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RESTAURANT REVENUE MANAGEMENT AND ANALYTICAL ASSESSMENT OF ITS EFFECTIVENESS

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The effectiveness of a revenue management system is important for every business, as revenue is a factor that directly affects profit. This issue is especially important for the restaurant business, where the level of costs is much higher than the average in the economy. The subject of the study is modern restaurant revenue management systems used in foreign practice. The goal of the article is to study the theoretical aspects of revenue management and evaluate its effectiveness in the restaurant business. Objectives: (1) to clarify the conceptual apparatus of restaurant revenue management, (2) to study the indicators for assessing the effectiveness of revenue management and their use in the restaurant business, (3) to determine the possibilities of using factor analysis of contribution margin in restaurant revenue management. The study was conducted using the method of a systematic review of scientific literature on this topic. The results of the study showed an ambiguous interpretation of the conceptual apparatus of revenue management and the need to adapt the indicators for assessing the effectiveness of revenue management to the conditions of the restaurant business. Conclusions: yield management, unlike revenue management, is applied to specific conditions and the restaurant business has the corresponding characteristics. Taking into account the specifics of the restaurant business, it is important to analyze the menu in terms of the contribution of each assortment item to profit. For an overall assessment of the restaurant menu, it is advisable to use a multi-criteria ABC-analysis. To quantify the effectiveness of the applied revenue management strategy in the operational order, the indicators CMPASH (Contribution Margin per Available Seat Hour) and CMPASM (Contribution Margin per Available Square Meter) should be used. To study the change in contribution margin as a result of management decisions made based on the results of ABC-analysis, it is advisable to conduct a factor analysis.

Keywords: *restaurant revenue management, yield management, contribution margin, margin analysis, ABC-analysis.*

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Introduction. The effectiveness of the revenue management system is important for every business, as revenue is a factor that directly affects profit. This issue is especially important for the restaurant business, where the level of costs is much higher than the average in the economy. This is primarily due to the significant labor intensity of this sector of the tourism industry and, accordingly, high labor costs. In addition, catering activities are mainly carried out by small businesses, which are characterized by higher costs. According to the State Statistics Service of Ukraine in 2010-2021 99.5% to 99.8% of business entities in the restaurants and mobile food service activities sector operated in the small business sector. The volume of services sold in 2021 amounted to UAH 72.1 billion. In 2021, 94.9% of business entities in the restaurants and mobile food service activities sector employed up to 9 people, 4.9% employed 10 to 49 people, and only 0.2% employed 50 to 249 people. That is, 99.8% of Ukrainian restaurant business entities employed less than 50 people, while in the United States this percentage was 90%. The volume of restaurant business services sold in relation to the GDP of Ukraine in 2021 amounted to 1.32% [34, 35], in the United States, the same figure for 2021 was 3.34% [25, 28]. Thus, the issues of improving the efficiency of revenue management for this sector of the Ukrainian economy are extremely important and relevant.

In the process of restaurant revenue management, managers need to make informed decisions both strategically and operationally, evaluate the effectiveness of new strategies, tactics and technologies. Modern theory and practice have developed effective approaches to building a revenue management system, including for business entities in the service sector. At the same time, the current literature pays insufficient attention to the analytical assessment of the consequences of the applied solutions. Therefore, in this article, we would like to (1) clarify the conceptual framework of restaurant revenue management; (2) consider the main performance evaluation criteria used in revenue management in terms of their application in the restaurant business, considering the specifics of accounting and pricing; (3) the possibility of using factor analysis for analytical evaluation of factor influences on the total contribution margin of a restaurant.

The purpose of the article. The purpose of the article is to study the theoretical aspects of revenue management and evaluate its effectiveness in the restaurant business.

Literature Review. Various aspects of revenue management of service companies are the subject of research by many scholars around the world. A study of the scientific literature on this topic has shown that researchers use two terms: “revenue management” and “yield management” [38]. Most scholars do not distinguish between these two concepts. Some researchers emphasize the differences between “yield management” and “revenue management”, including L. R. Weatherford and S. E. Bodily [30], S. Netessine and R. Shumsky [23], S. Shoemaker and T. Gorin [26] and others.

