

Analysis of Fast Food Service Capability Based on Flexsim Modeling and Simulation

Heng He*, Zhongmin Hu^a

College of Management, Guangxi University of Science and Technology, Liu Zhou, 545006, China

*Corresponding author e-mail: 26661041@qq.com, ^a836502540@qq.com

Abstract. The process of improving the efficiency of restaurants is a process of system integration and construction of restaurant business processes, service capabilities, and management. The foundation of the task is to establish a model of the enterprise operating system and to measure the service capabilities of the enterprise through the simulation of the model. Therefore, this article builds the model of the a restaurant service system based on the flexsim simulation software, sets the parameters of the service system model according to the actual operation data of the restaurant, and observes whether there is redundancy or insufficiency in the service capability of the service system through the operation model, and the simulation result Analyze, combine the actual situation of the restaurant, put forward the corresponding improvement suggestion, in order to improve the resource allocation efficiency of the restaurant busy hour, increase the income of the restaurant, shorten the average wait time of the customer, increase customer satisfaction, make the restaurant in the competition in an invincible position.

1. Introduction

China's service industry has developed rapidly and continuously, the scale has continued to grow, and the service industry has become the first of the national economy. A major industry has further increased its contribution to the growth of the national economy. The rapid development of the service industry in China is both an opportunity and a challenge for the traditional service industry. Service-oriented enterprises must make innovations and changes to maintain the survival and development of the company.

In recent years. Different scholars has studied the operation of restaurants and using different methods to increase restaurant revenue, reduce operating costs, and improve customer's satisfaction. Agnes Kanyan et al. (2016) [1] took a fast food restaurant in Malaysia as an example to propose a method to improve operational performance based on the theory of total quality management and quality function development of operation management, which overcomes the problem of poor service operations. Cheng Lijuan et al. (2013) [2] used questionnaires to measure the customer perceived quality of Haidilao Hotpot restaurants, and used quantitative methods such as questionnaire survey, structural equation model, and multiple regression analysis to perceive quality, customer satisfaction, and customer retention. Internal relations are discussed and studied. Guerriero et al. (2014) [3] discussed the problem of hotel revenue management from two aspects of strategy and management. A



new formula for the “table mixing problem” was proposed. The solution can be used to formulate service provision capability strategies based on order limits and service prices. The calculation results show that they bring higher benefits compared with traditional strategies. Yang Hui et al. (2013) [4] proposed a calculation method for restaurant seat combination optimization. Through the application of Flexsim system simulation analysis, it was verified that this optimization method can effectively improve the resource allocation efficiency during restaurant busy periods, significantly increase restaurant revenue, and improve The rate of return reduces the average waiting time for customers to queue up and increases customer satisfaction. Fatih Semerciöz, Çağlar Pehlivan (2015) [5] studied the crisis management practices and coping strategies of customer loyalty and price strategies at restaurant crisis, and used a questionnaire survey to evaluate the data of 45 high-end restaurants, and discussed crisis management practices and The relationship between cost, efficiency and competitiveness. Han YJ, Xie H(2012) [6] established a queuing theory model and deduced the model's profit maximization function in consideration of customer perception, and simulated the model By using Matlab. The result showed that a waiting room was set up. The strategy can reach the maximum profit of the restaurant.

2. Restaurant Service System Modeling

2.1. Ordering System Modeling

The fast food restaurant Provide 4 kinds of foods, namely: burgers, drinks, French fries, snacks. By investigating, the order arrival interval obeys the statistical distribution exponential (0, 40, 0) with an average value of 40s and complies with the principle of first come first serve. Assuming that the same batch of customers only generates one order. The layout of the Ordering System shows as below:

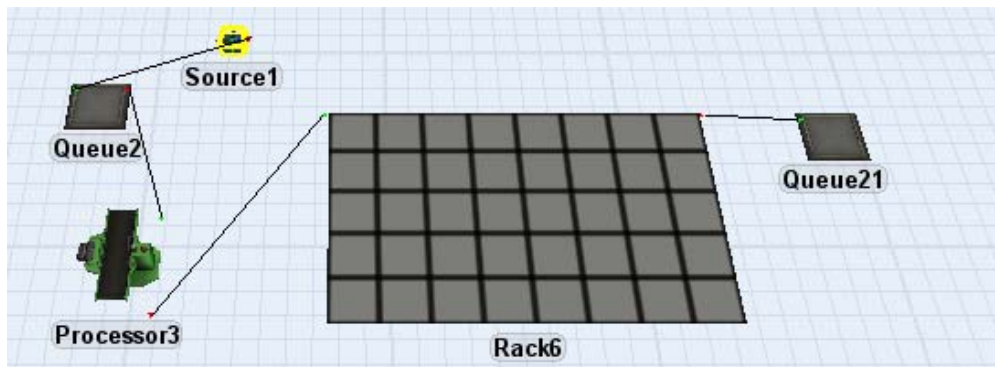


Fig 1. Ordering System

2.2. Preparing System Modeling

The customer order is first generated from the processor3. After the order is generated, it will enter the service desk order queue for queued waiting. Each order's order queue will send processing information to order the processing processor on its own job to start processing. The finished product is processed into the finished product area, and the product is integrated into the order tray by the product area to complete the processing of the order.

