Application of Barcode Technology in Warehouse Management of Printing and Packaging Enterprises

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Abstract In order to study the application of barcode technology in warehouse management of printing and packaging enterprises, an overview of barcode technology and feature is briefly stated, the significance and effect of the barcode technology applied in warehouse management of printing and packaging enterprises are analyzed, and the composition of barcode warehouse management system and its specific application in raw material warehouse management of printing and packaging enterprises are described. Thus it is concluded that the barcode warehouse management system not only highly improves the level of inventory management and reduces the labor intensity, but also decreases the total storage cost and improves inventory management efficiency with its application in warehouse management of printing and packaging enterprises. Simple, safe, quick and efficient barcode warehouse management system is becoming more proficient, and it will play an increasingly significant role in the warehouse management of printing and packaging enterprises.

Keywords Barcode technology · Printing and packaging enterprises
Warehouse management · Application

1 Introduction

China's printing and packaging enterprises are usually small and medium-sized, the warehouse management of various raw materials and auxiliary materials and finished goods includes multiple aspects in the daily management. Meanwhile it is a complex and important management process with high added-value. But in today's information age,

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many printing and packaging enterprises still do not get rid of the traditional management style, especially many enterprises' warehouse management still remain the manual operation method, by which all data of warehousing-in or warehousing-out are entered, verified and determined by warehouse manager one by one. This kind of warehouse management style can directly lead to the possibility of errors caused by human factors, and the high pressure and high risk of management [1], which seriously affects the efficiency of warehouse management, increases the cost of warehouse management and restricts sustainable development of printing and packaging enterprises [2].

The meaning and function of barcode technology were analyzed and its implementation and application method in the warehouse management of printing and packaging enterprises were summed up in this paper. After the actual application, the warehouse management of printing and packaging enterprises has realized digitization and informatization so that the warehouse material management becomes more timely, more accurate and more efficient, which greatly improves the warehouse material management level of printing and packaging enterprises, reduces the labor intensity and inventory costs, and improves the modern management level and market competitiveness of enterprises.

2 Meaning of Applying Barcode Technology in Warehouse Management of Printing and Packaging Enterprises

The barcode technology is an automatic identification technology based on computer technology, and it is designed for the automatic scanning of information [3, 4]. Using barcode technology can collect vast information quickly and accurately, thus it is suited to logistics management system which has higher requirements for collecting information massively and high-speed. Meanwhile, it is also a technological base which can realize the automation and real-time management of material purchase, arrival, warehouse-in, storage, custody, warehouse-out and query [5].

Especially, if printing and packaging enterprises could not accept the model of modern warehouse management with the increasing fierceness of market competition, they would be eliminated in the fierce market competition. So the use of barcode technology is very important.

The barcode technology plays an important role in warehouse management of printing and packaging enterprises.

(1) Coding material and printing barcode labels not only track material but also help the enterprises get ready for material in time and enhance productivity [6], and the funds will be used reasonably. Meanwhile, if we use uniform material coding which is based on the industrial standards, we will not get into trouble because of the chaotic material management.

(2) Printing the barcode labels which not only track material but also establish complete material files for material.

(3) We can stock, sell and store material by using barcode technology so that we can reduce the inventory cost effectively.

(4) We can establish an inspection records about the quality of the material and product, and make the quality inspection reports by identification of product. And it is closely related to purchase and indent, so that we can establish an assessment system for suppliers.

3 Application of Barcode Technology in Warehouse Management of Printing and Packaging Enterprises

3.1 Barcode Warehouse Management System of Printing and Packaging Material

The barcode warehouse management system of printing and packaging material is a management system which can manage warehouse by using barcode automatic identification technology. The whole system includes database server, client software, wireless network, PDA and barcode label printer. Taking material management in printing and packaging enterprises for example, its system operation process is shown in Fig. 1.

3.2 Application of Barcode Warehouse Management System in Warehouse Management of Printing and Packaging Material

3.2.1 System Management

Only the administrators have permission to manage the system, and the system assigns authority according to account groups. Usually, the system establishes many accounts and makes them belong to different account groups. Every account possesses the permission which belong to its location. Assigning the permissions to user group is shown in Fig. 2. Besides, the system can also add new users and carry out user management.