The theoretical foundations of modern revenue management systems are laid down in the work of K. Littlewood [21], where the goal was set to maximize airline revenues by segmenting consumers and manipulating tariffs. The term “yield management” was first introduced by the former chairman and CEO of American Airlines R. Crandall in 1978 [5]. This term was further developed in the works of L. Weatherford and S. Bodily [30], R. Cross [5] and other scholars. The improvement of the theoretical basis of yield management was accompanied by the expansion of modern management practices to other service industries: hotels, golf, car rental.

The successful use of yield management in various sectors of the service sector has led to the interest of researchers in the implementation of this practice in the restaurant business. One of the first issues of applying modern approaches to revenue management in the restaurant business was considered in the works of S. Kimes et al. According to these scientists, at that time, many restaurants used various methods of revenue management, but their application was tactical [19]. In their work, they developed a theoretical framework for strategic revenue management in the restaurant business.

Despite the fact that various aspects of revenue management are the subject of close attention of many scholars, the issue of measuring and evaluating their effectiveness in the restaurant business has not been sufficiently studied.

Materials and methods. To conduct the study, we used the method of a systematic review of scientific literature on the topic, as well as the materials of international scientific conferences. The search for scientific publications in the Scopus and Web of Science databases was carried out using the keywords "revenue management", "yield management", "restaurant revenue management". The review was conducted to investigate: (1) theoretical aspects of restaurant revenue management, (2) the main criteria for evaluating the effectiveness of management decisions in the process of restaurant revenue management, (3) the possibilities of using factor analysis in the restaurant revenue management system.

Results and discussion.

1. Yield management and revenue management

Historically, the term "yield management" was developed earlier than the term "revenue management". The term "yield management" was first coined by the former Chairman and CEO of American Airlines R. Crandall in 1978. This is reported by the author of the bestseller and guru of modern revenue management R. Cross [5]. The modern interpretation of these terms is associated with a number of fundamental events that have occurred in the field of air transportation of passengers. Prior to the Airline Deregulation Act (1978), the main task of US airlines was to increase the level of occupancy of seats in the aircraft. However, after the adoption of this Act and due to the fierce competition that emerged, the goal of maximizing airline revenues by segmenting consumers and manipulating tariffs was first set, as thoroughly described in K. Littlewood [21].

High competition in the US airline industry has led to price reductions. People-Express offered tickets at unrealistically low prices. It was the time of the "Flying That Costs Less Than Driving" advertising slogan [5]. According to I. Yeoman and U. McMahon-Beattie [33] report that between 1976 and 1990, average fares for domestic passengers in the United States decreased by 30%. American Airlines and other airlines used the approach of K. Littlewood's approach. The use of this tactic brought American Airlines $500 million in profit per year, Delta Air Lines more than $300 million in additional revenue [5]. Eventually, People-Express was absorbed by its former competitor Continental, which confirmed the effectiveness of new approaches to revenue management. As a result, American Airlines defined the goal of yield management as follows: "to maximize passenger revenue by selling the right seats to the right customers at the right time" [30]. Subsequently, I. S. Yeoman and U. McMahon-Beattie noted these events as the first turning point in the history of revenue management [33].

Yield management has become the subject of dissertations [1, 31] and numerous scientific articles. Since the formation of yield management is associated with air transportation, and later with hotels, the early literature on yield management focused mainly on the issues of overbooking or capacity allocation between customer segments: in hotels (room inventory management) and in airlines (Seat Inventory Control) [2]. This is quite logical - the return on effective seat inventory management in these service sectors can be significant. According to Delta Airlines, one seat for each flight sold at full fare could provide additional revenue of more than $50 million in one year [2].

A further development of yield management was the Expected Marginal Seat Revenue (EMSRa) model proposed by P. Belobaba [1]. This model is the basis for making decisions to maximize flight revenue. It is applied to the dynamic process of revising the reservation limit for future flights, taking into account the probability of fare class upgrades and overbooking. Thus, we can say that the K. Littlewood's rule and P. Belobaba's EMSR approach have become a revolutionary breakthrough in yield management [38].

