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MODELING THE PROCESS OF FORMING RECOMMENDATIONS FOR IMPROVING PRODUCT STRATEGIES OF AN IT COMPANY

The process of strategic analysis of product strategies based on the results of determining the priority areas of development of an IT company is considered in the article. The purpose of the study is to increase the effectiveness of company product strategies by generating recommendations based on a strategic analysis of the results of IT product sales on the market. It has been proven that the urgent problem is to develop a business process for strategic analysis of product strategies, considering market conditions, investment and resource opportunities of the company, and to improve product strategies in accordance with market requirements and the company's strategic goals. Since IT products and services are specific «goods» in the IT market, there are certain limitations in using existing strategic analysis methods to determine their competitiveness. Based on the research, it was concluded that the integration of classical methods of strategic analysis and artificial intelligence methods is needed. A business process for analyzing product strategies and making recommendations for their improvement is proposed. It includes the following stages: 1) formation of a set of external factors influencing the company's activities as a result of PESTLE analysis; 2) analysis of the strengths and weaknesses of the IT company using SWOT analysis; 3) formation of a set of factors influencing the company's activities; 4) analysis of the main influencing factors using pairwise comparison on the Saati scale; 5) selection of promising product areas as a result of the using of the analytic hierarchy process; 6) analysis of the results of the implementation of each IT product to evaluate the relevant product strategies; 7) formation of a KPI system for assessing the product strategy, which characterize three aspects of the effectiveness of the strategy implementation for a certain period: aggregate financial indicator; average customer satisfaction indicator; average sales and marketing efficiency indicator; 8) evaluation of software product strategies based on the implementation of the rules system, which are built using fuzzy logic tools; 9) generation of recommendations for improving each product strategy using of the fuzzy inference system. Recommendations for improving product strategies, taking into account influencing factors and in accordance with the company's strategic goals, are formed as a result of implementing the process.

Key words: information technology, business process, modeling, decision, artificial intelligence, analysis, expert assessment, analytic hierarchy process, fuzzy logic, key performance indicator, recommendation.

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МОДЕЛЮВАННЯ ПРОЦЕСУ ФОРМУВАННЯ РЕКОМЕНДАЦІЙ ЩОДО ПОКРАЩЕННЯ ПРОДУКТОВИХ СТРАТЕГІЙ ІТ-КОМПАНІЇ

У роботі розглянуто процес стратегічного аналізу продуктових стратегій на основі результатів визначення пріоритетних напрямів розвитку ІТ-компанії. Мета дослідження – підвищити ефективність продуктових стратегій компанії завдяки формуванню рекомендацій на основі проведення стратегічного аналізу результатів реалізації ІТ-продуктів на ринку. Доведено, що актуальним завданням є розроблення бізнес-процесу стратегічного аналізу продуктових стратегій з урахуванням ринкової кон'юнктури, інвестиційних та ресурсних можливостей компанії та вдосконалення продуктових стратегій відповідно до вимог ринку та до стратегічних цілей компанії. Оскільки ІТ-продукти та сервіси є специфічними «товаром» на ІТ-ринку, то є певні обмеження використання існуючих методів стратегічного аналізу для визначення їхньої конкурентоспроможності. На основі досліджень зроблено висновок, що потребується інтеграція класичних методів стратегічного аналізу та методів штучного інтелекту. Запропоновано бізнес-процес аналізу продуктових стратегій та формування рекомендацій щодо їх покращення. Він включає такі етапи: 1) формування множини зовнішніх чинників впливу на діяльність ІТ-компанії як результат проведення PESTLE-аналізу; 2) аналіз сильних та слабких сторін ІТ-компанії з використанням SWOT-аналізу; 3) формування множини чинників впливу на діяльність компанії; 4) аналіз основних чинників впливу, використовуючи попарне порівняння за шкалою Саати; 5) вибір перспективних продуктових напрямів у результаті реалізації методу аналізу ієрархій; 6) аналіз результатів реалізації кожного ІТ-продукту для оцінки відповідних продуктових стратегій; 7) формування системи КРІ для оцінки продуктової стратегії, які характеризують три аспекти ефективності реалізації стратегії за певний період: агрегований фінансовий показник; середній показник задоволеності клієнтів; середній показник ефективності продажів і маркетингової ефективності; 8) оцінки стратегій програмних продуктів на основі реалізації системи правил, які побудовані з використанням інструментів нечіткої логіки; 9) формування рекомендацій щодо покращення кожної

продуктової стратегії на основі реалізації системи нечіткого висновку. У результаті реалізації запропонованого процесу формуються рекомендації щодо покращення стратегій перспективних продуктів, урахуваючи фактори впливу та відповідно до стратегічних цілей розвитку ІТ-компанії.

