis of the study was presented by performance indicators of the leading system integrator companies of Ukraine. The methodological basis of the research was the scoring method using weight coefficients and the graphic method of creating a radial diagram of competitive advantages. During the research, the following methods were used: analysis and synthesis (to study the components of competitive advantages and to form integral indicators), induction and deduction (to form market trends and to identify enterprise strategies), classification (to form indicators that determine competitive advantages).

**Findings.** In the process of research, a model of competitive advantages for system integrator companies was formed. A methodology was developed and an assessment of competitive advantages of the leading system integrators of IT industry of Ukraine was carried out. A radial diagram of competitive advantages was created. It allows performing a comparative analysis of the factors of company competitive advantages with the aim to form a development strategy to improve the competitive position of the company in the market. Features of influence of the industry factors on the formation of competitive advantages of system integrators were considered and this influence was evaluated using cases of the mining and fuel & energy industries.

**Originality.** A model and methodology for assessing competitive advantages for system integrator companies in IT industry were proposed; the main factors of competitive advantages for system integrators have been identified. The necessity of taking industry factors into account when assessing the competitive advantages of these enterprises has been proposed and confirmed by the research results.

**Practical value.** The applied value of the research lies in the possibility of applying the developed model and methodology to assess the competitive advantages of system integrators. The results of such an assessment can be used by system integrators to develop a competitive strategy and improve their competitive positions in the market. Customers (including enterprises in the mining and fuel & energy industries) can use evaluation elements when conducting procurement (tender) procedures for selection of contractors for the implementation of system integration projects. Also, the results of the study can be used for the analysis of the system integration market.

**Keywords:** *system integration, competitive advantage, integral indicator, IT industry, industry factors*

**Introduction.** In today's world, information technology (IT) has an increasing influence on both business and people's everyday life. One of the important components of IT industry is the system integration market. System integration in the field of IT is understood as a process of creating a complex information system that may include designing or building a customized architecture or application, integrating it with new or existing hardware, packaged and custom software, and communications [1].

The global system integration market shows annual growth. According to [2], the market volume in 2023 was USD 385.95 billion. It is expected to grow at a compound annual growth rate (CAGR) of 13.8 % between 2023 and 2030, and the market size in 2030 will reach USD 955.21 billion.

System integration market trends in Ukraine are closely related to political and socio-economic processes in the country. Despite the decrease in market volumes in recent years due to the Russian aggression (to 267 million USD in 2022 [3]), in non-crisis years, the Ukrainian system integration market demonstrated positive dynamics with growth of about 20 % per year.

The important role of system integrators in the modern economy is that they ensure the introduction of the latest technologies at enterprises of various industries. Thanks to this, the

efficiency of enterprises increases, business processes are improved, modern production technologies are introduced, and proper safety and energy efficiency indicators are ensured [4].

As a result of the active development of IT and the growing demand from enterprises for the implementation of modern solutions, the system integration market is quite competitive. For successful work in the market, system integrators must form and improve their competitive advantages. Achieving and sustaining a competitive advantage is essential to the success and long-term viability of an enterprise. Competitive advantage, in its essence, is what makes an enterprise unique, compelling and more successful than its rivals [5]. Thus, by creating sustainable competitive advantages, the enterprise distinguishes itself among competitors and increases its value both for customers and for other stakeholders [6].

Competitive advantages of the enterprise are formed by a set of factors determined by internal and external environments, and provide the enterprise with a leading position on the market. The set of such factors is specific for each market. The study of competitive advantages makes it possible to assess the key factors of success and the competitive situation on the market, and is also the basis for the formation of a competitive strategy of enterprises.

A feature of the work of system integrators is the implementation of solutions for enterprises in various sectors of

economy. At the same time, it is necessary to take into account the fact that each industry has its own specifics, standards, technological and business processes, etc. With this in mind, the analysis of the competitive advantages of system integrators should take into account industry factors.

