

Digital Inventory Optimization in the Hotel and Restaurant Sector

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Abstract— The relevance of the study is due to the fact that the minimization of reserves allows to accelerate the turnover of own and borrowed funds, and the dynamic formation of their optimal volume, according to consumer preferences and with the use of digital technologies, provides additional competitive advantages of the company.

The aim of the study is to develop model ideas about the possibilities of integrated digital optimization of the hotel and restaurant sector enterprise stocks (HRS) with the simultaneous increase of customer focus of digital services.

Such research methods were used: empirical methods (the study of literature, documents, sites, results, experience); theoretical methods (analysis, synthesis, comparison, generalization, identification of contradictions) and general logical methods (modeling).

The novelty of this study is the analytical substantiation of model ideas about digital optimization of the HRS enterprise inventory management. A practically significant result is the proposed conceptual model of the relationship between customer-oriented service and digital inventory optimization, which contributes to the further improvement of developments in the part of digital management systems of HRS enterprises.

Keywords—*hotel and restaurant sector; inventory; optimization; management system; booking; digitalization.*

I. INTRODUCTION

In today's highly competitive market enterprises of the hotel and restaurant sector (HRS), with a simultaneous drop in real incomes of potential consumers, measures are needed to improve the quality of service and to optimize the costs of hotel and restaurant complexes to maintain their profitability.

The tendency of the HRS enterprises transition from rendering traditional services of accommodation and food to the simultaneous organization of citizens leisure, in connection with expansion of internal and tourist streams entering Russia, causes necessity of various commodity groups stocks formation that does actual researches on optimization of management of stocks of the enterprises of GDS.

Digital communication tools in the form of various ways of booking of the HRS enterprises rooms, both using the company's website and tour operators' systems, and by searching through independent booking sites, partially solve the problem of forecasting stocks. However, these tools do not fully reflect the preferences of consumers to certain methods of food and the need for additional services and do not solve the problem of minimizing stocks.

Minimization of reserves allows to accelerate the turnover of own and borrowed funds, and the dynamic formation of their optimal volume according to consumer preferences, with the use of digital technologies, will provide additional competitive advantages of the company.

II. LITERATURE REVIEW

In a number of publications on the example of catering enterprises, the growth of companies losses due to inefficient inventory management is noted. At the same time, the need for stocks as a kind of buffer to smooth out fluctuations in demand is indicated. The size of the buffer, on the one hand, is determined by the company's goals for the level of service, and on the other – its financial capabilities [1].

HRS enterprises should ensure the continuity of services, in particular in places of food as part of hotel and restaurant complexes, so that the offered products meet the assortment, quantitative and qualitative needs of consumers. In this case, inventories are created, which represent a part of the total mass of goods entering the sphere of circulation. With the reduction of the stocks lying time and acceleration of their sale and monetization, their transition from the sphere of circulation to the sphere of consumption occurs and goods cease to belong to the category of stocks [2].

In the literature, the main functions of reserves are noted, such as: ensuring the reproduction of the HRS enterprise with the processes of permanent formation and consumption of reserves; satisfaction of the solvent demand of possible consumers, when stocks act as a form of

commodity supply; alignment of the ratio between the parameters of demand and supply [3].

It is necessary to maintain the estimated level of stocks and provide for their timely resumption for uninterrupted sales of products. Insufficient or excessive reserves bring undesirable financial consequences for the HRS enterprise. Therefore, it is advantageous for an organization to optimize reserves according to the minimum criterion, since the cost of storing reserves increases in proportion to the volume of reserves [4].

In scientific researches the sufficient number of software products on management of the enterprise developed for HRS and including the module of the stocks account, for example, "ASTOR-restaurant", Tillypad R-Keeper, POS Sector, Iiko, Jowi, "RARUS-catering" is characterized. Digital inventory accounting, attributed to consumption, for example in restaurant activities, allows to differentiate the distribution of stocks on traditionally sold, promotional, preferential or free meals / drinks, as well as to take into account the consumption of stocks in connection with damage and combat [5].