Ключові слова: інформаційна технологія, бізнес-процес, моделювання, рішення, продуктова стратегія, штучний інтелект, аналіз, експертне оцінювання, метод аналізу ієрархії, попарне порівняння, нечітка логіка, ключовий показник ефективності, рекомендація.

Problem Statement

Modern research on the Ukrainian IT market reveals trends of increasing the share of product companies, expanding services, companies' transition to developing IT products using artificial intelligence methods, etc. [1; 2].

The Ukrainian IT market is characterized by two main features:

- 1) rapid growth of competition, which encourages every company to develop high-quality IT products and implement a customer-oriented approach;
- 2) a variety of software products (IT services) that are in demand by various companies to effectively support their activities.

Therefore, IT companies focus on implementing projects to develop software products and services that ensure their sustainable development over a long period. The activities of a Ukrainian IT company that develops several types of software products, that is, has several product areas, are considered in the article. The company needs to determine its development prospects for the planned period in accordance with its strategic goal – long-term profit growth by increasing the company's competitiveness in the IT market. It is necessary to analyze IT products from the point of view of their compliance with the needs of the changing market and taking into account the company's capabilities (investment resources, professional personnel, innovations and the latest technologies, etc.) to achieve the strategic goal.

Thus, the main management problem is formed. This is a strategic analysis of the competitiveness of IT products and the identification of priority products (or directions). Development strategies and investments in promising IT projects are determined based on the results of such an analysis. Strategic analysis should be carried out at different stages of product life cycles, and it requires constant accumulation and analysis of large amounts of data. Therefore, the problem of developing and implementing software to support the process of strategic analysis and determining priority areas of company development and forming effective product strategies in accordance with the strategic goals of the IT company is relevant.

Analysis of recent studies and publications

Strategic analysis of the IT company's activities is the process of conducting research on the impact of the internal and external environment (market conditions, IT products and services, resources, etc.) to formulate strategies for the company's development according to the strategic goal. The key goal of conducting a strategic analysis of an IT company is to determine the effectiveness of current product strategies in the IT market. Companies most often use the following basic approaches (frameworks) VRIO, Resource-Based View (RBV), SWOT, Value Chain and PESTEL, etc. to conduct strategic analysis. They can also be a tool for analyzing and developing effective product strategies for a company [3].

PESTLE is used as a tool for researching the political, economic, social, technological, legal, and environmental factors influencing an IT company's business. Such an analysis helps to identify the market opportunities of an IT company and external threats as a result of assessing government data policies, the economic impact of inflation or recession on IT spending, social trends in remote work or digital literacy, technological advances in artificial intelligence and cloud computing, legal requirements for data privacy, including environmental concerns regarding e-waste. Therefore, it helps to identify external risks of an IT company [4].

SWOT analysis as a method of strategic analysis is used to understand the internal and external environment of an IT company. SWOT analysis is a common tool for identifying strengths, weaknesses, opportunities and threats of a company and can be used to evaluate an IT product or for the product areas of an IT company [5].

Popular frameworks such as HEART (Happiness, Engagement, Adoption, Retention, and Task Success) [6] and AARRR (Acquisition, Activation, Retention, Referral, and Revenue) are used to analyze the customer-centricity of an IT product and prospects in the market, in addition to common methods of strategic analysis [7].

Google's HEART framework assesses user experience (UX) based on the measurement of five key metrics: Happiness, Engagement, Implementation, Retention, and Success of User Tasks in a software product. The result is specific data that is used to make a design decision (usability) and improve functionality.

The AARRR framework («Pirate Metrics») is a marketing model for measuring product user behavior to improve each stage of the customer experience across five key stages of the customer lifecycle: engagement, activation, retention, referral, and revenue.

