



159159

SALES FORECASTING APPARATUS AND SALES FORECASTING METHOD

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a system that forecasts sales of goods or services.

2. Description of the Related Art

In order to achieve efficient sales of goods by avoiding surplus and shortage of goods, an order volume of the goods is determined based on a sales forecast.

For example, Japanese Patent Laid-open Publication No. HEI 5-120314 discloses the following sales forecasting system. This system forecasts sales of goods in future based on the sales of the goods in the past. The sales forecast is carried out by taking into account sales of the goods in the nearest past three months, sales of the goods in the whole country in the nearest past three months, and sales of the goods in the same month of the preceding year including one month before and one month after this month. Based on this, the precision of the forecast is increased.

However, this system is based on the assumption that the same goods were sold in the preceding year. Therefore, it has not been able to forecast sales of goods that had no sales result in the past. Consequently, it has not been able to use this system for goods having a large variation in the volume handled, or in the industry that introduces many new goods. Further, as a forecast is made for respective goods by referring to the past



G00002

sales result of the goods, complex processing has been required when the number of goods handled is large. As a result, it has been difficult to realize this system.

Japanese Patent Application Laid-open Publication No. H8-278959 discloses a system that carries out a sales forecast of goods having no sales result in the past. According to this system, sales results of goods are recorded by classifying the goods in detail into attributes of color, pattern, size, and grade. For goods having no sales result in the past, other goods having attributes that are most similar to those of the goods are selected as reference goods from among goods already recorded. A sales forecast of the goods concerned is made based on the sales result of the reference goods. A sales forecast is made in time series. When there is a difference between the forecast and the actual sales, the forecast is corrected.

According to this system, it is possible to make a sales forecast of goods that have no sales result in the past. However, in order to increase the precision of a sales forecast, it is necessary to record attributes of the goods in detail. As a result, it is necessary to accumulate the record of an enormously large number of attributes.

SUMMARY OF THE INVENTION

In order to solve the above problems, it is an object of this invention to provide a sales forecasting apparatus that can carry out a proper forecast of sales by avoiding complexity of the processing, regardless of presence or absence of sales

result in the past.

In order to achieve the above object, according to one aspect of this invention, there is provided a sales forecasting apparatus that obtains a sales result of respective goods to be handled, sets respective goods into groups group by using a sales period of respective goods as at least one index, based on the sales result, decides to which group the goods to be forecast belong, based on a sales period of the goods to be forecast, and calculates, for respective goods to be forecast, a sales forecast of the goods to be handled, based on a sales result of the group of goods handled during a past period corresponding to the forecast period having a similarity with the period to be forecast.

According to another aspect of the invention, there is provided a sales forecasting apparatus that is structured to be able to make access to a recording section that has a record of a sales result of each group, for respective goods to be handled that are set into groups by using a sales period of the goods as one index. The sales forecasting apparatus decides to which group the goods to be forecast belong, based on a sales period of the goods to be forecast, and obtains a sales result of the group of goods to be handled during a past period corresponding to the forecast period having a similarity, and calculates a sales forecast of the goods to be handled based on the sales result.

In other words, goods to be handled are grouped according to a sales period. It is decided to which group the goods to

be forecast belong. A sales forecast is made based on a sales result of the group. As the goods to be handled are grouped based on a sales period, the classification of the goods to be handled becomes clear, and it is possible to carry out a forecast in high precision. Further, when the number of goods to be handled increases, there is no risk that the processing becomes complex due to an extremely increased number of classifications.

According to still another aspect of the invention, the sales forecasting apparatus carries out a forecast for a predetermined unit period, and calculates a sales forecast of a plurality of unit periods for each predetermined unit period. Therefore, it is possible to carry out a sales forecast in time series.

According to still another aspect of the invention, the sales forecasting apparatus carries out a sales forecast as at least a calculation of a relative sales rate during each unit period. Therefore, it is at least possible to forecast a sales transition trend in time series.