It should be born in mind that the function of predictive optimization of stocks, according to consumer demand and preferences is absent in the above systems. It is also not possible to integrate them with booking systems. At the same time, scientific research emphasizes the importance of digital technologies in the management of customer experience to generate positive feedback and increase the frequency of calls, for example, using the CRM module (Customer Relationship management) along with automated inventory management in the framework of digital enterprise management HRS [6].

These systems allow us to evaluate the customer's requests and preferences when booking through the company's website and partially predict and adjust the level of stocks. However, the problem remains the interconnection with independent booking systems and online services on the website of the HRS enterprise, as well as the export of data to inventory management systems and interaction with inventory suppliers.

Therefore, it is necessary to develop model ideas about the possibilities of stocks digital optimization, taking into account the demand and preferences of consumers of services of HRS enterprises, due to integration interactions of internal management systems of the HRS enterprise, as well as external digital interactions with customers and suppliers.

III. RESEARCH METHODOLOGY

The aim of the study is to develop model ideas about the possibilities of integrated digital optimization of reserves of the GDS enterprise with simultaneous increase in customer focus of digital services.

The object of the study is the enterprise GDS with a wide range of additional services of leisure. The subject of

the study is the inventory management system and prospects for its digital optimization.

Empirical and theoretical methods were used as methods of this research. Theoretical methods of research were: analysis, synthesis, comparison, generalization, identification of contradictions. Empirical methods were: methods-operations-the study of literature, documents and results; methods-actions-the study and generalization of experience, retrospective analysis.

The information base of the research was scientific research and practical solutions covered in journal publications, collections of articles, conference materials, statistical reporting. Opportunities for improving customer orientation and ergonomics were explored by assessing the content and usability of the HRS sites and booking systems by potential consumers.

IV. RESULTS

According to the statistical reports of the Republic of Tatarstan (RT) state Committee on tourism for 2018, the industry shows a steady positive trend with an annual increase in the volume of tourist flow by 8%. Along with the increase in domestic inbound tourist flows in the Republic, there is an increase in the arrival of foreign citizens by 24.3% compared to 2017, which is facilitated by the holding of various sports and business events in the Republic.

The average occupancy rate of hotels in Kazan in 2018 increased by 3% compared to the previous year and amounted to 60%, the average income per room increased by 22.8%, the average length of stay was 2-3 days. The data of tourists survey allow us to note that 80% come for recreation, 60.5% for the first time in Tatarstan, 39.5% are return tourists. Travel with family is 30%, further decrease in the percentage of tourists is in the categories of "couple", "with friends" "alone", and only 3.75% as part of tour groups and at work.

The share of tourists self-booking a trip-78%, using the Internet to search for information on trip planning-36.1%, using online booking systems-28.1% [7].

In general, statistics indicate an increase in tourist flows, including from foreign citizens; on preferential travel is not as part of tour groups, and for the purpose of family holidays, which involves an independent search for data on accommodation and booking. However, Internet search rates and the percentage of online booking systems use have a significant reserve for growth, which may be due to the lack of users competence in terms of digitalization tools, and poor ergonomics of hotel websites and booking systems. Also, this structure of tourist flow suggests that the competitive advantages will have hotel and restaurant complexes, providing a traditional set of "accommodation-food" range of additional services that take into account the interests of adults and children's age groups.

In order to optimize the planning of inventory requirements at HRS enterprises, in particular stocks of

perishable and expensive food and alcohol, it is necessary that booking data from independent sites, from the site of the HRS enterprise, from travel companies and operators, including using traditional means of communication, are entered into the inventory management system. Such opportunities will allow us to dynamically generate queries to providers according to the needs of customers.

In this case, if the formation of reserves for buffet included in the room rate, to be predicted, depending on the number of rooms booked, then evaluate the need for specific dishes within the proposed additional (not included in the price) Breakfast, lunch or dinner is often not possible.