The Analytic Hierarchy Process (AHP) is used to comprehensively understand the problem of defining strategies and to support managerial decision-making [8]. AHP is one of the most used multi-criteria decision-making methods. It is used in situations where objective and subjective decisions of decision-makers need to be evaluated together [9]. The method provides a tool to represent the decision-making structure; it is used to evaluate alternatives in a logical and rational way. AHP helps the manager to make decisions, structure the problem into a hierarchy – from the general goal (to solve the problem) to specific criteria for making certain decisions and alternatives for achieving the goal or solving the problem. The relative coefficients of importance of each element, including the importance of each alternative, are determined using the technique of pairwise comparisons of the elements of the hierarchy [10].

Key performance indicators (KPIs) are usually used to assess the results of strategy implementation. The paper [11] proves that the formation of a system of KPIs of IT products is an urgent task in the process of analyzing the results of the company's activities. The necessity of conducting a factor analysis of integral indicators of the company's competitiveness to determine effective development strategies has been substantiated. A cognitive model is proposed to determine the impact of the values of key product performance indicators on the achievement of the strategic goals of the IT company in the planning period.

Statistics, survey data, and expert assessments are required to determine KPI values. Fuzzy logic tools are often used to process such heterogeneous data and to form certain conclusions about the results of strategy implementation [12]. For example, the Fuzzy Inference System Tree is used to make managerial decisions based on the knowledge formed to solve complex problems. A fuzzy decision support system for improving software design based on user experience assessment and user satisfaction level when interacting with software is proposed in the article [13]. Personalized recommendations are also provided to improve the user experience as a result of the implementation of such a fuzzy decision support system.

Therefore, the above strategic analysis tools should be used to analyze the effectiveness of a company's market strategies, to solve local problems of strategic analysis of an IT product at the stages of its life cycle. Since IT products and services are specific «goods» in the IT market, there are certain limitations to the use of existing methods, strategic analysis frameworks for evaluating the product strategies of an IT company. It was concluded based on research into these limitations that artificial intelligence methods need to be added to the «classical» methods of strategic analysis. Various methods of artificial intelligence can be effectively applied to prepare and analyze data that are necessary for conducting a strategic analysis of the market results of the implementation of IT products and services, including for the formation of recommendations for improving product strategies.

Research objective

Since the IT market is changing rapidly, a product company needs to regularly analyze the effectiveness of product strategies, adjust them depending on changes in market situation, the emergence of new user needs, depending on resource opportunities and the company's strategic goals. Conducting a comprehensive strategic analysis of product strategies based on marketing data, performance data, and taking into account the company's goals is required to develop product strategies to increase the competitiveness of IT products.

The objective of the study is to increase the effectiveness of product strategies of an IT company through the formation of recommendations based on a strategic analysis of the results of the implementation of IT products on the market. The results of the study proved that existing strategic analysis tools need to be adapted to the specifics of the IT market and the features of determining the competitiveness of a software product. Therefore, an urgent problem is the development of a business process for strategic analysis of the product areas of an IT company, taking into account market conditions, investment and resource opportunities of the company, if product strategies correspond to the strategic goals of the company.

Presentation of the main material of the study

This article is a continuation of the authors' research. The paper [3] considers the main stages of information technology of strategic analysis of the company's software. The results of the SWOT analysis for each IT area of the company are used in the article [3] to determine the competitiveness of IT products. But it is necessary to thoroughly analyze the impact of the external environment on the company's activities to determine market opportunities and threats. Therefore, it is proposed to first carry out a PESTLE analysis of the macroenvironment of an IT company. Then experts determine the market opportunities and threats to the IT company, taking into account the influence of external factors. Experts determine the strengths and weaknesses of an IT company using a SWOT analysis. Experts form risk factors and company-friendly factors that need to be taken into account when improving product strategies. The stages of evaluating product strategies and providing recommendations for their improvement were added to the information technology.

Thus, a business process is proposed for assessing and analyzing the product strategies of an IT company and formulating recommendations for their improvement, taking into account the priority areas of the company's development (Fig. 1). The IDEF0 functional modeling notation is used to develop a business process model.

Let's consider the main stages of the business process.

A1. Formation of a set of external factors influencing the activities of an IT company. The experts formed factors in six groups based on the analysis of the macro environment of the IT company as a result of PESTLE-analysis.

1. Political factors:

P1 – government policy towards the IT industry (the impact on the prospects for the development of the IT industry, including the impact on investments in this industry);

P2 – tax policy in the IT industry (the impact of taxes on the company's profitability).