An illustration of the EMSRa model is shown in Fig. 1-3. In Fig. 1 shows a graph where the y-axis shows the product of the price and the probability of selling a seat at the price PH, and the x-axis shows the number of seats. The probability of selling one seat is 1 (the point closest to PH on the graph). With the sale of each seat, the probability of selling the next seat decreases and eventually will be zero (intersection of the curve with the x-axis).

Figure 2 shows the same, but with the condition that seats are sold at a lower price PL (PH > PL).

The graph in Figure 1 shows that it is not possible to sell all 100 seats at a high price. Therefore, the number of seats that cannot be sold at a high price must be sold at a lower price. To do this, it is necessary to determine the maximum number of seats Q, after which the price should be changed. Figure 3 shows how this looks graphically (two graphs are superimposed). Mathematically, the marginal number of seats is determined on the basis of statistical observations for past periods. Thus, (100 - Q) seats can be sold at a lower price, and the rest at a higher price.

The definition of the term "yield management" in the early period of this system's existence is reflected in the studies of E. Orkin [24], S. E. Bodily and L. R. Weatherford [3], S. Kimes [12] and other scholars. In particular, S. Kimes describes yield management as the process of allocating the right type of capacity to the right type of customer at the right price to maximize the revenue or yield of the firm [12]. Thus, in her view, the goal of yield management is to determine what the trade-offs between price and number of customers should be.

G. Withiam defines yield management as a set of strategies that allow service industries with limited production capacity to obtain optimal revenues from

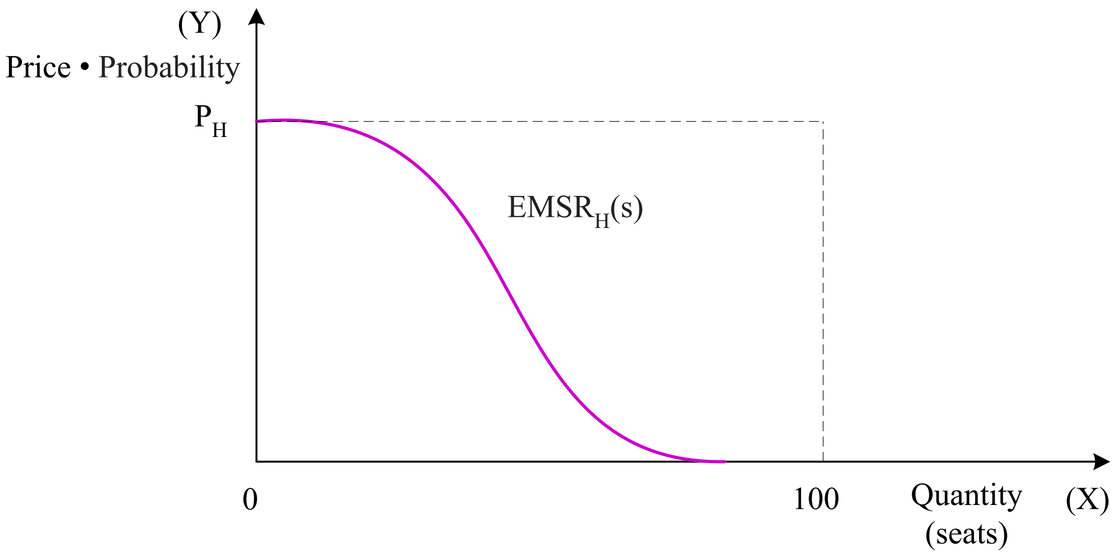

Fig. 1. Graph of the dependence of the product of price and probability of sale on the number of seats sold (assuming sale at price PH)
**Source: based on [1]*