Technological and calculation cards meals available in the systems of automatic control of HRS enterprises, allow to estimate the current consumption of the reserves, as a source of products and semi-finished products, to assess the movement of products, the efficiency of the raw materials replacement that can be useful when building relationships with suppliers. However, the registration of stock consumption in this case is the fact of ordering a dish on the spot, which is due to the lack of digital options for pre-selection of children's/adult menu options and its components.

It should be born in mind that in addition to working capital frozen in stocks, their very presence leads to an increase in relevant costs, namely, related to the storage of stocks (the cost of immobilized capital; the cost of maintaining the stock); related to the execution of orders (inventory accounting; transportation costs, etc.); losses in case of shortage of stocks (in the form of a partial loss of profit or business reputation of the company).

At the same time, it should be remembered that part of the costs associated with the formation of stocks, has a mutually competing impact on the competitiveness of the company. Thus, the growth of the insurance stock leads to an increase in the cost of its storage, but reduces the risk of losses and loss of the company's image due to failures and downtime.

In addition, when managing inventory at the HRS enterprise, it is necessary to take into account the costs associated with risks, which include damage, theft, fighting, etc. Also, each product has its own storage conditions. The risks of storing frozen food or alcohol are several times lower than the risks of storing goods of the category "Fresh".

At the same time, the HRS enterprise can suffer losses if at the right time stocks appear insufficiently. Accordingly, such an enterprise needs to consider all the possibilities of operational re-ordering of products. If their delivery time is short and relationships with suppliers are established, then in case of inventory reduction "below the minimum" they can be quickly resumed without compromising the service (without getting the final dish in the "stop list"). Therefore, when optimizing inventory, you should consider the terms and conditions of delivery of products.

Optimization of stocks in this case will be significantly simplified by digitalization of consumer preferences, both to

the organization of food, and to additional services of the enterprise of HRS. Customer preferences should be considered as one of the input parameters to the inventory management system when booking accommodation, which requires customer orientation and ergonomics of digital systems interfaces that provide booking, use of CRM-modules, software capabilities to manage customer experience and relationships with suppliers.

Implementation of the automation system will optimize all processes related to guest service, execution and booking of orders, reduce costs, as well as get the necessary tools for analysis and improvement of the enterprise.

Scientific research confirms the importance of digital infrastructure development for the regional economy [8], emphasizes the importance of the transition from traditional management of material resources to service and digital management [9]. At the same time, it is rightly noted the need to adapt and improve the competence of specialists of companies to work in the digital environment [10], as well as to strengthen the role of IT-management in the implementation and use of multimodule means of automation of business processes [11].

In the part of HRS enterprises, automated process management is considered in a descriptive way [12], mainly with a general characteristic of the business processes digitalization possibilities. There are also more specialized reviews of reservation systems [13] and inventory management of informatization systems [5,14,15]. However, these studies do not take into account the potential of the relationship between reservation systems and management systems of the HRS enterprise in terms of inventory optimization.

A typical inventory management system in a HRS enterprise includes front-office and back-office units. The first is suitable for automation of cash desks of small cafes, bistros, fast food restaurants as part of the hotel and restaurant complex. It is used if there is no need for loyalty programs and work with the hall plan.

Back-office-operational and accounting unit of digital design, maintenance, analytical work with electronic documentation, formed by the participants of front-office, in the framework of the enterprise HRS financial resources redistribution general system. The unit allows to take into account the implementation of stocks, their transformation into a finished product, generate reports on sales, output and write-off of products.

The advantage of the back-office block is the ability to keep records of the "buffet", calculate banquets, analyze the structure of the menu and adjust the level and range of stocks and the whole system of commodity movement. Also, the block allows to forecast the cost, prices and profits with the introduction of a modified menu.

The analysis of the HRS enterprise site and independent booking sites is made for the leading hotel and entertainment complex in RT - "Riviera", Kazan (<https://kazanriviera.ru>), in order to identify the completeness and ergonomics of electronic information

about the possibilities of catering and methods of pre-booking.