P3 – trade policy (e.g. international trade rules affect the import/export of technology and equipment, including their cost);

P4 – budget expenditures (state subsidies or investments in IT development, including state projects, state financing of IT projects affects the growth of the IT industry);

P5 – state cybersecurity policy within the national policy (affects the emergence of new IT products in the field of cybersecurity).

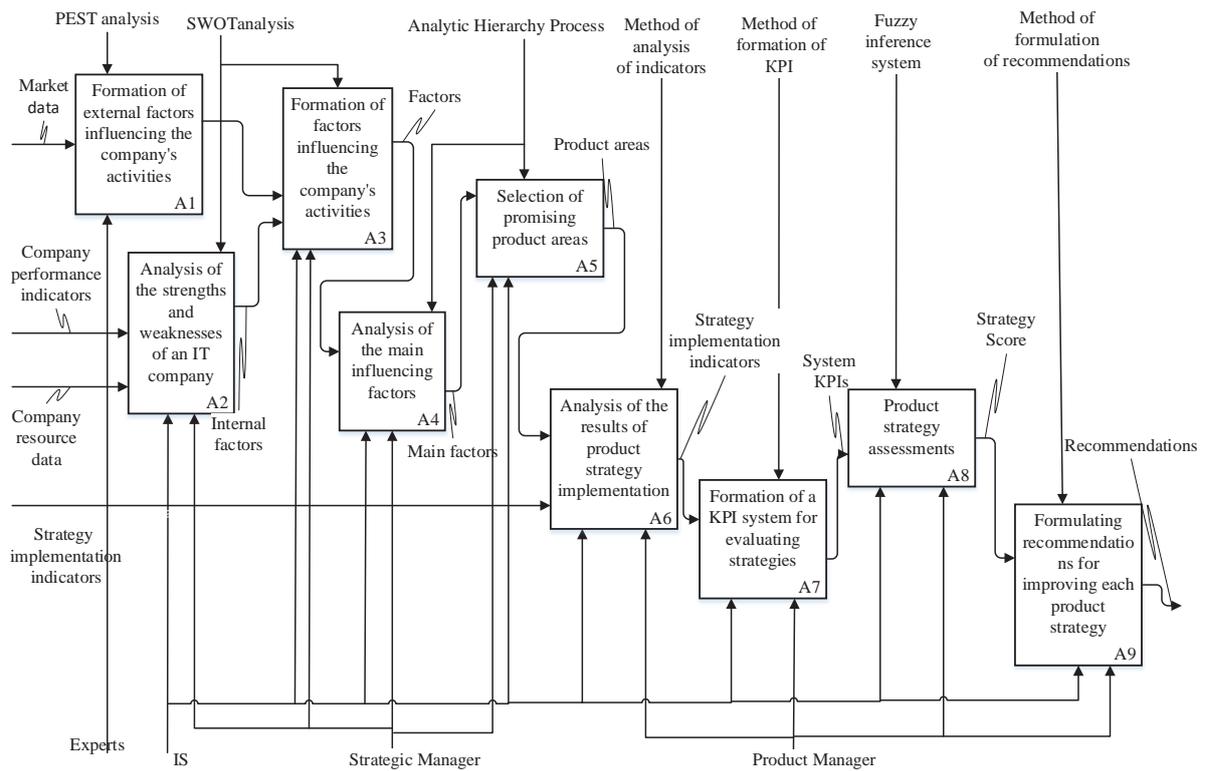


Fig. 1. Model of the process of analyzing product strategies and forming recommendations for their improvement

2. Macroeconomic factors:

M1 – economic growth or recession, GDP dynamics (impact on market demand for IT products and services);

M2 – interest rates (impact on the cost of a loan for both IT companies and their customers);

M3 – inflation rate, which affects the cost of IT companies' equipment, labor, etc.;

M4 – unemployment rate (impact on the cost of IT specialists, availability of qualified personnel);

M5 – income of the population and companies (impact on the cost of using IT products, purchasing software, etc.)

M6 – exchange rates (impact on foreign investment in the IT sector, on operating costs for international projects of IT companies, on the volume of international sales of IT products and services by Ukrainian companies, on the cost of international contracts, etc.).