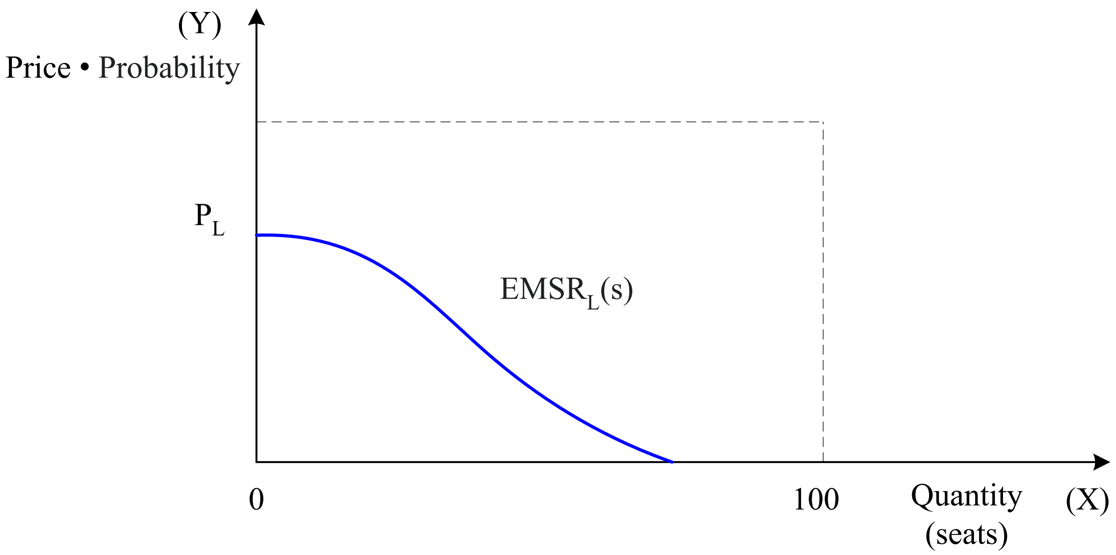

Fig. 2. Graph of the dependence of the product of price and probability of sale on the number of seats sold (assuming sale at price PL)
**Source: based on [1]*

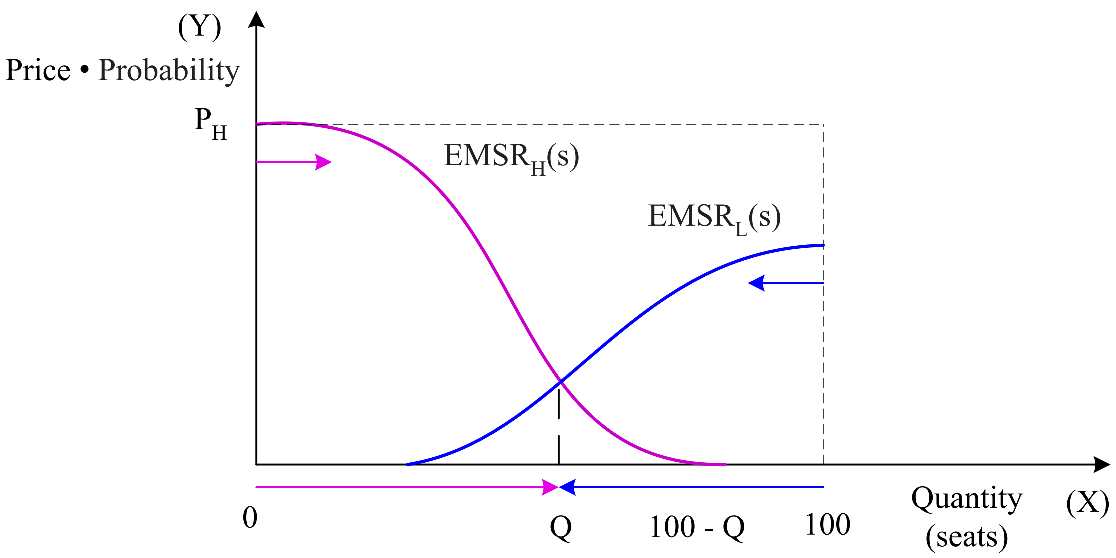

Fig. 3. Combining graphs to determine the critical number of seats (Q)
Source: based on [1]

operations [32]. The main concept of yield management, according to this researcher, is to provide the right services to the right customer at the right time at a reasonable price. Strategic levers of yield management G. Withiam defines as the four "C": namely, calendar, clock, capacity, and cost. They are linked by a fifth "C": customer. Thus, the strategic levers of yield management are focused on matching the timing of service provision and prices with the willingness of customers to pay for the service depending on its timing. Based on demand levels and customer characteristics, management can shift the demand of those customers who are relatively price-sensitive but time-insensitive during off-peak periods. Changing this demand frees up prime time for customers who are relatively time-sensitive but not price-sensitive [32].

