Create a Curriculum Reform and Practice Mode of Integration of Production and Education Based on Virtual Simulation Resources

Taking the Course "Cold Chain Logistics Management" as an Example

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Abstract. Cold chain logistics involves many links such as picking, packaging, storage and transportation, and sales, and it is difficult to carry out traditional experimental teaching. Based on this, this paper integrates the principles of 3T, 3P and 3C of cold chain logistics, and uses 3D modeling, animation, human-computer interaction and other technologies to independently develop a virtual simulation experiment of cold chain logistics process. In the realization of virtual simulation, this paper establishes the dynamic simulation model of fruit and vegetable cold chain logistics distribution center, and designs the simulation process and evaluation index. Through the simulation analysis of the fruit and vegetable turnover of the distribution center, the time interval between incoming and outgoing shipments, the operating time of each area, and the utilization rate of personnel and equipment, a resource allocation and operation process optimization plan were proposed. The experimental simulation shows that the virtual teaching platform realizes the effective combination of theory and practice, and improves the quality of logistics modeling and the ability of innovative application of modeling.

Keywords: virtual simulation technology · industry-university-research · cold chain logistics · system simulation

1 Introduction

With the development of Chinese economy and society, as well as a new generation of information technology such as big data and the Internet of Things, cold chain logistics has developed rapidly. Logistics education is booming like never before, but most of the training methods of cold chain logistics are completed by masters, and most of the novices are learning and practicing in the enterprise. This model has led to the development of Chinese refrigerated distribution industry, and some problems have appeared in the development of China. Engineering practice is an important part of the implementation of engineering practice in colleges and universities, and it is of great significance for cultivating students' practical work and creative spirit. Strengthening the teaching of

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refrigerated warehousing and logistics in higher vocational colleges is to strengthen the logistics management of higher vocational colleges, strengthen the employability of graduates of higher vocational colleges, and adapt to the needs of applied talents under the new market economy conditions [3]. How to study the talent training of refrigeration majors and the needs of the market from the aspects of curriculum setting, curriculum setting and curriculum setting. In order to achieve high-quality teaching goals in a limited time, it is necessary to reform the teaching of "Cold Chain Logistics Management". How to achieve the teaching goal within the limited school hours is a problem worthy of further study. In view of this, combined with the teaching practice of logistics professional modeling and simulation courses, combing the teaching reform experience, and strive to play its inspirational role.

2 Curriculum Framework of Cold Chain Logistics Management

Through the transformation analysis of knowledge skills from behaviour to knowledge skills, it is concluded that knowledge skills in cold chain logistics work are divided into basic knowledge skills, core knowledge skills, auxiliary knowledge skills and extended knowledge skills. The contents of the cold chain logistics management course include: cold chain basic knowledge course group, cold chain core course group, cold chain minor course group, and cold chain distribution extension course group. The primary course of cold chain logistics is designed to enable students to master the required professional quality, job knowledge and job technology [7]. The cold chain distribution center major is the professional foundation and professional technology necessary for the cold chain distribution work, which should master the relevant professional knowledge of the relevant profession, and be able to actively operate according to the cold chain transportation process. Not only have the professional knowledge and technology in traditional logistics procurement, transportation, warehousing, processing, packaging, distribution, etc., but also use advanced low-temperature technology in each production process to achieve long-distance tracking and monitoring of products to ensure Product safety and quality; master the corresponding logistics information processing technology, and use the information technology of cold chain logistics and remote logistics information technology. Freezers are the key equipment and facilities for cold chain transportation. Therefore, personnel engaged in cold chain transportation must have corresponding planning and design levels. The minor course of cold chain logistics is an auxiliary skill for the training of cold chain professionals, which can make them better in the operation of cold chain logistics. The cold chain logistics extension class is to train students to use various professional skills as the core of professional skills. The above courses basically cover the knowledge and skills required to engage in cold chain logistics management business positions. Through the teaching of these cold chain logistics courses, compound cold chain logistics management talents with the characteristics of the logistics industry can be cultivated to meet the rapid development of the cold chain logistics industry talent needs (Fig. 1).