According to still another aspect of the invention, the sales forecasting apparatus carries out a sales forecast for a unit period not yet passed, based on a relative sales rate and a sales result during a past unit period for which sales result is already available among a plurality of unit periods, and a relative sales rate during a unit sales forecast period not yet passed.

Therefore, it is possible to forecast a sales in future, based on a relative sales rate calculated in time series, by

taking into account a sales result during a past unit period.

According to still another aspect of the invention, the sales forecasting apparatus uses a nearest past unit period as the past unit period. Therefore, it is possible to carry out a sales forecast by properly reflecting a trend of a past sales result.

According to still another aspect of the invention, the sales forecasting apparatus uses a plurality of unit periods as the past unit period. Therefore, even when there is a variation in the sales result due to a sudden special factor, it is possible to carry out a stable sales forecast without being affected by this.

By using a plurality of nearest unit periods, it is possible to carry out a stable sales forecast by eliminating a special factor, while reflecting a trend of the past sales result as far as possible.

According to still another aspect of the invention, the sales forecasting apparatus estimates presence or absence of a stock in shortage based on goods arrival and sales, for a sales result during a past unit period, and forecasts a sales by using a corrected sales result obtained by correcting the sales result, when it has been decided that there is a stock in shortage.

Therefore, it is possible to carry out a correct sales forecast, taking into account a variation in the sales result due to the occurrence of a stock in shortage.

According to still another aspect of the invention, the sales forecasting apparatus carries out a sales forecast by using

a sales result during a plurality of corresponding periods. Therefore, it is possible to carry out a sales forecast based on a sales result in higher precision.

According to still another aspect of the invention, the sales forecasting apparatus carries out a sales forecast by taking into account a sales result during a period before or after or both before and after a corresponding period as well. Therefore, it is possible to carry out a sales forecast by taking into account a sales result of other group during a sales period before or after or both before and after a sales period of a group to which the goods to be forecast belong. In other words, it is possible to carry out a stable sales forecast without being affected by a deviation of a time series trend.

According to still another aspect of the invention, the sales forecasting apparatus calculates a sales forecast of goods to be handled during each unit period, based on a total sales plan of the goods during a total period of a plurality of periods, and a transition of a sales result of a group to which the goods belong during the corresponding period.

Therefore, it is possible to carry out a sales forecast in time series during each unit period, based on a total sales plan.

According to still another aspect of the invention, the sales forecasting apparatus calculates a necessary delivery volume of goods to be handled, based on a calculated sales forecast, and outputs delivery order data.

Therefore, it is possible to calculate a necessary delivery

volume based on a forecast sales volume.

According to still another aspect of the invention, the sales forecasting apparatus sets the predetermined unit time to a period shorter than a period of deviation required from the ordering of the goods till the delivery. Therefore, it is possible to determine a necessary delivery volume by taking into account an arrival schedule of ordered goods and a sales result.

According to still another aspect of the invention, the sales forecasting apparatus calculates the necessary delivery volume as a volume that is necessary for a future unit period that takes into account the deviation period, and calculates the delivery volume necessary for a future unit period, based on the sales forecast.

Therefore, it is possible to determine a necessary delivery volume in high precision by taking into account a deviation period.

According to still another aspect of the invention, the sales forecasting apparatus determines a forecast stock volume during a unit period so that the stock volume becomes equal to a total forecast sales volume during a predetermined number of unit periods ahead the unit period or has a predetermined relationship with the total forecast sales volume, and determines the delivery volume that is necessary during the future unit period, based on the forecast stock volume.

Therefore, it is possible to determine a proper stock volume based on a sales forecast, and then calculate a necessary delivery volume. Further, it is possible to determine a proper

delivery volume, by adjusting a stock volume to a level equal to (or in a predetermined relationship with) a forecast sales volume during a predetermined number of periods ahead the unit period, according to the frequency of forecast or precision of forecast.