As stated in section B, catering stocks are perishable, contain expensive units and require forecasting and dynamic updating to ensure adequate levels of customer satisfaction.

The Riviera complex, in addition to the traditional services of accommodation and food type "buffet" for Breakfast provides guests with the opportunity to visit the water Park, Ferris wheel, 5 D cinema (admission is included in the price of some rooms) and many other leisure options. This determines the length of guests stay on the territory of the complex and creates a demand for additional paid catering services. The complex has 10 catering facilities- restaurants, cafes and bars.

The study of the complex "Riviera" site showed that data on places of food are contained in the sections "entertainment complex" and "restaurants and bars", where the transition to a particular restaurant (the main ones - "Panorama", "Caravel", "amore") is accompanied by its description. Under the description, you can make a reservation by phone/e-mail. this naturally does not contribute to the prompt receipt of information about the preferences and specific dishes selected by the customer, and does not provide the possibility of customer-oriented optimization of stocks.

The advantage of each restaurant tabs for the consumer is the ability to expand the menu and get an idea about the range of dishes and prices. However, the possibility of online booking on the website of the complex of a specific set of dishes for lunch/dinner is not available, which does not contribute to understanding the structure of demand of guests and ensuring the necessary stock.

Moreover, the online booking service of hotel rooms available on the website of the complex, not only includes the choice of restaurant and type of additional power, but the results fill the requirements of the room does not display its value (in contrast to sites of independent reservation system). According to the results of filling the guest sees only a feedback form with the need to specify contact details, often scaring consumers at the stage of collecting information.

The independent booking engine (Woodco) the prices of different room types at Riviera naturally present, including

specifying additional services included in the rooms of high category. However, the digital option to supplement the room selection with a standard lunch/dinner set, which is generally available in the booking system, is not displayed for this complex. For example: "order an additional standard set for lunch (dinner) for rubles". there is also no possibility to switch from booking a room to booking restaurants in a single system.

The study of reviews about the hotel and restaurants in the complex "Riviera" showed that among the variety of positive reviews there are some complaints about the service and food. Reviews from the site are given for analysis https://www.tripadvisor.ru/Restaurant_Review-g298520-d6075851-Reviews-Karavella-Kazan_Republic_of_Tatarstan_Volga_District.html.

For example, in a traditional order in the restaurant "Caravella" the waiter does not own the composition of the dish, and some of its ingredients are replaced without displaying changes in the menu. As a result, the Camembert cheese in the dish was replaced with cottage cheese, and asparagus with asparagus beans (Tatiana L.'s review of August 4, 2019). There are also reviews of meal replacements at pre - paid banquets (review DayTrip504626 of December 28, 2018). Such reviews expose the imperfection of the inventory management system, gaps in their optimization and forecasting according to customer needs.

According to the analytical justification given in section D, the lack of opportunities for online booking of additional paid meals (including children's menus) both on the website of the GDS enterprise and on the websites of independent booking systems leads to uncertainty in the formation of perishable and expensive stocks of hotel and restaurant complexes.

From the consumer detection menu in the "stop list" or the discrepancy menu, the meal leads to the formation of negative attitudes towards the restaurant, and the modern opportunities of digital resources to broadcast reviews negative perception of the enterprise HRS on potential consumers. In this regard, a conceptual model of the HRS enterprise reserves digital optimization with a focus on demand is proposed (figure 1).