The mining and fuel & energy industries of Ukraine actively use modern IT and engineering solutions implemented by system integrators. Such solutions cover the areas of enterprise management, support of technological and business processes, provision of security and control of the use of resources, etc. Thus, the evaluation of the competitive advantages of system integrators taking into account industry factors for the mining and fuel & energy industries of Ukraine allows us to determine the capabilities of system integrators to implement projects at enterprises of mentioned industries.

**Literature review.** The classic theory of competition and competitive advantages, which is based on the resource approach, was developed by M. Porter. Remaining relevant until now, it found development in the works of others, including modern scientists. The integration approach proposed by I. Shapovalova allows diversifying the sources of competitive advantages [7]. L. Shevchenko considers the implementation of competitive advantages in conditions of growing uncertainty and instability, in particular during the war in Ukraine, which is particularly relevant for the current situation in the world and Ukraine [8].

The method for determining competitive advantages based on key success factors in the industry is described by N. Kudenko [9] and is based on the analysis of external and internal factors.

The classification of competitive advantages and their influence on strengthening the competitiveness of the enterprise is given in the work by A. Troyan [10].

Analysis of competitive advantages and methods of their formation and strengthening are studied in the works of modern scientists and practitioners. Thus, in the work by Wang, Lin, and Chu, the importance of such sources of competitive advantages as technologies and innovations, human resources, and organizational structures is determined [11]. In the article by L. Frederiksen [12], the following factors of competitive advantages are noted: automation, service integration, process advantages, service level, business model, expertise, brand, geography, industry focus, and others.

An important characteristic of competitive advantage is its dynamism. The need to constantly maintain the relevance of the enterprise's competitive advantage is an important condition for maintaining competitive positions. The study of the dynamic business model was carried out in the work by S. Lopes, H. Lopes, K. Coleta, V. Rodrigues [13].

It should be noted that existing studies confirm the significant impact of IT on modern business and, in particular, the formation of competitive advantages of enterprises. The role of IT in the development of a competitive strategy according to M. Porter's model is described by S. Roch, B. Smith, J. Fowler & D. Bourgeois [14]. An integrated model of the influence of IT on the process of formation of competitive advantages by an enterprise was developed in the work by J. Chi and L. Sun [15]. The impact of IT on the sharing model in a circular economy is studied in the article by D. Atstaja, V. Koval, J. Grasis, I. Kalina, H. Kryshnal, & I. Mikhno [16].

The analysis of external and internal factors in the development of a competitive strategy for high-tech enterprises, which are system integrators, is provided by F. T. Rothaermel [17]. In the work, the author points out the important role of innovations in increasing the competitiveness of high-tech enterprises.

Unfortunately, it should be noted that the system integration market is poorly researched in terms of competitive strategies, sources of competitive advantages, and other factors of the competition model. General studies of the industry at the global level are contained in the materials of research and consulting companies Grand View Research [2], Precedence Research [18] and others. Research on Ukrainian market is carried out annually by the journal "Networks and Business" [3] and indi-

vidual researchers: S. Baryngolts [4], O. Moskalenko, O. Zozulov [19]. Methods, approaches, best practices and risks of system integration are mostly described in articles by market practitioners, such as P. Raatikainen [20] and FasterCapital [21].

The use of modern IT solutions and other technological innovations is a necessary component of the development of the mining and fuel & energy industry. The study by O. Sukhodolia [22] analyzes in detail modern technologies of artificial intelligence (AI) and related solutions for the energy industry, and also highlights the main trends and obstacles on the way of their implementation in the world and in Ukraine.

The processes of digital transformation, implementation of analytical systems and AI systems are analyzed in the material of the National Association of the Mining Industry of Ukraine [23]. The authors examine prerequisites, prospective directions and practical cases of the application of digital technologies, in particular AI, in the mining industry.

**Unsolved aspects of the problem.** The rapid development of IT technologies causes a significant interest of scientists in researching various aspects of IT industry functioning. At the same time, the system integration market as one of the segments of IT industry remains poorly researched.