3. Social factors:

S1 – the growth rate of digital literacy in the country (impact on the pace of introduction of new IT, on the formation of a talent pool of IT specialists, etc.);

S2 – remote work trends (impact on demand for online work tools, cybersecurity software, IT services, e.g. cloud infrastructure deployment, etc.);

S3 – trends in changes in the consumers behavior of IT products and services (impact on the emergence of new IT products due to the creation of new needs for digitalization, impact on the update of outdated applications);

S4 – demographic factors (aging or population growth in a country affects the demand for certain IT products and services, as well as the distribution of labor force in the IT field);

S5 – the needs of the population in education and obtaining IT qualifications (influence on the formation of the reserve of IT specialists);

S6 – cultural trends in the country (affect user experience, product design, distribution system, etc.).

4. Technological factors:

T1 – the development of innovations (the need to use systems with AI, cloud computing, blockchain, etc., affects the structure of the IT market, the emergence of new products, for example, the needs of businesses to quickly process large amounts of data, solve complex problems stimulates IT companies to develop software using machine learning, natural language processing algorithms, etc., create innovative IT products, services, etc);

T2 – trends in information protection (the emergence of new types of cyber threats requires increased investment and innovation in the development of cybersecurity software);

T3 – trends in the automation of technological processes, management processes (the emergence of business needs in the reengineering of work processes, for example, in the use of new equipment, hardware, changes in communication standards, etc., affects the development of relevant software, which creates new market opportunities for IT companies);

T4 – government projects on the automation of public services (impact on the IT market, on the demand for certain IT services and products).

5. Legal factors:

L1 – data protection and privacy laws (rules such as the GDPR or others must be taken into account in companies that process personal data);

L2 – intellectual property laws (impact on software development, patents and copyrights, on their cost of development and implementation);

L3 – antitrust and competition law (impact on mergers of IT companies, as well as acquisitions and dominance in the IT market);

L4 – labor law (regulates the hiring of IT company specialists, labor practice and remote work, for cooperation by contractors, especially in the international context);

L5 – consumer protection laws and regulations on digital services (affects the quality and cost of IT services and software products).

6. Environmental factors:

E1 – energy consumption level (the impact of using a company's IT infrastructure can have a significant carbon footprint, etc.);

E2 – government policies on e-waste and energy efficiency (adopted laws on the disposal and recycling of electronic equipment may affect the overall costs of the IT company);

E3 – environmental impact of the use of data centers and cloud infrastructure.

The selection of the main factors influencing the activities of an IT company is carried out in each group on the basis of a pairwise comparison of the factors of the group.

The results of the comparison of factors by experts are placed in a prepared template, an example of which is given in Table 1, using the following scheme: a factor is sequentially selected, for example, P1. P1 is compared with factor P2. If factor P1 has a greater impact on the activities of the IT company than P2, then the expert puts the symbol «>» in the cell, otherwise the symbol «<<» is put.

The score for each factor is equal to the number of «>» symbols in the corresponding row. Next, the factor with the highest score is determined. As a result, the expert selects the factor with the highest score in each group. If two factors in the table have the same maximum score, they can be included in the set of external factors, according to the expert's opinion. If, as a result, more than two factors in a group receive the same score, the experts must revise the comparative scores of the factors in that group. The factors that received the highest scores in each PESTLE analysis group form the set of external factors influencing the IT company's activities.

Table 1

Example of a comparative table for political factors

1. Political factors						Score
	P1	P2	P3	P4	P5	
P1		<	>	<	>	2
P2			<	>	>	3
P3				<	<	1
P4					<	2
P5						2
Maximum score						3
Factor						P2

For example, if two factors were selected from each group, then the F_{ext} set is formed as follows:

where the set F_{ext} contains such elements as important political (\hat{P}_1, \hat{P}_2), economic (\hat{M}_1, \hat{M}_2), social (\hat{S}_1, \hat{S}_2), technological (\hat{T}_1, \hat{T}_2), legal (\hat{L}_1, \hat{L}_2) and environmental (\hat{E}_1, \hat{E}_2) factors.

If the number of factors, according to experts, needs to be reduced, for example, as in this example, then it is proposed to conduct an additional comparative analysis of such factors. An example of a comparative table of selected external factors is given in Table 2. As a result, six factors have been obtained, which, according to experts, have the greatest impact on the activities of an IT company.