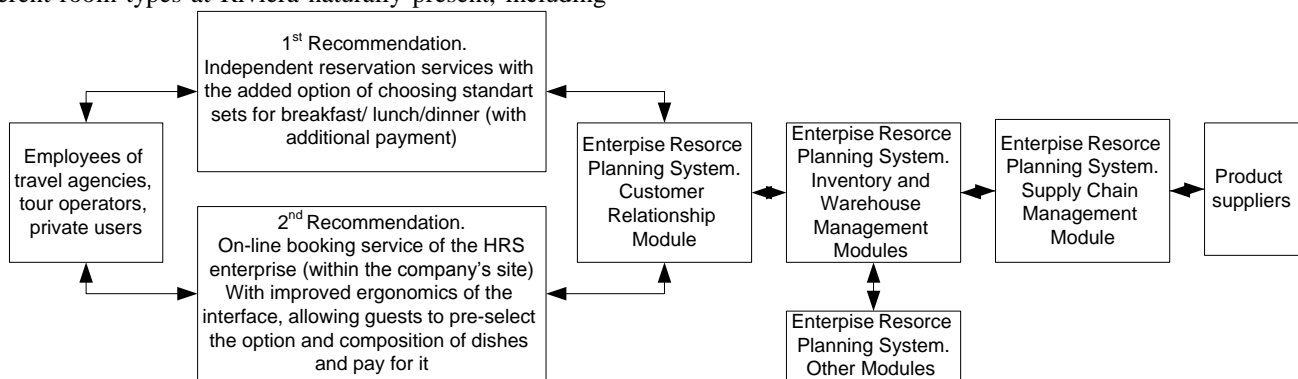


Fig.1 Conceptual model of a HRS enterprise stocks digital optimization with a focus on demand (Compiled by the authors)

According to the model, employees of travel agencies, tour operators and individuals, 78% of whom, according to the statistics given in section A, independently plan a tour, should have access to ergonomic digital services of the company's website or independent booking companies, which should be supplemented with the possibility of choosing additional meals.

At the same time, on independent booking sites, the practical implementation of this offer is possible through the provision of standard sets for lunch and dinner (if Breakfast is included in the price). If according to section A the average length of stay of tourists is 2-3 days, then a standard set is enough to have 3 different compositions. Such information will allow not only to estimate needs for lunches/dinners, but also to plan typical purchases of stocks for their preparation.

Within the framework of its own website of enterprises, the reserve for improving the ergonomics of the interface and the choice of power options is much higher. When booking online, the consumer should be given the opportunity to choose category of restaurants, then category breakfast/lunch/dinner, and within each offer a set of soups, salads, main dishes, drinks, etc. or pre-structured transitions "meat-fish-poultry-children's menu" with the subsequent disclosure of dishes.

In this case, the hierarchy of the online order page will be close to the structure of the online store. It is necessary to have a photo of the dish, the price and the possibility of online payment. Such a change in attitude to the reservation of food will ensure the predictability of stocks, and feedback on stock balances will allow to quickly place an order with the supplier, or, in the online booking system on the company's website, flexibly change the range and composition of dishes for the available resources.

This information about orders enters the system of automated enterprise resource planning (enterprise resource planning), for example, in the customer relationship management module, where it is integrated with the information flows from the server. e-mail, telephone and other channels for receiving data on consumer requests. The module provides, among other things, customer feedback to clarify the request, the accumulation of order history, the formation of a customer portrait and loyalty programs.

The information is processed by various modules of the system, including inventory and warehouse management modules and transferred to the supply chain management module for relationships with suppliers. 1C: Hotel, 1C: restaurant and 1C: Corporation can be mentioned as Russian developments of scalable enterprise resource management systems. The latest product involves digital optimization of a variety of business processes within multi-complexes with a wide range of services.

V. CONCLUSIONS

It is shown that the activity of the HRS enterprises, aimed at meeting the demand of consumers in the organization of accommodation, food and leisure, requires maintaining the optimal level of reserves for uninterrupted activity,

maintaining the image and providing customer-oriented service.

The analysis of the RT tourist services market trends is made, according to which, more than 70% of the guests coming to RT plan rest independently, 30% travel with a family, but only about 30% use the Internet and online services of the enterprises of HRS for booking that, probably, is connected with insufficient functionality of digital services.