Key success factors and competitive advantages are industry specific. Their research for the system integration market, respectively, is of great importance to the enterprises of the industry.

Another aspect that needs to be studied is taking into account the industry specifics of various sectors of the economy, for which system integrators implement their projects, when determining the competitive advantages of system integrator enterprises.

Unfortunately, the mentioned issues currently do not have proper scientific justification and require additional study.

**Purpose.** To evaluate competitive advantages of IT system integrators in Ukraine. To investigate the influence of industry factors on the formation of competitive advantages based on the mining and fuel & energy industries use cases.

**Methods.** The empirical basis of the study was presented by performance indicators of the leading system integrator companies of Ukraine. The methodological basis of the research was the scoring method using weight coefficients and the graphic method for creating a radial diagram of competitive advantages. During the research, the following methods were used: analysis and synthesis (to study the components of competitive advantages and to form integral indicators), induction and deduction (to form market trends and to identify enterprise strategies), classification (to form indicators that determine competitive advantages).

**Results.** According to M. Porter's theory, the value chain plays a key role in the formation of competitive advantages [17]. Based on the method for evaluating competitive advantages [9], which involves the study of factors of the external (industry) and internal (enterprise) environment and the calculation of a weighted assessment for each indicator, when determining competitive advantages, relevant factors of the internal and external environment were considered. Based on the study of the value chain for system integrators [24], which reflects the factors of internal environment, and taking into account the study of forces of competition in the industry [25], which reflects the factors of external environment, a set of factors of competitive advantages for system integrators was formed and an assessment and comparison of these indicators was carried out.

A separate part of the study was aimed at taking into account industry factors (using the example of the mining and fuel & energy industries) in the formation of competitive advantages.

Three companies were chosen for the analysis, which, according to market research [3], are leaders among Ukrainian system integrators: IT-Integrator, Netwave, Seeton. It should be emphasized that the purpose of this study is not to evaluate the current competitive situation on the market, the advantages or disadvantages of the work of enterprises, etc. The

specified enterprises were selected for the study exclusively as representatives of the industry in order to objectively assess the competitive advantages of enterprises in the system integration market of Ukraine, based on the performance indicators of real enterprises. Taking into account the above, the results of the study should not be considered in any way as an assessment of the competitiveness of the mentioned enterprises on the market or an assessment of their activities. In order to maximize the depersonalization of the research results, in the future the enterprises will be presented as Enterprise 1 (IT-Integrator), Enterprise 2 (Netwave), Enterprise 3 (Seeton),

When conducting the research, the information on the activities of mentioned enterprises posted on their corporate websites [26, 27] and [28] was used as well as current reporting data of the enterprises for 2023, posted on Opendatabot [29, 30] and [31].

The formation of factors of competitive advantages was performed on the basis of the value chain model [24]. At the same time, the selection of characteristics for conducting research was carried out taking into account the possibility of obtaining objective data (enterprise performance indicators) from open sources.

The results of research of competitive advantage factors and the calculation of the integral indicator for the selected enterprises (without taking into account industry factors) are shown in Table 1.

The evaluation of given factors of competitive advantages was carried out as follows.

Product range defines the assortment of products/solutions that the company implements. According to [4], the assessment was carried out for three main groups (components) of product areas of system integrators: IT solutions, engineering solutions, and business solutions, within the framework of which the capabilities of enterprises in the main product lines of the corresponding group were considered based on data posted on the companies' websites. The impact of each product component on the company's market positioning can be determined by taking into account the number of projects for

each component, their respective share in the revenues of the industry, market trends for each component, and other factors. Based on the results of the analysis, the study adopted the following weight coefficients: IT solutions – 0.45, engineering solutions – 0.35, business solutions – 0.20.

Competence/vendors – determines the level of competence, cooperation and partnership relations of the enterprise with vendors (manufacturers). The evaluation was carried out similarly to the evaluation of the product range, since these two parameters have a direct connection.