3.2.2 Basic Data Management

Some basic data, such as ordinary data, unit of measurement, warehouse data, location data, picking data, material data, finished goods data, supplier's files, customer's files and production workshop's data can be increased, deleted and compiled in the system. The page of material information management is shown in Fig. 3.
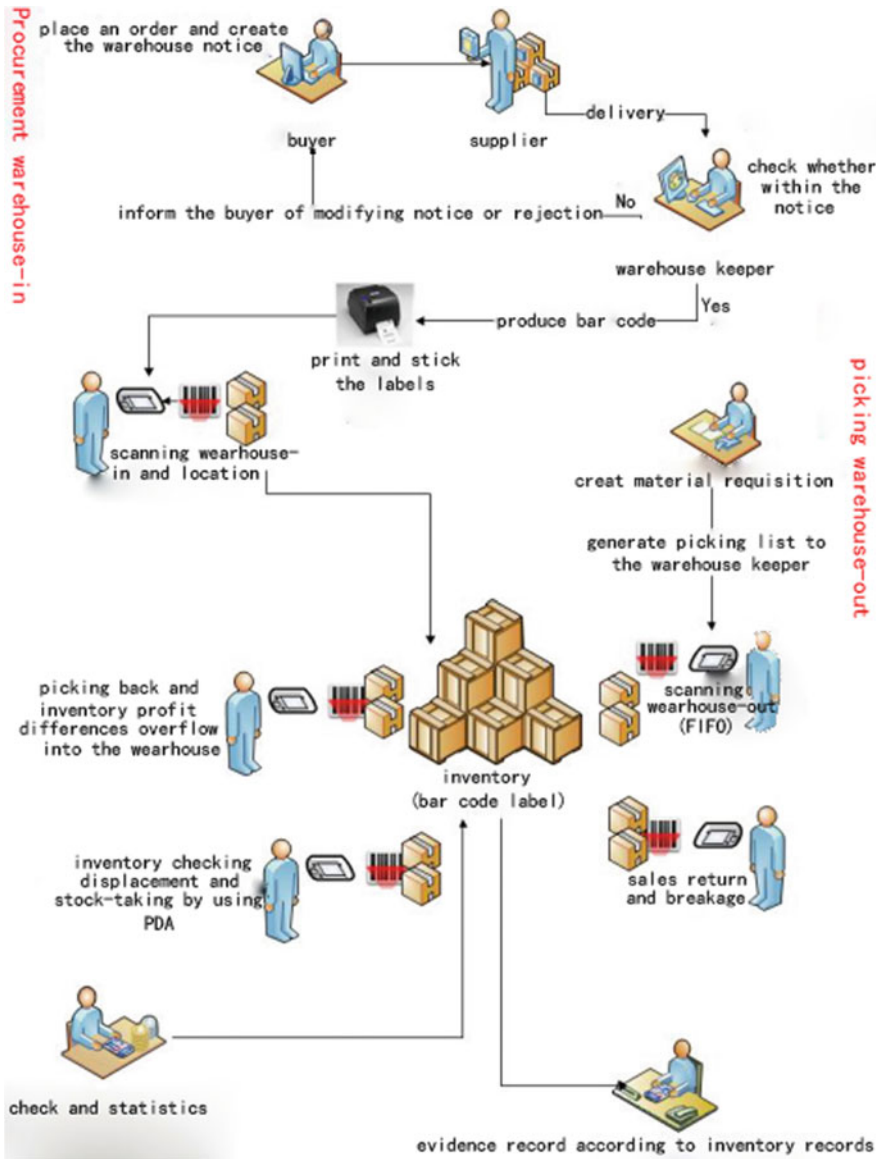
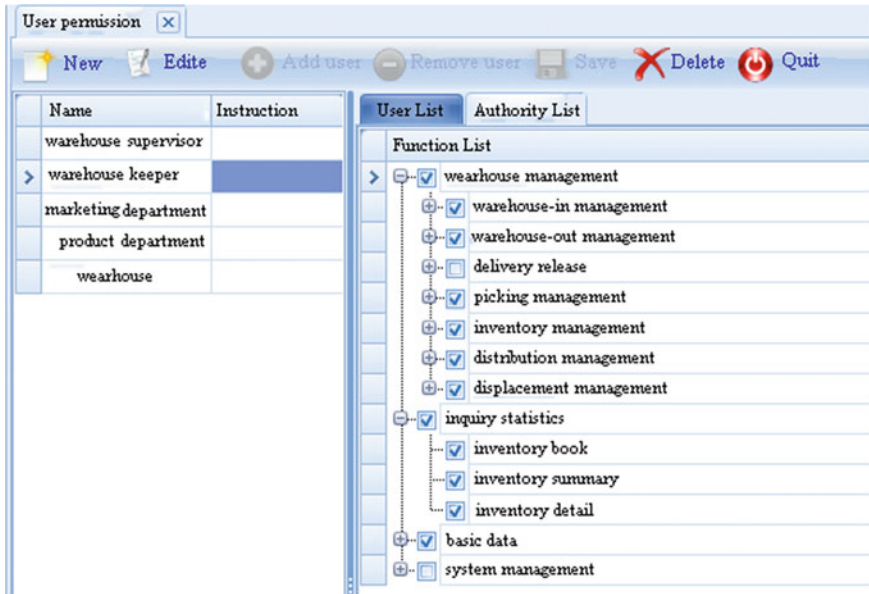**Fig. 1** The operation process of barcode warehouse management system of printing and packaging material
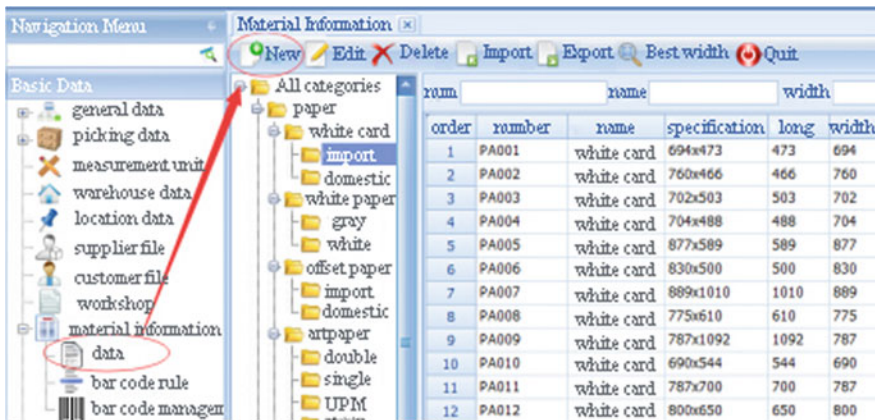
Fig. 2 Assigning the permissions to user group