Early researchers of yield management identify the following characteristic elements:

- fixed capacity, which is very expensive to increase.
- over time, the service loses its value.
- changing demand.
- possibility of dynamic pricing.
- fixed costs dominate the cost structure.

Later, the Yield Management system was implemented in other businesses, such as the hotel business, car rental, and advertising. Thus, A. E. Leask and I. Yeoman [20] considered the possibilities of applying yield management in the field of Heritage Visitor Attraction. They proposed the principles of yield management that are suitable for cultural heritage sites. S. E. Kimes and L. W. Schruben [15] studied the features of revenue management of golf courses. S. E. Kimes and S. Singh [16] proposed a framework for implementing a revenue management strategy for spas. Nair S. K. and Bapna R. [22] considered the application of the yield management methodology for Internet providers in order to better utilize network bandwidth. The possibility of applying the Yield Management strategy to generate additional revenue from reserve capacities in telecommunications networks was investigated in the thesis of S. Humair [8]. F. Jallat and F. Ancarani [9] considered the application of dynamic pricing in telecommunications. S. Netessine and R. Shumsky [23] studied the characteristics of yield management for three industries: airlines, hotels, and car rental companies. According to R. Cross, the implementation of this tactic in the Marriott hotel chain brought an additional $100 million per year. The National Car Rental company turned from a state on the verge of bankruptcy into a profitable company that grew at a rate of 20% per year within 18 months of applying yield management. The Canadian Broadcasting Corporation, adopted these tactics and realized a 2 million dollar gain in the first two weeks [5].

Over time, approaches to defining the purpose of revenue management have changed. X. Wang et al. studying the main changes in revenue management in various sectors of the service sector for the period 2004-2014, note a managerial shift from revenue maximization to profit optimization [29]. Thus, since the 70s of the 20th century, the goal of revenue management has changed from maximizing the number of seats sold to maximizing revenue and then profit.

2. Difference between yield management and revenue management

There is no consensus among scholars on the difference between the concepts of yield management and revenue management. In addition, not many works are devoted to discussing this issue. Let us consider the arguments used by researchers who separate these concepts.

S. Netessine and R. Shumsky consider yield management to be one of the aspects of revenue management [23]. In their view, the decision to manage yield is only one aspect of a more general business question: how should a firm sell and distribute products to multiple customer segments? To answer this question, a firm must use tools for pricing and forecasting, as well as for inventory management. All of these tools are often grouped under the term "revenue management", although the boundaries between yield management and revenue management are often ambiguous. According to S. Netessine and R. Shumsky, yield management is applicable in a business environment that has the following characteristics: 1. It is expensive or impossible to store excess resources. 2. Commitments need to be made when future demand is uncertain. 3. The firm can differentiate among customer segments, and each segment has a different demand curve. 4. The same unit of capacity can be used to deliver many different products or services. 5. Producers are profit-oriented and have broad freedom of action [23, p.35].

L. R. Weatherford and S. E. Bodily rightly believe that the terms "yield management" and "revenue management" are not equivalent, since the term "yield management" has certain limitations when describing a wide class of approaches to revenue management and propose to use the term "perishable-asset revenue management" (PARM) [30]. The main tool of PARM, according to these researchers, is price segmentation.

S. Shoemaker and T. Gorin also note that revenue management is often confused with yield management [26]. These scientists put forward a different argument in favor of the differences between these concepts. In their opinion, yield management is only one of the components of revenue management. Yiled (in relation to hotels) is the ratio between actual and potential room revenue, while the total revenue of a hotel is not only generated from room sales.