Services – determines the volume and level of provision of services such as design, implementation of solutions and training of customer's personnel. The evaluation was carried out on the basis of the procedures for the provision of services at various stages of project implementation described by enterprises.

Service support – determines the volume and level of provision of service support by the enterprise to the customer. The evaluation was carried out on the basis of the procedures for the provision of service support described by enterprises.

Promotion and sales – determines the enterprise's ability to promote and sell its solutions on the market. The evaluation was carried out based on the indicators of income and profitability of the sale of enterprises according to reporting data.

Enterprise management – determines the economic efficiency of the utilization of enterprise resources. The evaluation was carried out based on indicators of profitability of assets and profit per employee according to reporting data.

Personnel management – determines the efficiency of personnel work and its turnover. The evaluation was carried out according to indicators of labor productivity (with a coefficient of 0.8) and the coefficient of the general movement of the labor force (with a coefficient of 0.2) according to reporting data.

Regional presence – determines the development of regional sales channels. The assessment was carried out by the number of regional representative offices of the enterprise in Ukraine (with a coefficient of 0.6) and abroad (with a coefficient of 0.4).

Experience – determines the experience of the enterprise in the market. The evaluation was carried out taking into account the projects implemented by the enterprise (with a coefficient of 0.6) and the number of years of work on the market (with a coefficient of 0.4).

Reputation and image in the market. The evaluation was carried out according to the ratings of system integrators of Ukraine based on the materials [3] and [32, 33].

The integral indicator for each enterprise was obtained taking into account weight coefficients given in Table 1 that reflect the importance of the influence of relevant factor of competitive advantage. When evaluating the factors of competitive advantages, the following were identified as the most important: product range, level of competence and interaction with manufacturers (vendors), experience, promotion and sales.

Comparisons of integral indicators and their components for each enterprise are shown in Fig. 1. A radial diagram of competitive advantages, built using a graphical method, is shown in Fig. 2.

According to the results of the study, the highest integral indicator was obtained by Enterprise 1. Analyzing Fig. 1 and Fig. 2, it can be noted that the main components that determined this result were the indicators as follows: product range, competence/vendors, promotion and sales, experience, reputation.

As follows from the analysis of Fig. 2, the largest difference between the enterprises' indicators is determined by the following components: product range, competence/vendors, promotion and sales, and enterprise management. The indicators of product range and competencies reflect the product strategy of the enterprises: while Enterprise 1 and Enterprise 3 cover almost all product areas and have a high level of competencies in them, Enterprise 2 is positioned as a network integrator focused only on IT solutions. The indicators of sales and promotion and enterprise management are related to financial performance and largely reflect the efficiency of the

Table 1

Enterprises Competitive Advantage Factors

Competitive Advantage Factors	Weight coef.	Enterprise 1		Enterprise 2		Enterprise 3	
		Score	Rating	Score	Rating	Score	Rating
Product range	0.15	4.80	0.72	3.09	0.46	4.49	0.67
Competence/vendors	0.15	5.00	0.75	3.13	0.47	4.41	0.66
Services	0.10	4.50	0.45	5.00	0.50	4.20	0.42
Service support	0.05	4.50	0.23	5.00	0.25	5.00	0.25
Promotion and sales	0.15	3.21	0.48	2.99	0.45	2.08	0.31
Enterprise management	0.05	1.07	0.05	5.00	0.25	1.51	0.08
Personnel management	0.05	3.81	0.19	3.46	0.17	3.12	0.16
Regional presence	0.05	3.00	0.15	2.00	0.10	1.60	0.08
Experience	0.15	5.00	0.75	4.08	0.61	4.67	0.70
Reputation and image in the market	0.10	5.00	0.50	4.38	0.44	4.32	0.43
TOTAL (integral indicator)	1.00	–	4.27	–	3.70	–	3.76