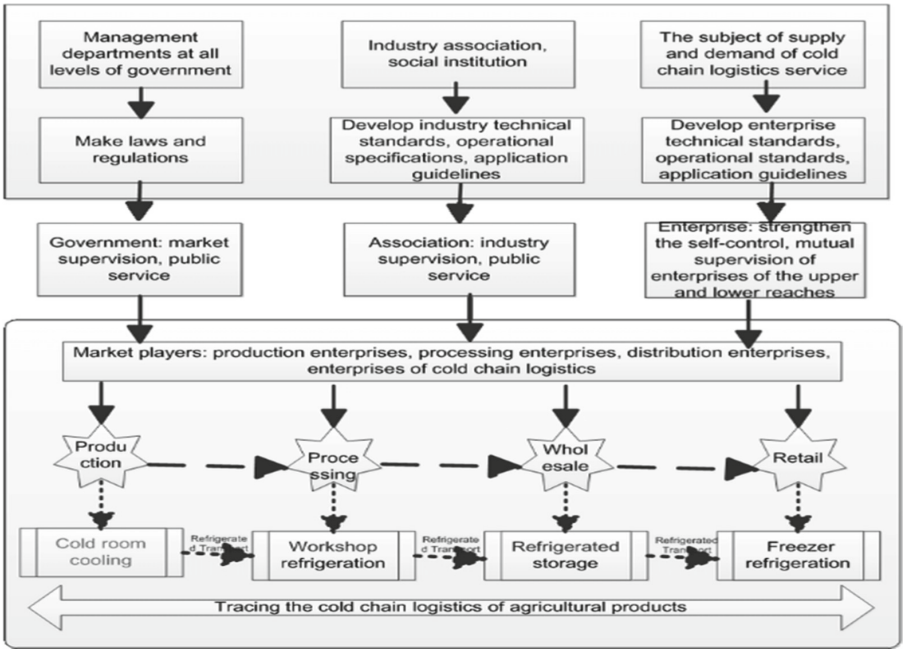

Fig. 1. Cold chain logistics transition from action domain to learning domain

3 Design of Virtual Simulation Experiment Teaching System

The subject of "Cold Chain Logistics Management" adheres to the school's "integration of animal husbandry and industry" development strategy. On the basis of years of practical teaching accumulation, it further enriches fresh food e-commerce and cold chain logistics by means of "school-enterprise cooperation and school-enterprise co-construction" Virtual simulation teaching resources, while complying with the trend of intelligent development of e-commerce and logistics industry, with the core of cultivating students' practical ability, innovation ability and engineering practice ability, facing e-commerce, logistics management, refrigeration and refrigeration technology, international business, cross-border For commercial and trade circulation majors such as international e-commerce, a virtual simulation practice teaching system has been constructed, as shown in Fig. 2.

This paper studies the basic knowledge, core knowledge, auxiliary knowledge, and expanding knowledge and skills for the transformation of knowledge skills from action to knowledge skills. The cold chain logistics management courses mainly include: cold chain basic knowledge course group, cold chain core course group, cold chain minor course group, and cold chain distribution expansion course group. The introductory courses for cold chain majors are designed to equip students with the necessary professional qualities, job knowledge and job skills [8]. The refrigerated truck distribution center is the basic skills and basic skills that the personnel engaged in the refrigeration industry must have. It has certain freezing technology and can freeze commodities

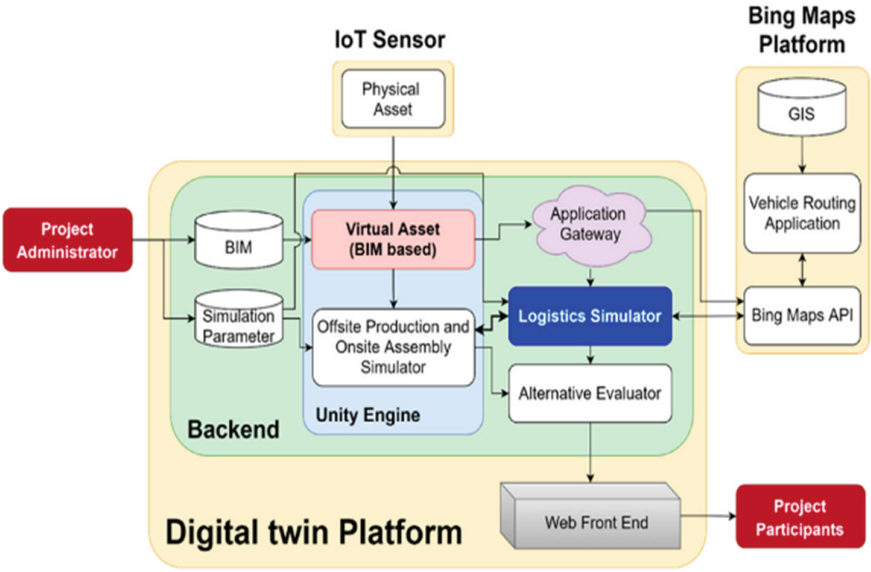

Fig. 2. Fresh food e-commerce and cold chain logistics virtual simulation practice teaching system

