ANALYSIS OF BUSINESS MODELS OF RESTAURANT ENTERPRISES UTILIZING CLOUD KITCHEN TECHNOLOGY

Abstract. An analysis of the implementation features of business models for restaurant enterprises using cloud kitchen technology and online delivery based on relevant network services was conducted. Based on target performance indicators, the advantages of cloud kitchens compared to traditional restaurants were identified, including cost reduction through the exclusion of certain services and expenses, and the ability to expand the customer base by making changes and scaling production. It is noted that the task of analyzing the business models for implementing cloud kitchens is based on evaluating current market segmentation methods, determining positioning strategies for the cloud kitchen's online service, developing strategies for a strong brand, introducing extended marketing arsenal tools, and conducting a SWOT analysis in the strategic planning process. A strategy determination diagram was built based on calculating target indicators derived from evaluating current market segmentation methods for cloud kitchens, formalized mathematically through statistical data sets. This comprehensive market analysis methodology forms the basis of tools for assessing current market segments and developing specifications for organizing and further scaling restaurant industry establishments of this type, which is important for discussing service positioning and rental issues. The adaptation of the basic SWOT analysis model for the task of implementing cloud kitchen online services was carried out. The adaptation of the business model to the task of implementing a cloud kitchen allowed the identification of relevant analysis categories as follows: (i) key partners are product suppliers, online delivery services, and investors; (ii) key resources are initial capital obtained from investors, rental workspace, and hired personnel and managers according to professional experience and salary expectations; (iii) main advantages are low product cost, a wide range of products, and fast home delivery; (iv) user interaction methods are online communication via the cloud kitchen website and specialized software applications ensuring timely request fulfillment and delivery tracking, as well as additional information channels convenient for clients; (v) the expansion of the customer base is achieved through social media advertising, external advertising, and additional promotional campaigns; (vi) market segmentation is conducted based on geographical, demographic, psychographic, and behavioral indicators.
Keywords: cloud kitchen, business model, restaurant industry, SWOT analysis, market segmentation, extended marketing arsenal, online service.

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АНАЛІЗ БІЗНЕС-МОДЕЛЕЙ ПІДПРИЄМСТВ РЕСТОРАННОЇ ГАЛУЗІ, ЩО ЗАСТОСОВУЮТЬ ТЕХНОЛОГІЮ ХМАРНОЇ КУХНІ

Анотація. Проведено аналіз особливостей впровадження бізнес-моделей підприємств ресторанної галузі, що застосовують у своїй роботі технологію хмарної кухні та онлайн-доставки на основі відповідних мережевих сервісів. На основі цільових показників продуктивності визначено переваги хмарних кухонь порівняно з традиційними ресторанами, що включають у себе зменшення собівартості продукту за рахунок виключення частини послуг та витрат, а також можливість розширення клієнтської бази через внесення змін і масштабування виробництва. Зазначено, що постановка задачі аналізу бізнес-моделей впровадження хмарних кухонь базується на оцінці актуальних способів сегментації ринку, визначенні способів позиціонування онлайн-сервісу хмарної кухні, розвитку стратегій розвинення сильного бренду, введенні засобів розширеного маркетингового арсеналу і проведені SWOT-аналізі у процесі стратегічного планування. При цьому була побудована діаграма визначення бізнес-стратегії на основі розрахунку цільових показників отриманих у відповідності до оцінки актуальних способів сегментації ринку хмарної кухні, що формалізуються на математичному рівні через представлення статистичних наборів даних. Відповідна комплексна методика аналізу ринку лежить у основі інструментарію для оцінки актуальних сегментів ринку та формування набору специфікацій для організації і подальшого масштабування закладів ресторанної індустрії зазначеного типу, що є важливим для обговорення питання позиціонування і орендування сервісу. Проведeno адаптацію базової моделі SWOT-аналізу при роботі з завданням впровадження онлайн-сервісів хмарних кухонь. Адаптація бізнес-моделі до задачі впровадження хмарної кухні дозволила визначити актуальні для аналізу категорії наступним чином: (i) ключовими партнерами є постачальники продуктів, сервіси онлайн-доставки і інвестори; (ii) ключовими ресурсами є стартовий капітал, отриманий від інвесторів, робочі приміщення доступні до оренди, а також персонал та менеджери, найняті у відповідності до професійного досвіду та очікувань щодо оплати; (iii)
Основними перевагами є низька вартість продукту, а також широкий асортимент та швидка доставка додому; (iv) способами взаємодії з користувачами є онлайн-зв'язок через сайт харчової кухні та спеціалізовані програмні додатки, що забезпечують як своєчасне виконання запитів, так і трекінг доставки, а також додаткові інформаційні канали, зручні для клієнтів; (v) за розширення бази клієнтів відповідає реклама у соціальних мережах і зовнішню рекламу, а також додаткові рекламні акції; (vi) сегментація ринку проводиться за географічними, демографічними, психографічними та поведінковими показниками.

**Ключові слова:** хмарна кухня, бізнес-модель, ресторанна індустрія, SWOT-аналіз, сегментація ринку, розширенний маркетинговий арсенал, онлайн-сервіс.