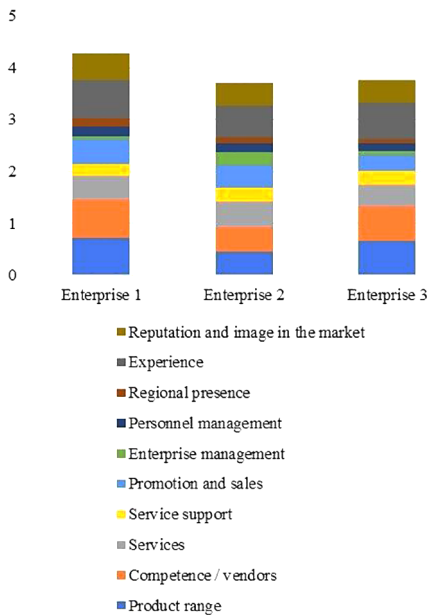


Fig. 1. An integral indicator of competitive advantage factors of enterprises and its components

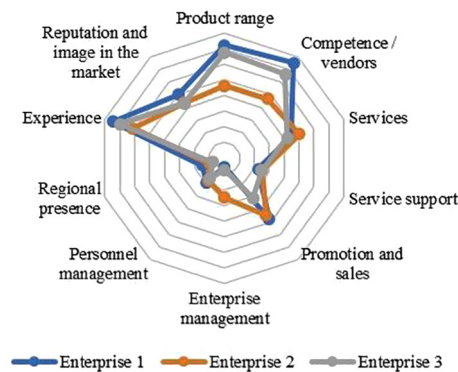


Fig. 2. A radial diagram of competitive advantages of enterprises

enterprises. In terms of promotion and sales, Enterprise 1 and Enterprise 2 have high values, and in terms of enterprise management, Enterprise 2 has a significant competitive advantage. Thus, the results obtained actually reflect the capabilities of the enterprises in the respective competitive advantage factor. These capabilities are based on resources, experience, competencies, and other components of the enterprise's activities and form its business strategy.

Based on the identified factors and taking into account those in which the enterprise has a leading position, the enterprise can develop competitive advantages that improve its competitive position in the market. For example, a strong product range and competencies can be the basis for competitive advantages for Enterprise 1 and Enterprise 3, the promotion and sales system constitutes competitive advantages for Enterprise 1 and Enterprise 2, the level of management and efficiency are competitive advantages for Enterprise 2, etc.

A special feature of system integrators is the implementation of projects for various sectors of the economy. Each industry has its own specifics in terms of prioritization of needs, required functionality and services, conditions and modes of system operation, regulatory and technological standards, etc. These industry specifics should be taken into account by system integrators when designing and implementing their solutions. Accordingly, the industry factor plays an important role and should be taken into account when considering the competitive advantages of system integrators.

System integrators implement a wide range of solutions for enterprises in the mining and fuel & energy sectors of Ukraine. In addition to traditional solutions for industrial enterprises, they are implementing solutions for building sustainable and secure power grids, specialized communication systems for operation in special operating conditions, CCTV solutions for monitoring of wagons and vehicles, transport weighing systems, technological CCTV systems, data collection and technological process automation solutions, etc.

When assessing the competitive advantages of system integrators, the industry component can be considered on the basis of two factors: product, i.e. solutions or products that a system integrator implements at industry enterprises, and industry competencies, i.e. practical experience in cooperation with enterprises in a particular industry and implementation of industry projects.

Consideration of the product factor requires obtaining detailed information on technical requirements, products and solutions from industry enterprises (customers), system integrators and system manufacturers (vendors). This information, unfortunately, is rather limited in the public domain and requires additional substantial work to collect and analyze it.

In this study, the industry factor is assessed based on the industry competencies of system integrators. The results of the study of competitive advantage factors and the calculation of the integral indicator by industry component are presented in Table 2.

The assessment of the above factors of competitive advantage by industry component was carried out as follows.

Project experience – determines the company's experience in implementing projects in the mining and fuel & energy sectors of Ukraine. The evaluation was conducted based on the data on projects implemented by system integrators in these industries over the last three years, which are provided in market research [3] and [32, 33].