Despite the identification of yield management and revenue management by many scholars, due to the specific conditions in which it is applied, yield management continues to develop and improve as a separate segment of revenue management. This is confirmed by modern publications on yield management. Undoubtedly, yield management is a narrower term than revenue management, as it is used in those sectors of the economy that have specific characteristics mentioned above. Accordingly, specific techniques are used to manage such “stocks”.

3. The genesis and development of restaurant revenue management

The successful application of modern approaches to revenue management in some sectors of the service industry, such as hospitality, golf, spa, advertising, and car rental, has prompted researchers to consider yield management in restaurants. According to G. Thompson [27], the first study that substantiated the possibility of using yield managementtools in the restaurant business and created an appropriate theoretical framework is the work of S. E. Kimes et al. [19]. Indeed, the main necessary conditions for the application of yield management technology, such as relatively fixed capacity, predictable demand, perishable inventory, appropriate cost structure and pricing, as well as demand that is variable and uncertain [19]. These scientists have studied the peculiarities of applying some strategic and tactical tools of revenue management in the restaurant business.

A successful revenue management strategy is based on effective control of customer demand. S. E. Kimes et al. focus on two strategic levers that restaurant managers have to manage demand and, consequently, revenue [19]. These are length of stay management and demand-based pricing. Restaurateurs are usually faced with unpredictable lengths of customer stays, which limits their ability to manage revenue. The practice that is perceived to be the most unfair is controlling the length of customer stay [6]. Two practices that are considered fair are the difference in price between lunch/dinner and cancellation in case of late arrival. The perception of fairness of these practices affects customer intentions. In addition, price fluctuations depending on the time of lunch/dinner, day of the week/weekend, and time of day will affect the desire to visit the restaurant. The reservation policy also affects customer intentions [6].

An important element of restaurant revenue management is the regulation of the duration of customer service (ordering, cooking, check processing). This is especially important during the peak hours of the restaurant. Modern technologies can improve the efficiency of meal time management, increase revenue, and improve customer satisfaction. Reducing the duration of lunch during periods of high demand by only 5 minutes per customer can significantly increase restaurant revenues [14]. According to M. Cavusoglu's research [4], technologies that reduce customer service time are the most popular among restaurant managers.

4.Approaches to assessing the effectiveness of restaurant revenue management

The final stage of implementing a revenue management system, applying new tools or technologies to increase restaurant revenues is to evaluate the effectiveness of the measures taken [17]. Traditionally, the revenue indicator is used as a criterion for assessing the effectiveness of revenue management in the service sector, since the main goal of revenue management is to maximize revenue from the services provided. This is quite justified for those service sectors where the variable costs per unit of service provided (e.g., airplane or train seats, advertising time, hotel rooms in the same tariff class) are basically the same for the company (for example, if you are traveling by air, the airline's variable costs for the next seat are exactly the same as for yours). In the restaurant business, the situation is the opposite. The food cost for different menu items, as well as the time spent on their preparation, can vary significantly. As a result, the contribution of each dish to the restaurant's profit is different. Therefore, to evaluate the effectiveness of restaurant revenue management, you should use contribution margin or profit.

Thus, Kim K., Kim M.-J. and Jun J.-K. [11] evaluate the effectiveness of the application of pricing strategies, table mix strategy, seat occupancy strategy in the practice of revenue management of small restaurants in South Korea in terms of queues in terms of their contribution to profit. The expediency of forming indicators for evaluating the effectiveness of restaurant revenue management strategies based on profit is reported by C. Heo [7]. She proposes to use the indicators ProPASH (Profit per Available Seat Hour) and ProPASM (Profit per Available Square Meter) in addition to RevPASH (Revenue per Available Seat Hour), arguing that the purpose of restaurant revenue management is to maximize its profit. This approach, in our opinion, is appropriate when assessing indicators for time periods lasting at least one month, since the profit indicator is fully formed only at the end of the month (restaurant revenues are received daily, and some expenses are determined only at the end of the month). To make such an assessment for a shorter period of time (less than 1 month), the contribution margin indicator can be used. Contribution margin can be calculated for a shorter period of time, unlike profit. Therefore, we believe that in the process of operational assessment of the effectiveness of restaurant revenue management, the CMPASH (Contribution Margin per Available Seat Hour) and CMPASM (Contribution Margin per Available Square Meter) indicators should be used. At the same time, you should monitor such indicators as the average check and seat occupancy [36]. In addition, increasing restaurant revenues should be carried out in the direction of improving the menu based on the use of multicriteria ABC analysis [10]. As criteria, it is advisable to use 1) the number of dishes sold; 2) contribution margin from a unit Given that in Ukraine, accounting of financial results and pricing at catering enterprises is carried out mainly on a trading basis [37], instead of the contribution margin from a unit of the assortment item of the menu, you can use the trade margin per unit of the assortment item [10].