**Introduction.** The emergence and implementation of the "cloud kitchen" (CK) or virtual restaurant (VR) paradigm in the restaurant industry are generally associated with the development of information technologies [1-5], particularly with the creation of online data processing services, whose functionality is ensured by the development of hardware tools, such as computing power, data transmission channel bandwidth, and the volume and speed of functional blocks of the information storage [6, 7]. This allows efficiently fulfilling the requests of a large group of users in real-time. A cloud kitchen is considered a restaurant industry establishment fully oriented towards food and beverage delivery, where orders are placed through corresponding network software applications, and delivery is outsourced to third-party delivery services. This approach significantly reduces the cost of products by excluding part of the services and expenses on renting a dining area and hiring customer service personnel, and also provides the opportunity to substantially expand the customer base by making changes to the menu and promotional programs, scaling production, etc. This indicates the high relevance of analyzing the business models of restaurant enterprises using cloud kitchen technology and determining their efficiency based on target indicators obtained through statistical analysis [8-10].

As the analysis of scientific research dedicated to the implementation of cloud kitchen technology in restaurant enterprises has shown [1-5], the development of these establishments is based on the formation of an online service, the hardware-software platform of which ensures reliable access to a wide range of users with minimal latency in processing incoming requests. Despite the novelty of these approaches, effective success metrics for cloud kitchens have been determined and key performance indicators for the development of online delivery services have been highlighted [8-10]. Based on these target indicators, the advantages of cloud kitchens compared to traditional restaurants have been identified, as well as approaches to aligning the working schedules and locations of these establishments.
[11-13], both in the context of competitive strategies and in forming "win-win" strategies to meet customer demands during peak periods. At the same time, it is possible to point out the absence of a comprehensive methodology for forming a mathematical model that can be used to develop software algorithms for determining global marketing strategies and promoting services to attract customers to cloud kitchens, which is considered an unresolved part of the overall research.

Therefore, the goal of this work is to build and refine a comprehensive machine analysis methodology for the business models of restaurant enterprises that utilize cloud kitchen technology and online delivery based on network services.

1. Problem Statement for Analyzing Business Models for Cloud Kitchen Implementation and Development

The research is based on analyzing a set of aspects that reveal potential opportunities and identify key success factors in the cloud kitchen restaurant industry. Specifically, to build a comprehensive methodology, the following aspects need to be identified:

- evaluating current market segmentation methods for building a cloud kitchen business strategy [14, 15];
- determining positioning strategies for the cloud kitchen's online service according to the overall market perception, and ways to attract and retain customers;
- assessing strategies for developing a strong brand that allows the cloud kitchen service to stand out from competitors and create positive consumer perception;
- introducing tools for the extended marketing mix (EMM), which includes describing and defining product characteristics, pricing strategy, effective placement and delivery, advertising strategies, personnel selection, and evaluating operational processes efficiency [16-18];
- conducting a SWOT analysis during strategic planning to separate key factors and phenomena [19].

The goal of assessing current market segmentation methods in the framework of building a cloud kitchen business strategy is to determine sets of variables for developing personalized offers for different market segments, as well as selecting the optimal placement and marketing communication strategy. Given the innovative nature of this industry, a wide range of market segmentation methods must be considered to build an effective mathematical model:

1. Introduction of a set of geographic variables (Geographic Variables; GV), represented by the set \( \{G_k\} \), where \( k \in [1; K] \), with each \( G_k; \{G^1_k, \ldots, G^r_k\} \) representing a data set \( G^1_k, \ldots, G^r_k \), characterizing potential sales markets' locations and enabling
business development strategies forecasting for each region, considering specific needs and local population preferences.

2. Introduction of a set of demographic variables (Demographic Variables; DV), represented by the set \( \{D_l\} \), where \( l \in [1; L] \), with each \( D_l: \{G^i_l\} \) representing a set of statistical data (income, gender, education, occupation, etc.) presented as \( D^1_l \ldots D^L_l \), allowing the correlation of demand for cloud kitchens for different categories.

3. Introduction of a set of psychographic variables (Psychographic Variables; DV), represented by the set \( \{P_m\} \), where \( m \in [1; M] \), with each \( P_m: \{P^i_m\} \) representing a set of statistical data \( P^1_m \ldots P^M_m \), characterizing lifestyle, values, and food preferences that influence the choice of the cloud kitchen service.

4. Introduction of a set of behavioral variables (Behavior variables; BV), represented by the set \( \{B_n\} \), where \( n \in [1; N] \), with each \( B_n: \{B^i_n\} \) representing a set of statistical data \( B^1_n \ldots B^N_n \), characterizing the interaction of potential clients with the chosen brand, use of online services, etc.