Customer experience – determines the experience of the system integrator in cooperation with enterprises of the mining and fuel & energy industries of Ukraine. The evaluation was carried out based on the data on the relevant industry customers provided on the corporate websites of system integrators [34–36].

A comparison of the integral indicators of the industry component for each enterprise is shown in Fig. 3.

According to the results of the study, Enterprise 2 received the highest integral indicator for the industry component. This result was obtained primarily due to the significant experience of implemented industry projects.

It should be noted that the ratio of integral indicators of enterprises by industry component (Fig. 3) differs from the similar ratio of integral indicators of competitive advantage factors of enterprises (Fig. 1).

The calculation of the resulting integral indicator, which includes both the integral indicators for the enterprise and the industry component, is shown in Table 3. Taking into account the impact of each component on the enterprise's positioning

Table 2

Factors of competitive advantage by industry component

Competitive Advantage Factors	Weight coef.	Enterprise 1		Enterprise 2		Enterprise 3	
		Score	Rating	Score	Rating	Score	Rating
Project experience	0.50	1.43	0.71	5.00	2.50	0.00	0.00
Customer experience	0.50	5.00	2.50	3.33	1.67	3.75	1.88
TOTAL (integral indicator)	1.00	–	3.21	–	4.17	–	1.88

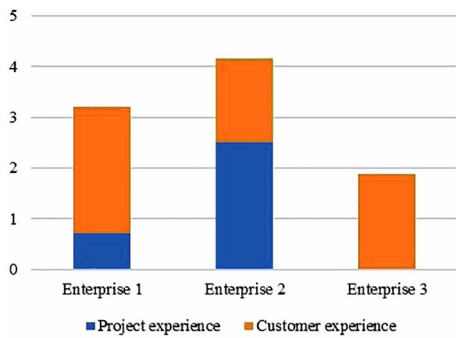


Fig. 3. Integral indicator of competitive advantage factors by industry component of enterprises

Table 3

The resulting integral indicator of competitive advantages, taking into account the industry component

Competitive Advantage Factors	Weight coef.	Enterprise 1		Enterprise 2		Enterprise 3	
		Score	Rating	Score	Rating	Score	Rating
Enterprise	0.70	4.27	2.99	3.70	2.59	3.76	2.63
Industry	0.30	3.21	0.96	4.17	1.25	1.88	0.56
TOTAL (integral indicator)	1.00	—	3.95	—	3.84	—	3.19

in the market, the following weight coefficients were adopted: the indicator for the enterprise – 0.7, the indicator for the industry component – 0.3.

A comparison of the integral indicators for each enterprise, taking into account the industry component, is shown in Fig. 4.

The analysis of the results and their comparison with the integral indicators of enterprises without taking into account the industry component (Fig. 1) indicates changes in the ratio of the integral indicators of enterprises. Taking into account the industry factor brought Enterprise 2 to the second place in terms of the value of the integral indicator and significantly reduced the difference between the values of the indicators of the enterprises that rank first and second.

Thus, taking into account the industry component allows obtaining a more objective assessment of the integral indicator of competitive advantages of enterprises, since it combines both the assessment of the factors of competitive advantages of the enterprise itself and the assessment of the enterprise in terms of industry competitive advantages.

**Conclusions.** The study formed a set of factors (model) of competitive advantages for system integrators. The most important of them are: product range, level of competence and

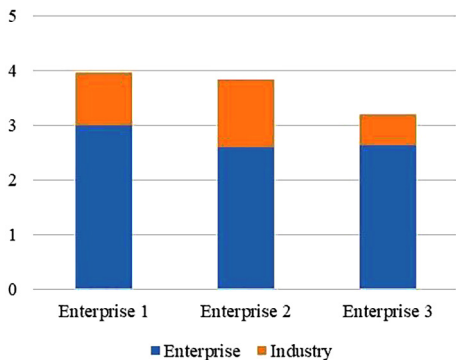


Fig. 4. The resulting integral indicator of competitive advantages of enterprises, taking into account the industry component

interaction with manufacturers (vendors), experience, promotion and sales.