5.Substantiation, scope and conditions of application of the contribution margin factor analysis for assessing the effectiveness of restaurant revenue management

The actions of revenue managers are aimed at increasing revenue and maximizing profits. These actions can affect the performance indicators in different ways and in different directions. Therefore, managers must have clear information about the impact of factors on the change in the amount of contribution margin and, ultimately, profit. In addition to being aware of the factor formation of retrospective results, this can help the manager determine which aspect of restaurant revenue management needs to be paid more attention to in order to improve performance.

Factor analysis of the restaurant contribution margin can be carried out separately for the kitchen and bar, as well as separately by different methods of sale - through the table (individual or group service), takeaway and delivery (Fig. 4). It is also possible to analyze the impact of factors on contribution margin within the following groups of assortment items: drinks, alcoholic beverages, first and second courses, desserts, salads.

The use of factor analysis tools can allow a manager to determine how changes in factors, such as the amount of contribution margin per unit of sales (or trade margin), the number of dishes sold and their structure, have affected the total contribution margin of a restaurant. When choosing time periods for such an analysis, it is necessary to take into account the fact that the restaurant business has a clearly expressed seasonal nature. The issue is to identify and neutralize seasonal surges in demand for certain types of own-produced and purchased goods of the restaurant. It is possible to identify assortment items that have a seasonal nature of consumption using various statistical methods, the simplest of which is the index method.

Conclusions. The analysis of scientific publications of foreign scholars on the issues of revenue management has revealed the use of two terms: “revenue management” and “yield management”. Yield management is a narrower term than revenue management, as it refers only to a certain range of “inventory” whose main characteristic is the ability to lose value quickly. In addition, the use of yield management technologies presupposes the presence of the following characteristic elements: fixed capacity, which is expensive to increase; variable demand; and the possibility of dynamic pricing. Accordingly, specific techniques are used to manage such “inventory”.

The development of yield management was accompanied by the expansion of the use of special techniques in various service sectors, as well as a change in the goal from maximizing the number of tickets sold to maximizing profits. A feature that should be taken into account when applying yield management in the restaurant business is that, unlike air transportation, a customer can order dishes of different prices at his or her seat in a restaurant. Therefore, in order to monitor the revenue from the sale of dishes, it is important to analyze the assortment on an ongoing basis in terms of the contribution of different assortment items to the overall financial result.

For an overall assessment of the restaurant menu, it is advisable to apply a multi-criteria ABC-analysis of the menu according to the following criteria: 1)