Fig. 3 Material information management

3.2.3 Generating Barcode and Printing Labels

Generating barcode and printing labels are original works for the only identification of material in barcode system. And we have to operate carefully and avoid making mistakes in material data and information, such as supplier batch number, production batch, packing specification, suppliers' name, raw material production date
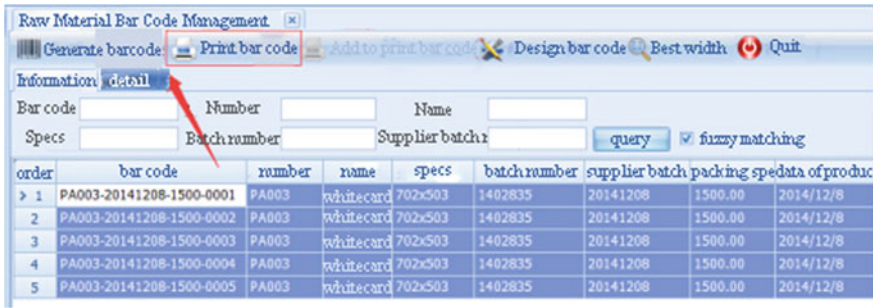
Fig. 4 Generating barcode and printing labels

and so on. The labels after being printed are stuck on location where can scan easily and the raw material after being scanned is stored. The page of generating barcode and printing barcode labels is shown in Fig. 4.

3.2.4 Inventory Management

The inventory management is a main functional module, such as warehouse-in management, warehouse-out management, evidence record, displacement, inventorying and so on.

Warehouse-in management includes raw material storage (purchase), picking back into storage, storage overflow. Firstly, we can generate and print barcode for the purchased raw material. Secondly, we need to stick the labels. Finally, we can put raw material into storage according to the warehouse notice. The warehouse warrant is closely related to the warehouse notice. The material without the notice will not be allowed to put into storage and the PDA will also warn in time. The page of warehouse-in management is shown in Fig. 5.
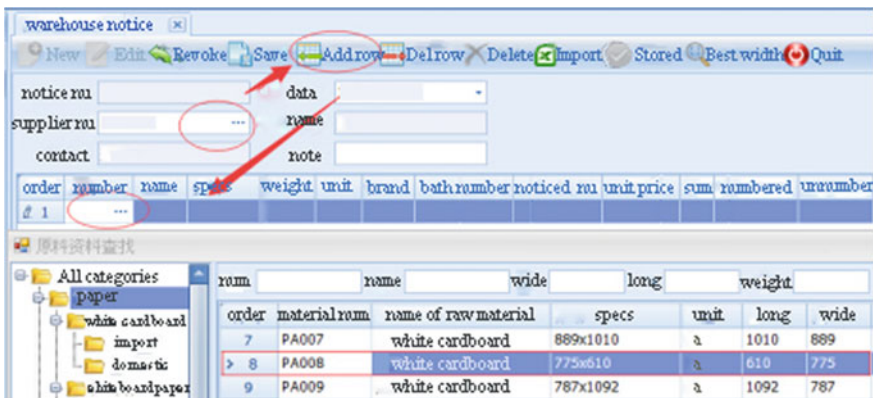