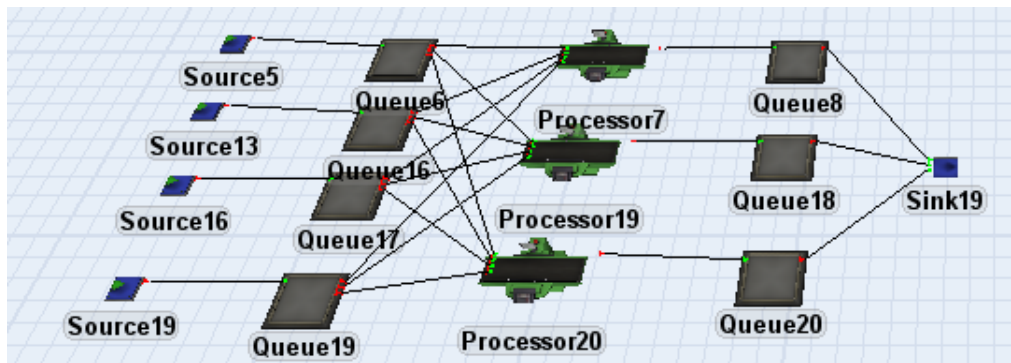


Fig 2. Preparing System

2.3. Model layout of the whole system

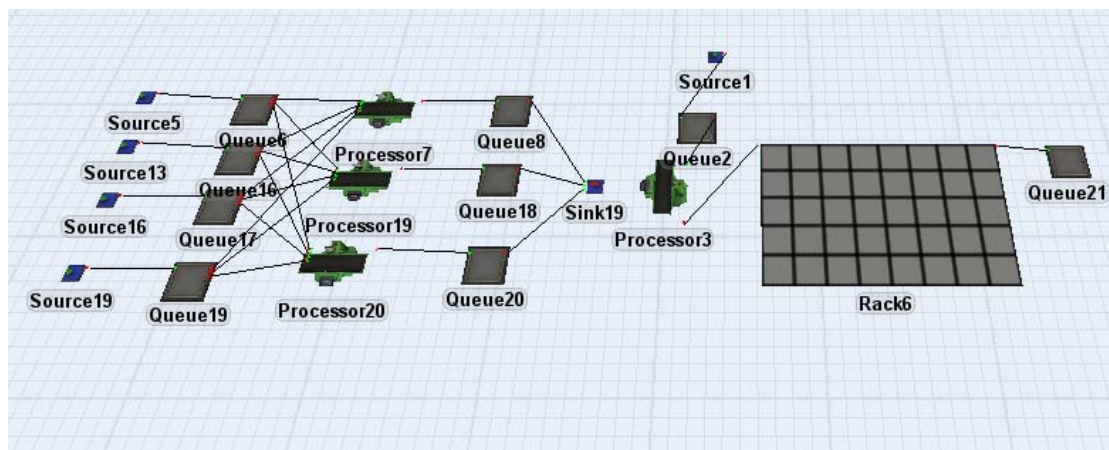


Fig 3. The Whole System

3. Simulation the model

To run the model, we need to write the corresponding code, and write code in the onexit trigger to set the purchase quantity of various products to be recorded on the label of the order tray, indicating that when the order left the generator, the type and quantity information of the product has been obtained. The assignment of the product quantity of the order requires the establishment of a global table. The rows indicate the product type and the column indicates the quantity. The number of products purchased by the customer obeys the duniform (0, 4) distribution, code show as below:

```
Settablesize ("GlobalTable1", 1, 6);
Settablenum ("GlobalTable1", 1, 1, 0);
Settablenum ("GlobalTable1", 1, 2, 0);
Settablenum ("GlobalTable1", 1, 3, 0);
Settablenum ("GlobalTable1", 1, 4, 0);
Settablenum ("GlobalTable1", 1, 5, 0);
Settablenum ("GlobalTable1", 1, 6, 0);
Int r=gettablerows ("GlobalTable1");
Settablenum ("GlobalTable1", r, 1, x1);
Settablenum ("GlobalTable1", r, 2, x2);
Settablenum ("GlobalTable1", r, 3, x3);
Settablenum ("GlobalTable1", r, 4, x4);
Settablenum ("GlobalTable1", r, 5, x5);
```

Settablenum ("GlobalTable1", r, 6, x6);

When the order enters the service desk order queue from the generator, the serial number of each incoming mobile entity in the service desk order queue is set to itemtype, which is the order number. And in the entry trigger, messages are sent to the order queue for each job, and the type, quantity, and order number of the order product are delivered. The code of processor2 show as below:

```
Int type= msgparam (1);
Int r= msgparam (2);
Int k= msgparam (3);
Setlabelnum (current, "k", k);
If (k==1)
{Setlabelnum (current, "r", r);
Settablenum ("GlobalTable1", r, 6, 2);
Settablenum ("GlobalTable2", 2, 1, 1) ;}
Openinput (current);
Treenode obj=inobject (current, type);
Openoutput (obj);
```

After the product is processed, it enters the finished product area first, and then the product is assembled by the synthesizer. The assembly is completed and the order processing ends.

4. Operation of the model

The simulation period of this simulation is the business peak period. The operation of the system within two hours is observed. From the next picture, we can find out some results: This system service capability is not enough, there is a large amount of order backlog in the system, and the skipper at the ordering queue is too large, which is also the bottleneck of the system. The utilization rate of the processing processor in the system has not been effectively used, resulting in low efficiency of the whole service process and easily causing customer complaints and reputation of the restaurant. Damage.