Table 2

Example of a comparative table of external factors

External factors													Score
	P ₁	P ₂	M ₁	M ₂	S ₁	S ₂	T ₁	T ₂	L ₁	L ₂	E ₁	E ₂	
P ₁		<	<	<	<	<	<	<	>	>	>	>	4
P ₂			>	<	<	<	<	<	<	<	>	>	4
M ₁				<	<	<	<	>	<	>	>	>	5
M ₂					<	<	>	<	>	>	>	<	7
S ₁						>	>	>	>	>	>	>	11
S ₂							>	>	>	>	>	>	10
T ₁								>	>	>	>	>	8
T ₂									>	>	>	>	7
L ₁										<	>	>	4
L ₂											>	<	3
E ₁												>	1
E ₂													2

Therefore, a set of important external factors that, according to experts, affect the activities of an IT company are formed as a result of PESTLE analysis:

$$F^{ext} = \{f_{1}^{ext}, f_{2}^{ext}, \dots, f_{n}^{ext}\},$$

where \hat{n} – the number of factors identified.

It should be noted the following: the number of main factors of influence can be determined depending on the state of the economy, the impact of state policy on the development of the IT industry, etc. Usually, when the strategic analysis process begins, experts understand the situation in the IT market and state policy and other aspects that need to be taken into account. A large number of

identified factors can lead to an increase in the inconsistency of expert opinions and an increase in the time for analysis.

A2. Analysis of the strengths and weaknesses of the IT company. The first part of the SWOT analysis is used. The result of the implementation of such a stage is a formed list of internal factors that positively (strengths) or negatively (weaknesses) affect the competitiveness of the company. As a result, two sets of internal factors are formed, which are determined by the resource capabilities of the IT company:

$S = \{S_1, S_2, \dots, S_m\}$ – a set of internal factors of the company's success;

$W = \{W_1, W_2, \dots, W_{\hat{m}}\}$ – a set of internal risk factors to consider.

where $\hat{m}, \hat{\hat{m}}$ are the number of success factors and the number of risk factors, respectively, they are determined by the resource capabilities of the IT company.

A3. Formation of the main factors influencing the company's activities. Here the second part of the SWOT analysis is implemented.

Experts analyze opportunities and threats for an IT company, taking into account important external factors (set F^{ext}), which are formed as a result of PESTLE analysis. As a result, factors are formed that characterize the market opportunities of an IT company and threats from competitors and other negative impacts on the company's activities. For example, these could be factors influencing the competitiveness of an IT company (both positive and negative). In other words, they characterize the competitive advantages and market lagging of an IT company.

So, sets are formed:

$O = \{O_1, O_2, \dots, O_{\hat{m}}\}$ – a set of internal factors of the company's capabilities;

$T = \{T_1, T_2, \dots, T_{\hat{\hat{m}}}\}$ – a set of internal risk factors,

where $\hat{m}, \hat{\hat{m}}$ are the number of internal opportunities factors and the number of threats factors, respectively; they are caused by the external environment of the IT company.

So, as a result of three stages, a set of factors is formed:

$\{S, W, O, T\} = \{S_1, S_2, \dots, S_m\} \cup \{W_1, W_2, \dots, W_{\hat{m}}\} \cup \{O_1, O_2, \dots, O_{\hat{m}}\} \cup \{T_1, T_2, \dots, T_{\hat{\hat{m}}}\}$.

A4. Analysis of the main influencing factors. The purpose of this stage is to prioritize the main factors that are formed as a result of PESTLE and SWOT analyses.

Pairwise comparison of these criteria in relation to the goal of increasing the competitiveness of the IT company (how important these criteria are for assessing competitiveness) is carried out using the Saati scale (Table 3) [9].

Note about mutual values: if the value of $\langle x \rangle$ is compared with the value of $\langle i \rangle$ and $\langle j \rangle$; j will be $(1/x)$ when comparing with i .

As a result of pairwise comparison of elements from the set $\{S, W, O, T\}$ та $F^{ext} = \{f_1^{ext}, f_2^{ext}, \dots, f_{\hat{n}}^{ext}\}$, factor priorities are calculated. Factors that have low priority may be excluded from further consideration.

Table 3

Saati Basic Scale for Evaluating Factors

Importance	Definition	Explanation
1	Equally important	Compared factors contribute equally to the goal
3	Moderately important	The first factor is moderately important compared to the other to achieve the goal.
5	Quite important	The first factor is quite important compared to the other to achieve the goal.
7	Much more important	Factor 1 is very strongly important over the other.
9	Extremely important	The first factor is extremely important compared to the other.
2, 4, 6, 8	Intermediate values	Used when compromise is needed.