The mentioned sets of variables \( \{G^i_l\}, \{P^i_m\} \) and \( \{B^i_n\} \) act as parameters of target functions that enable building a business strategy and evaluating the competitiveness of the product and services offered within the implementation of a new cloud kitchen service for each market segment (Fig. 2) through the calculation of the absolute extremum of the function. This comprehensive market analysis methodology forms the basis for tools to assess current segments and develop specifications for organizing and scaling restaurant industry establishments of this type. This is crucial for discussing the positioning of the service when launching a new system of establishments, particularly in addressing questions about the attractiveness of the new brand to potential clients and defining approaches to explaining the brand's advantages compared to existing alternatives. The corresponding process involves presenting the product's unique advantages, which is also important for the entrepreneur in terms of maintaining motivation and understanding the market participation goal. Proper positioning of the cloud kitchen's online service allows forming a brand as a key element on which consumers rely. It should be noted that within the framework of business analytics, a brand should not be limited to symbols or logos but represents a form of content mediation, offering consumers not just a product but an experience worth sharing [20]. Consumers have different perceptions of the brand and its importance; in some cases, the brand is chosen as a tool for self-expression (for example, in the case of a cloud kitchen, this can be self-presentation at the level of a modern, ambitious, and mobile person who focuses on an active lifestyle and healthy eating).
Thus, determining consumer motivation involves finding a reliable solution to meet existing needs, and incorporating the appropriate analysis into the business analytics process involves identifying current promotional campaigns and brand promotion among consumers using the appropriate set of media resources.

The conducted analysis can be supplemented with EMM tools. In this context, it is necessary to consider key aspects that influence consumer perception of the brand. It is important to find out which factors are associated with the brand in consumers' minds and which communication channels most effectively influence consumer decision-making.
purchase decisions. Moreover, the EMM analysis can include additional elements such as service processes and brand representation, which can also affect consumer perception and behavior. This comprehensive approach allows for a deeper understanding of how the brand interacts with its target audience and identifies factors that contribute to its market implementation.

Fig. 2. SWOT analysis diagram for the implementation of cloud kitchen online services

To formalize the business analytics process of cloud kitchen implementation, a SWOT analysis is used, which includes the identification of such basic categories as: Strengths (S), Weaknesses (W), Opportunities (O), and Threats (T). In the context of the research task, it is proposed to further refine the model by constructing the corresponding SWOT analysis diagram for the implementation of cloud kitchen online services.
online services, as presented in Figure 2. The above categories "S", "W", "O", "T" are refined according to the analysis as follows:

1. **Strengths:** (i) Reduction in rental and personnel costs. (ii) Flexibility of the establishment's infrastructure, which is relevant for reorganization and scaling. (iii) Efficient use of shared resources.

2. **Weaknesses:** (i) Commission paid to the aggregator platform and online delivery services. (ii) Potential delays due to traffic and peak courier load. (iii) Potential errors in the online platform during order processing and fulfillment. (iv) Difficulty in establishing a new brand due to the absence of representation at the level of a restaurant hall, staff, etc.

3. **Opportunities:** (i) Attracting a wide customer base through presence on network resources and the capabilities provided by online delivery. (ii) Partnerships with restaurant establishments and delivery services for business expansion. (iii) A wide range of outsourcing delivery services.

4. **Threats:** (i) High competition with traditional restaurant industry establishments that also provide online delivery services. (ii) Loss of brand trust due to errors in the organization of the online platform and the choice of delivery services. (iii) Unpredictable and frequent changes in legislation related to the regulation of the restaurant industry.

Depending on the specific task of implementing the cloud kitchen online service, the components of the "S", "W", "O", "T" categories are refined, which allows for adequate business analytics and the development of an appropriate business strategy.

2. **Development of Business Models for Restaurant Enterprises Using Cloud Kitchen Technology**

As the results of the conducted research show, the development of a business model for restaurant enterprises using cloud kitchen technology is based on market segmentation and identifying key categories of the SWOT analysis. Based on the obtained data set, it is necessary to assess the following categories of the business model:

- Key partners to be involved in the project.
- Key resources that should be accessible.
- Main advantages for service users.
- Methods of interaction with service users.
- Channels for expanding the customer base.
- Selection of relevant market segments for project execution.
Adaptation of the business model to the task of implementing a cloud kitchen (Fig. 3) allows for the identification of the following categories: key partners are product suppliers, online delivery services, and investors; key resources include initial capital obtained from investors, rental workspace, and personnel and managers hired according to professional experience and salary expectations; main advantages are low product cost with proper cloud kitchen organization, a wide assortment, and fast home delivery; methods of interaction with users include online communication via the cloud kitchen website and specialized software applications.
that ensure timely request fulfillment and delivery tracking, as well as additional information channels convenient for clients; the expansion of the customer base is achieved through social media advertising, external advertising, and additional promotional campaigns; market segmentation is conducted based on the indicators discussed above.

Conclusions.
As a result of the conducted research, the features of organizing business models for restaurant enterprises using cloud kitchen technology and online delivery based on network services were analyzed.

In the course of the research:
● A comprehensive methodology for calculating key parameters and target functions for the implementation of cloud kitchen online services was developed, based on the evaluation of current market segmentation methods for cloud kitchens.
● The SWOT model was refined by constructing the corresponding SWOT analysis diagram, which can be applied in the implementation of cloud kitchen online services.

Thus, the conducted analysis allowed for the formation of a methodology for adapting the business model to the task of implementing a cloud kitchen.

References:

**Література:**