through low temperature and low temperature technology; it not only has specialized technology and technology in procurement, transportation, warehousing, processing, packaging, distribution, etc., but also can use modern low temperature technology to remotely track products, Monitor to ensure the safety and quality of products; master the relevant information technology, and apply it to the informatization of cold chain transportation and remote logistics management. Refrigerator and freezer are important equipment and facilities for refrigerated trucks. Therefore, in the refrigerated truck industry, those who are engaged in refrigerated trucks must have a certain professional level [4]. The cold chain logistics auxiliary course is an auxiliary technology for auxiliary training of cold chain technicians. The extension course of cold chain distribution is a comprehensive course whose main content is to improve students' comprehensive application ability.

4 Case Simulation of Cold Chain Logistics Management - Vegetable Cold Chain Distribution Center

Virtually build a vegetable distribution center in any logic simulation software [1]. It includes the following operation areas: receiving and inspection area (including specific operations such as fruit and vegetable purchase, inspection and warehousing), circulation processing area (fruit and vegetable cleaning, rough processing, deep processing, packaging and other specific operations), sorting and tally area (fruit and vegetables). Sorting, inspection, packaging, labeling and other specific operations of goods), storage area (refrigerated, frozen or normal temperature storage), assembly and delivery area

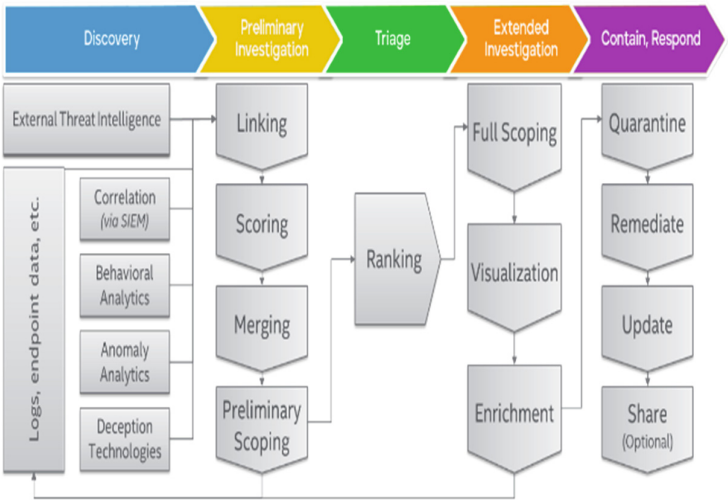

Fig. 3. Image of the operation flow of the vegetable distribution center

(fruit and vegetable assembly, delivery and other specific operations). Different operation links are equipped with corresponding staff and equipment resources. The work flow is shown in Fig. 3.

4.1 Model Settings

The vegetable transportation company uses a certain timed procurement method, and within a certain period of time, the purchase volume of each batch of 100 kg (0.1 t) is based on Baseperson (10, new Random ()). Under normal circumstances, the logistics center will deliver the goods within 24 working days after receiving the customer's order, and the products that are not delivered in time will have different shelf-life t ($t \leq 0$), or refrigerated containers t ($7 \leq t \leq 3$) to store [2]. The receiving area is uniformities (2,5), the cycle processing area (3,5); the sorting tally area (1,3), uniformities (5,10). Set the following assumptions:

(1) The quantity of fresh fruits and fruits entering the distribution point is certain, and the quantity of each batch is certain; (2) The time interval of purchase is in line with Poisson's distribution; (3) The shelf life of various vegetables and fruits is different. Assuming their shelf life is 7 days; (4) The utilization adjustment value of the simulated units can vary in the wrong (−5%) range [9]. According to the specific situation of the operation process of the logistics center, combined with the above assumptions, the entity flow diagram method is used to abstract the working process of Fig. 2, and the simulation of the generation, flow, disappearance, processing, processing and logical connections of logistics entities is constructed.

4.2 Parameter Setting

System simulation time: Assuming that the working state of the distribution center is continuous in the working state of one day, and assuming that the working state of the

distribution center is continuous, then in the running state of the simulated distribution center for one day, set it to 480 time points (8 h × 60 min = 480).