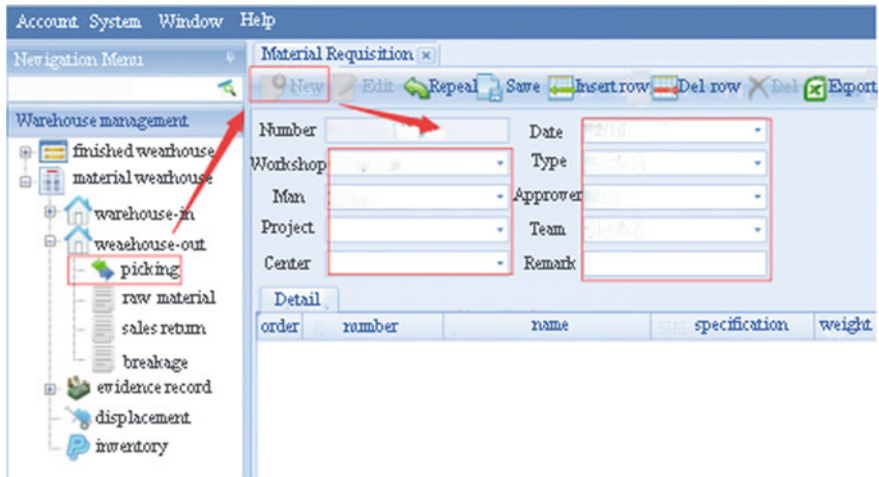**Fig. 5** Warehouse-in management

Fig. 6 Warehouse-out management

Warehouse-out management includes picking out-of storage, sales return, breakage, especially the picking out-of storage. We can make the raw material out-of storage by scanning according to the material requisition. The goods without material requisition will not be allowed to put out storage and the PDA will also warn in time. The page of warehouse-out management is shown in Fig. 6.

Displacement management is a shifting operation which can move the goods from one warehouse to another in the barcode system. Firstly, we should increase the displacement lists in the inventory management system. Next, we need to seek corresponding displacement number to scan after saving. Finally, we need to affirm that whether the data and physical objects are fitted after the displacement and finish displacement operation.

When the data and physical objects are discrepant, we need to use inventorying management system after running a longer period of time. The way of inventorying is that we can click the lists by the computer client software firstly, and next we can scan corresponding barcode by PDA. Finally, we can know the profit and loss situation so as to make effective measures. The page of inventorying management is shown in Fig. 7.

Inventory checking can inspect the data and physical objects for uniformity and the operation is run only by PDA.

3.2.5 Inquiry Statistics

The inquiry statistics includes shelf life warning, inventory warning, inventory checking, warehouse-in details, warehouse-out details, inventory daily report,
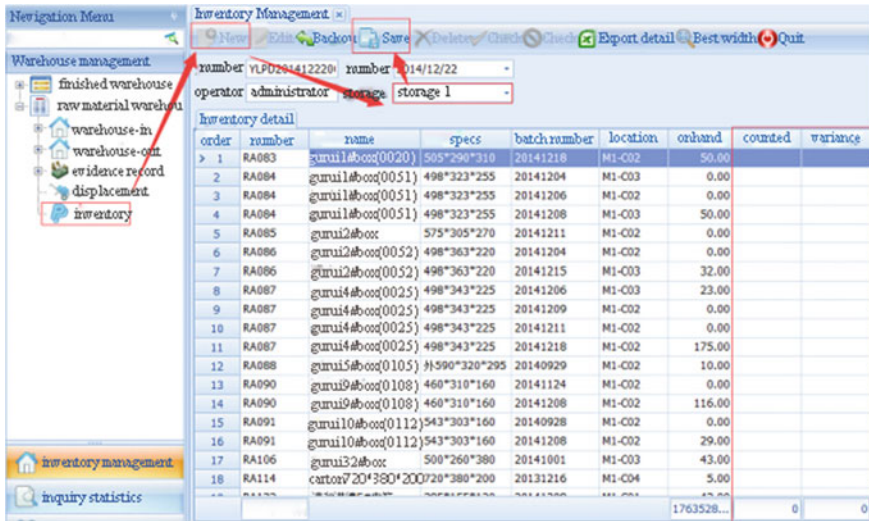
Fig. 7 Inventorying management

non-voucher statement, non-payment statement and total arrears statement. Most statements can be exported in Excel tables formats.

4 Conclusions

The barcode technology has many advantages such as easiness, convenience, collecting information quickly and largely, reliability, flexibility and freedom. And it has penetrated into all sectors of production management and circulation, and the application of barcode technology is maturing gradually in warehouse management of printing and packaging enterprises. We firmly believe that if the enterprises adopt the technology in warehouse management according to their own situation, they will achieved good results and remarkable economic benefits.

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