Features of HRS enterprises stocks formation and function are generalized, necessity of perishable and expensive stocks of food optimization according to demand from consumers is revealed. The analysis of the "Reviera" case showed the imperfection of filling independent booking services with information about the possibilities of organizing additional paid meals. Analysis of the company and customer website reviews revealed the lack of pre-selection and payment of food and dishes, which limits the optimization of stocks and leads to substitutions in the dishes.

The conceptual model with recommendations on filling of the HRS enterprise card on independent service of booking is proved and developed, and also on increase of ergonomics of the company own site with possibility of a choice, pre-order and payment of food for digital optimization of stocks according to demand.

The novelty of this study is the analytical substantiation of model ideas about of the HRS enterprise inventory management digital optimization. Practically significant results are the proposed conceptual model of the relationship between customer-oriented service and digital inventory optimization, which contributes to the further improvement of developments in the part of digital management systems of HRS enterprises.

References

- [1] I. A. Ilkhasan. State and tendencies of development of public catering in modern economy of Russia. Scientific researches: vectors of development, Materials of the international conference. science.- pract. Conf. Cheboksary: CNS "Interactive plus". 2017, pp. 181-182.
- [2] I. I. Zakharova, I. V. Shavandina, M. Z. Dubinovsky. Efficiency of public catering enterprises in the conditions of the country's economy development. Fundamental research. 2014, 12-9, pp. 1962-1967.
- [3] N. I. Baryshnikova, T. N. Zaitseva, E. E. khodakova, N. A. Vavilova, V. V. Baklanova. Application of system approach in public catering as an element of "lean production". Young scientist. 2017, 3, pp. 59-62
- [4] D. A. Alekseeva. State and tendencies of development of public catering in Russia. Concept. 2016, vol. 6, pp. 151-155.
- [5] T. I. Kiselevich, Ya. Yu. Mityushkin, G. R. Khvistani. Automation of public catering enterprises: theory and experience. Innovative development of the economy, 2018, vol. 1, 6(48), pp. 161-166.
- [6] A.V. Kazaev. Improving customer experience management in service organizations with the help of digital tools. Proceedings of vseross. science.-pract. Conf. "Service sector development: strategies, innovations, competences", N. Novgorod: Publishing house of NNSU. 2019, pp. 24-29.
- [7] Results of the work of the state Committee of the Republic of Tatarstan for 2018, Kazan. 2019, 76, URL: http://tourism.tatarstan.ru/rus/file/pub/pub_1752926.pdf
- [8] T. V. Kramin, A. R. Klimanova. Development of digital infrastructure in regions". Terra Economicus. 2019, vol. 17, 2, pp. 60-76.

- [9] S. V. Orekhova. Industrial enterprises: electronic technology. the traditional business model. *Terra Economicus*. 2018, vol. 16, 4, pp. 77-94
- [10] S. Zemtsov, V. Barinova, R. Semenova. Risks of digitalization and adaptation of regional labor markets in Russia, *foresight*. 2019, vol. 13, S2, pp. 84-96.
- [11] V. Nissen, T. Iezina, A. Saltan. The role of IT-management in the digital transformation of Russian companies. *foresight*. 2018, vol. 12, 3, pp. 53-61
- [12] D. A. Pogonysheva, A. R. Chobanyan. Automation of business processes at the enterprises of restaurant business. *Bulletin of the educational consortium Central Russian University. Information technology*. 2018, 2(12), pp. 38-41.
- [13] A. A. Kleiman, O. A. Babanchikova. Computerization and automation-the main trends of innovative management and development of hotel business. *Bulletin of the national Academy of tourism*. 2018, 2(46), pp. 25-32.
- [14] Aleksandr S. Kuznetsov. Russian Professor's meeting. *Russian Journal of Physical Education and Sport*. 2019, 14(1), pp. 17-22. DOI: 10.14526/2070-4798-2019-14-1-18-24
- [15] Z. M. Lomaza. Information systems as a tool for inventory management in the restaurant business. *Journal of legal and economic research*. 2018, 4, pp. 162-165.