Therefore, as a result, a set of main factors (F^p) is formed and their weights (α^p):

$$F^p = \{f_1^p, f_2^p, \dots, f_{\hat{n}}^p\}, \alpha^p = \{\alpha_1^p, \alpha_2^p, \dots, \alpha_{\hat{n}}^p\},$$

where \hat{n} – the number of factors that will be considered as criteria for evaluating product areas.

The criteria from the set F^p is used in the next stage of evaluating the company's areas.

A5. Selection of promising product areas. To select promising product areas, a hierarchy is built according to AHP. The hierarchy consists of three main levels [3].

The first level is the main goal: increasing the competitiveness of the IT company. This goal can be achieved through the implementation of software products (IT services) that are competitive or have the prospect of success in certain markets. The second level is the factors that affect the competitiveness of the company, and which are the criteria for evaluating alternatives - product areas of the IT company. The third level is the company's product areas, that are alternatives for achieving the main goal. Since at the previous one a pairwise comparison of factors was carried out in accordance with the main goal – to increase the competitiveness of the company, at this stage the assessment of product areas is carried out in accordance with the criteria F^p . As a result of the implementation of AHP, each product area is evaluated according to each criterion. The aggregate value of the assessment of each product area is calculated using local assessments for each criterion. The areas that received the highest value of the aggregate weight factor form a set of promising areas of the IT company.

Thus, as a result of the implementation of AHP, the impact of each product area on the company's competitiveness is determined. Those product areas that have low priority are considered by the management of the IT company to close them.

A6. Analysis of the results of the implementation of product strategies. Evaluation of the results of the implementation of the IT product strategy is carried out within each priority area. If an IT company keeps a consolidated record of the results of activities, then it is necessary to «separate» from the general statistics those data that relate to the results of the implementation of each IT product. Therefore, at this stage, the role of the product manager is important. It determines the results of the implementation of IT products according to certain indicators.

A7. Formation of a KPI system for evaluating strategies.

The statistical data on indicators obtained at the previous stage are input data for calculating KPIs of the product strategy. For each product, the manager forms his own KPI system, which reflects objective results [11]. It is proposed to use aggregate indicators to evaluate the product strategy, which characterize three aspects of the effectiveness of the strategy implementation for a certain period:

- Aggregate financial indicator (AFI);
- Average customer satisfaction indicator (ACSI);
- Average Sales Performance and Marketing Effectiveness (ASPI).

A8. Product Strategy Evaluations of Software Products.

It is proposed to use fuzzy logic tools to evaluate product strategies [12; 13]. Product strategy evaluation is based on the implementation of a hierarchical system that combines three subsystems of fuzzy inference (FIS trees). Each fuzzy inference subsystem provides local assessments of the product strategy based on financial performance, user satisfaction with the product, and the performance of the product sales team. Generalized product strategy assessment is a systematic integration of local assessments based on rules, which are built taking into account the goals of the IT company for the period during which the strategic analysis of the product strategy is carried out.

Based on the results of such an analysis, ways to improve the product strategy of an IT company are identified, taking into account the goals of the IT company.

A9. Formation of recommendations for improving each product strategy. It is proposed to use a fuzzy inference system to form recommendations, as this will make it possible to group the knowledge of the product manager and other specialists involved in the process of product development and implementation in the IT market, taking into account the results of the stages of the proposed process.

Thus, an effective product strategy is a high-level plan that helps the product manager maintain the competitive advantages of the product and justify the economic feasibility of further improving the product, promoting it to the market and, consequently, justify the advisability of investing in the corresponding IT project [14].

Conclusions

The business process of strategic analysis of software products of an IT company is proposed. As a result of its implementation, recommendations for improving product strategies are formed. The prospects of products are determined on the basis of an assessment of the company's activities, taking into account the external and internal environment, as well as its strategic goal - to increase the competitiveness of the company.

Further areas of work. To support decision-making to improve product strategies, taking into account the long-term goals of an IT company, it is necessary to develop a software solution that should implement the process of strategic analysis of areas of activity and determination of their priorities. Such a software solution should provide information to product managers on improving product strategies based on the results of analyzing market data and the company's resource capabilities. The implementation of such a software solution in the management circuit of an IT company will allow the management to determine the priority product areas of the company, and product managers to make management decisions to improve product strategies. The implementation of such strategies will help to increase the competitiveness of software products (IT services) and, as a result, increase the competitiveness of the company.

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