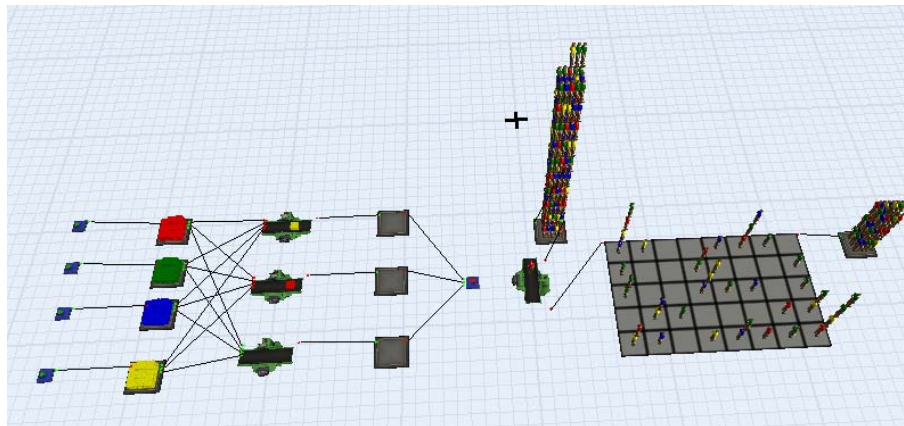


Fig 4. The results of business peak period

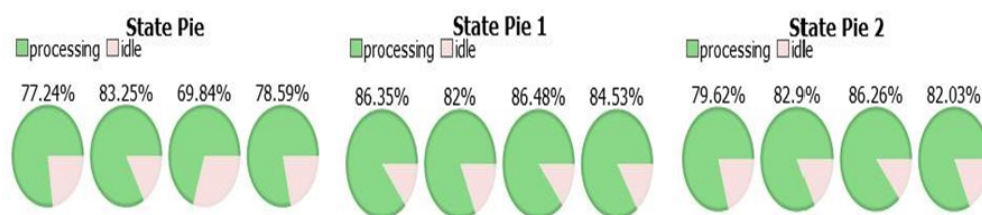


Fig 5. The utilization rate of the processing processor

5. Solutions

(1) During the peak period, a service desk is added for meal preparation. Because adding service desks also means adding waiters to assemble orders, in order to keep restaurant costs within an acceptable range, a guide in the lobby can be used to do the job properly, which can increase the number of employees. It also avoids improper distribution of personnel.

(2) When the system service facilities are not changed, the operation of small orders can be preferentially performed.

(3) Service Desk A la carte staff can make recommendations for sales. For example, if a large number of customers currently book Hamburg, the wait time for hamburger supply will be longer. Customers may be advised to order other foods first to obtain customer understanding.

(4) Under the premise of providing the freshest food in the restaurant, it is allowed to save a part of the finished product during peak business hours, which will help relieve the system's working pressure. Perform the above measures, run the model again, and observe the results.

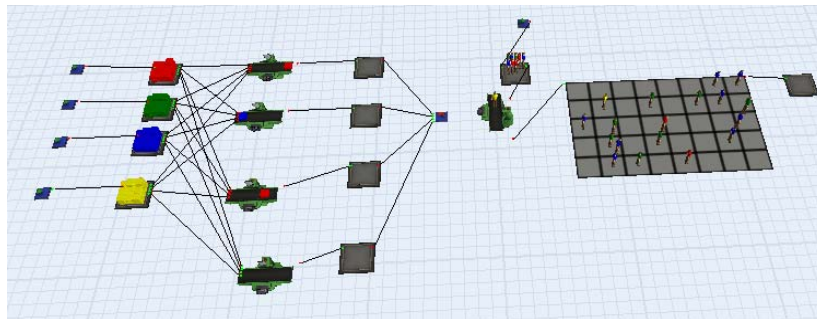


Fig 6. The second results of running this model

6. Conclusion

By implementing the above recommendations and running the model again, it was found that during the peak period, the system orders squeezed significantly. The utilization rate of various processing processors has also improved a lot. Practice has proved that these measures have increased the efficiency of restaurant busy hours, maintained the competitiveness of the company's survival, and maintained a high level of customer satisfaction.

References

- [1] Agnes Kanyan, Lizzberth Ngana, Boo Ho Voon, Improving the Service Operations of Fast-food Restaurants [J]. In *Procedia - Social and Behavioral Sciences*, Volume 224, 2016, Pages 190-198, ISSN 1877-0428
- [2] Cheng Lijuan, Wang Jing. Different effects of perceived quality on customer satisfaction and customer retention: An empirical study based on sea fishing restaurants [J]. *Industrial Engineering*, 2013, 16 (05): 125-132.
- [3] Guerriero F, Miglionico G, Olivito F. Strategic and operational decisions in restaurant revenue management [J]. *European Journal of Operational Research*, 2014, 237 (3): 1119-1132.
- [4] Yang Hui, Song Huaming, Zhou Jing. A Seat Combination Optimization Calculation Method and Simulation Analysis [J]. *Journal of Industrial Engineering and Engineering Management*, 2013, 27 (03): 150-155.
- [5] Fatih Semerciöz, Çağlar Pehlivan, Aytuğ Sözüer, et al. Crisis Management Practices and Strategic Responses Through Customer Loyalty and Price Strategy in Hard Times: Evidence from Fine-dining Restaurants [J]. *Procedia - Social and Behavioral Sciences*, 2015, 207: 149-156.
- [6] Han Y J, Xie H. Research on the Necessity of Setting Waiting Room in Restaurant Queue Management [J]. *Industrial Engineering Journal*, 2012.