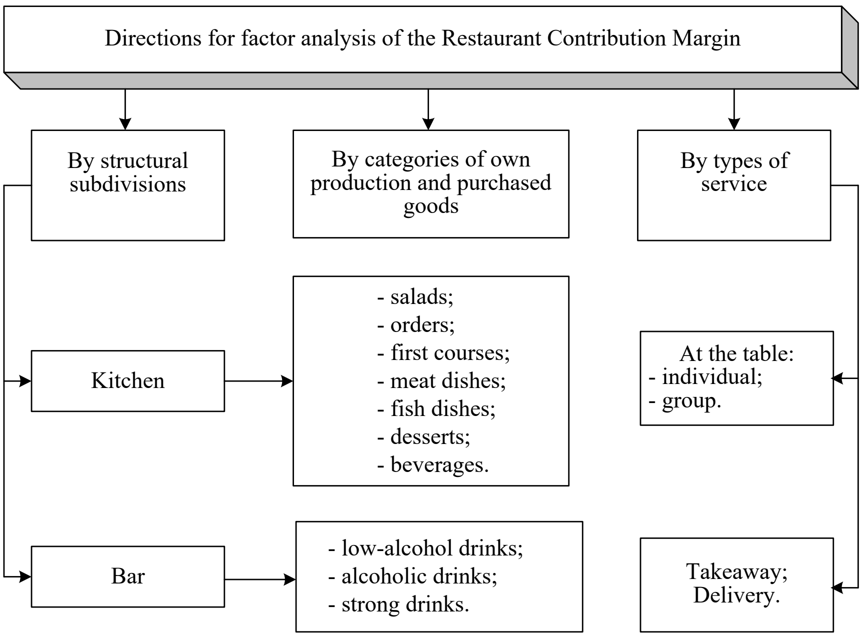

Fig. 4. Areas of factor analysis of the restaurant contribution margin

Source: improved by the authors based on [10] number of sales; 2) contribution margin per unit of assortment item of the menu (or trade margin); 3) cost of products for the production of the dish. To quantify the effectiveness of the applied revenue management strategy in the operational order, the indicators CMPASH (Contribution Margin per Available Seat Hour) and CMPASM (Contribution Margin per Available Square Meter) should be used. This is due to the fact that it is difficult to obtain a profit indicator for a time period of up to 1 month, given the length of the full accounting cycle. Given that in Ukraine, accounting for financial results and pricing at restaurant business enterprises is carried out mainly on a trade basis, the amount of trade margins from the sold dishes can be used instead of marginal income from the sale of dishes. In order to study in more depth the changes in contribution margin as a result of management decisions, it is advisable to conduct a factor analysis of contribution margin. Such an analysis will allow to quantify the impact of factors on the restaurant contribution margin.

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УПРАВЛІННЯ ДОХОДАМИ РЕСТОРАНУ ТА АНАЛІТИЧНА ОЦІНКА ЙОГО ЕФЕКТИВНОСТІ

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Ефективність системи управління доходами має важливе значення для кожного підприємства, оскільки доходи є фактором прямого впливу на прибуток. Особливо важливим це питання є для ресторанного бізнесу, де рівень витрат значно вищий, ніж у середньому в економіці. Предметом дослідження є сучасні системи управління доходами ресторану, що використовуються у зарубіжній практиці. Мета статті полягає у дослідженні теоретичних аспектів управління доходами та оцінки його ефективності в ресторанному бізнесі. Завдання: (1) уточнення понятійного апарату управління доходами ресторанів , (2) вивчення показників оцінки ефективності управління доходами та їх використання в ресторанному бізнесі, (3) визначення можливостей застосування факторного аналізу маржинального доходу в управлінні доходами ресторанів. Дослідження проводилось з використанням методу систематизованого огляду наукової літератури по даній темі. Результати дослідження показали неоднозначне трактування понятійного апарату управління доходами та необхідність адаптації показників оцінки ефективності управління доходами до умов ресторанного бізнесу. Висновки: управління доходністю на відміну від управління доходами застосовується до специфічних умов і ресторанний бізнес має відповідні характеристики. Враховуючи специфіку ресторанного бізнесу важливо здійснювати аналіз меню з точки зору вкладу кожної асортиментної позиції у прибуток. Для загальної оцінки меню ресторану доцільно використавувати багатокритеріальний АВС-аналіз. Для кількісної оцінки ефективності застосовуваної стратегії управління доходами в оперативому порядку слід використовувати такі показники: (1) маржинальний дохвд на доступне місце за годину та (2) маржинальний дохід на квадратний метр. Для дослідження зміни маржинального доходу внаслідок управлінських рішень, прийнятих за результатами АВС-аналізу, доцільно проведення факторного аналізу.

Ключові слова: *управління доходами ресторану, управління доходністю, маржинальний дохід, маржинальний аналіз, АВС-аналіз.*

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