4.3 Operation of Simulation Mode and Display of Results

From the simulation calculations in Tables 1 and 2, it can be seen that on each conveyor, that is, in the transportation cycle of each operation section, the transportation turnover rate is between 0.66 and 1.00, which indicates that the resource utilization of each conveying system is very high. And has a good utilization effect. It takes 150–300 min from incoming goods to loading and outgoing, which means that from warehousing to distribution processing, to sorting and transportation, the entire working process takes 150 min at the shortest and 300 min at the longest. Merchandise entering a freezer or freezer warehouse. The input and output in Table 2 are the input and output of simulated vegetables and fruits, while the input of fruits and vegetables is the ratio of input and output. According to Table 2, the estimated turnover of fruits is 16.7% (66/11). The second column of Table 2 lists the resources of each operation area [5] Among them, the inspection and receiving area is 0.872, the distribution processing area, the sorting and tally area, and the proportion of resources in the assembly and delivery area to the total resources is 0.872. The distribution processing area is 0.714, and the tally area is 0.367, indicating that the resource utilization rate of the receiving area, the distribution processing area and the sorting and tallying area is higher than that of the assembly and delivery area. Through the simulation of the operation process of the actual fruit logistics center, it is found that in the actual operation process, the data of 480 min did not achieve the expected effect, and the processing batches from Q1 to M1 were blocked from 66 to 30 batches. Resulting in poor transportation [6]. The utilization rate of manpower, equipment and facilities in the logistics distribution area of the logistics distribution center is not high, and the turnover rate and logistics cycle of logistics and logistics are relatively large. In order to improve the operation of various areas of the fruit logistics center and the circulation of vegetables and fruits, it is necessary to modify the resource parameters of the simulation system to set and optimize the operating conditions (Fig. 4).

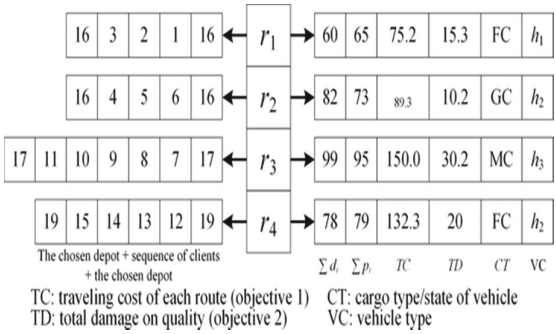

Fig. 4. Statistical image of the utilization rate and cargo turnaround time of each work area

Table 1. STATISTICS ON THE TURNOVER AND WORKLOAD OF EACH CONVEYOR BELT

Name	Input volume	Output	Turnover	Name	Input volume	Output	Turnover
Q1	66	41	0.62	C6	3	2	0.66
C1	41	30	0.73	C7	2	2	1
C2	29	24	0.82	C8	0	0	-
C3	23	21	0.91	C9	0	0	-
C4	12	12	1	C10	0	0	-
C5	3	3	1	C11	11	11	1

Table 2. THE TURNOVER AND RESOURCE UTILIZATION STATISTICS OF EACH WORK AREA

Indicator name	Number of boxes	Utilization
Input volume	66	-
M1	30	0.872
M2	24	0.799
M3	21	0.714
M4	12	0.367
M5	3	0.011
M6	2	0.002
M7	2	0
Output	11	-

By adjusting the raw materials Q1 and C1, the blockage can be eliminated, and the delay time from M1 to M4 can be adjusted, thereby changing the turnover times of commodities. The revised turnover rate is 0.55 (86/47), and the turnover rate is between 124 and 130 min, which proves the speed of reducing transportation delays and shortening the circulation cycle of goods. Assuming that the supply of materials follows the index distribution Inter Arrival type: exponential (10), Entia tie prearrival: unform_disc (1,2), and other parameters do not change, the resource utilization efficiency of each workspace is 0.938, 0.91, 0.415, respectively, 0.26, however, the turnaround time for commodities is extended, reaching 90–110 min. The turnover rate of fruits and vegetables was 0.34 (289/289), which was significantly higher than the turnover rate before the change.

5 Conclusions

Based on the introduction of the system simulation theory of the logistics modeling and simulation course, the practice is carried out with the help of computer simulation

technology, and an effective method and means for designing and optimizing the logistics system are provided through quantitative analysis of the logistics system model. Taking the course "Cold Chain Logistics Management" as an example, this paper proposes to establish a fruit, vegetable and agricultural product distribution system model based on virtual simulation modeling, and simulates the dynamic changes of variables such as the delay time of operation and processing and the way of purchasing goods to the turnover rate of agricultural products in the distribution center and the distribution center impact on resource utilization.

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