The article develops a methodology and assesses the competitive advantages of the leading Ukrainian system integrators based on the data of their activities and reporting.

The applied graphical method for constructing a radial diagram of competitive advantages allows one to visually analyze the status of each of the factors of competitive advantages of an enterprise and formulate a development strategy to improve the competitive position of an enterprise in the market.

The article considers the peculiarities of the business of system integrators in the implementation of projects in the mining and fuel & energy industries of Ukraine.

The article develops a methodology and evaluates the influence of industry factors in the formation of competitive advantages of system integrators based on the mining and fuel & energy industries.

By the example of the enterprises considered in the study, the hypothesis about the significant influence of the industry factor and the need to take it into account when assessing competitive advantages has been confirmed.

Prospects for further research may include clarifying the set of competitive advantage factors for system integrators and their correlation in the calculation of the integral indicator.

It is planned to improve the study of the impact of the industry factor by including the product component in the analysis. Its study requires collecting and analyzing additional data on solutions and products of system integrators that are implemented at enterprises of the mining and fuel & energy industries.

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## Оцінка конкурентних переваг підприємств ІТ системних інтеграторів з урахуванням галузевих чинників

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**Мета.** Провести оцінку конкурентних переваг підприємств ІТ системних інтеграторів України. Встановити вплив галузевих чинників на формування конкурентних переваг на прикладі гірничодобувної та паливно-енергетичної галузей.

**Методика.** Емпіричною базою дослідження стали показники діяльності провідних підприємств системних інтеграторів України. Методологічною основою дослідження стали метод бальних оцінок із використанням вагових коефіцієнтів і графічний метод побудови радіальної діаграми конкурентних переваг. При проведенні дослідження використовувались методи аналізу й синтезу (при дослідженні компонентів конкурентних переваг і формуванні інтегральних показників), індукції та дедукції (при формуванні ринкових тенденцій і виявленні стратегій роботи підприємств), метод класифікації (при формуванні показників, що визначають конкурентні переваги).

**Результати.** У процесі дослідження сформована модель конкурентних переваг для підприємств системних інтеграторів. Розроблена методика та проведена оцінка конкурентних переваг провідних підприємств системних інтеграторів ІТ галузі України. Побудована радіальна діаграма конкурентних переваг, що дозволяє виконати порівняльний аналіз факторів конкурентних переваг підприємства з метою формування стратегії розвитку для покращення конкурентних позицій підприємства на ринку. Розглянуті особливості впливу галузевих чинників на формування інтегрального показника конкурентних переваг для підприємств системних інтеграторів і проведена оцінка такого впливу на прикладі гірничодобувної й паливно-енергетичної галузей.

**Наукова новизна.** Запропонована модель і методика оцінки конкурентних переваг для підприємств системних інтеграторів ІТ галузі, виявлені основні фактори, що дають перевагу в конкуренції серед підприємств галузі. Запропонована й підтверджена результатами досліджень необхідність урахування галузевих чинників при оцінці конкурентних переваг цих підприємств.

**Практична значимість.** Прикладне значення дослідження полягає в можливості застосування розробленої моделі й методики для оцінки конкурентних переваг підприємств системних інтеграторів. Результати такої оцінки можуть використовуватися підприємствами для формування конкурентної стратегії та покращення конкурентних позицій на ринку. Підприємства замовники (у т.ч. підприємства гірничодобувної й паливно-енергетичної галузей) можуть використовувати елементи оцінки при проведенні закупівельних (тендерних) процедур для вибору підрядників при реалізації проектів із системної інтеграції. Також результати дослідження можуть застосовуватися при проведенні аналізу ринку системної інтеграції.

**Ключові слова:** системна інтеграція, конкурентна перевага, інтегральний показник, ІТ галузь, галузеві чинники

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