According to still another aspect of the invention, the sales forecasting apparatus forecasts sales of goods of which sales volume varies due to seasonal factors. Therefore, it is possible to carry out a sales forecast in high precision by grouping the goods according to sales periods.

According to still another aspect of the invention, the sales forecasting apparatus forecasts sales of goods that are classified according to their attributes, and are grouped based on a combination of the attributes and the sales period.

Therefore, it is possible carry out a more proper grouping of the goods, and it is possible to carry out a sales forecast in high precision.

According to still another aspect of the invention, the sales forecasting apparatus sets the sales period used for the grouping, as a sales starting period. By grouping the goods based on sales periods, it is possible to carry out a sales forecast starting from the sales starting period.

According to still another aspect of the invention, there is provided a sales forecasting method including the steps of: obtaining a sales result of respective goods to be handled; deciding to which one of existing goods the goods to be forecast belong, based on a sales period of the goods to be forecast;

and calculating, for the goods to be forecast, a sales forecast of the goods to be handled, based on a sales result of the goods handled during a past period corresponding to the forecast period having a similarity with the period to be forecast.

In other words, goods to be handled are classified according to a sales period. It is decided to which one of existing goods the goods to be forecast belong. A sales forecast is made based on a sales result of the goods handled. As the goods to be handled are classified based on a sales period, the classification of the goods to be handled becomes clear, and it is possible to carry out a forecast in high precision. Further, when the number of goods to be handled increases, there is no risk that the processing becomes complex due to an extremely increased number of classifications.

In the present specification, the invention of an object can be understood as the invention of a method, and the invention of a method can be understood as the invention of an object. Further, it is also possible to realize the invention as a recording medium recorded with a program that realizes a predetermined function in a computer, or as a program product.

The "goods to be handled" refers to goods or services of which sales are forecast in the present invention. In the embodiments, apparel goods corresponds to this.

The "sales forecast" means a forecast of unknown sales, regardless of past or future. This concept applies to not only the sales of goods, but also to demand forecast of power consumption. Further, this concept includes the forecast of

a sales trend (a relative rate) such as an index used in the embodiments, not only the forecast of an absolute volume or absolute number of sales.

The "sales result" refers to a volume actually sold.

The "grouping based on a sales period" refers to a grouping of goods to be handled, based on a sales period of the goods. This concept includes the grouping based on a sales ending period, not only a sales starting day, a sales starting period like a week and a year, and a sales starting day of the week.

The "recording medium recorded with a program" refers to a recording medium such as a ROM, a RAM, a flexible disk, a CD-ROM, a memory card, a hard disk, etc. that are recorded with a program. This "recording medium recorded with a program" also includes a concept of a communication medium such as a telephone circuit, and a carrier path. This recording medium includes not only a recording medium like a hard disk a program recorded on which is directly executed by being connected to a CPU. This recording medium also includes a one like a CD-ROM recorded with a program that is executed once after the CD-ROM is installed on a hard disk.

The "program" includes not only a program that can be directly executed by a CPU, but also includes a source-format program, a compressed program, and an encrypted program.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a diagram that shows a total view of a system.

Fig. 2 is a diagram that shows a concept of a business

model.

Fig. 3 is a diagram that shows a hardware structure of a host computer.

Fig. 4 is a flowchart that shows a data count-up processing.

Fig. 5 is a table that shows sales and stock data.

Fig. 6 is a table that shows sales and stock data.

Fig. 7 is a diagram that shows a hardware structure of a sales forecasting computer.

Fig. 8 is a flowchart that shows a sales index preparation processing.

Figs. 9A and 9B are tables that show sales result data.

Figs. 10A and 10B are tables that show a process of calculating a week index.

Fig. 11 is a table that shows an example of a week index.

Fig. 12 is a flowchart that shows a sales forecast and order volume calculation processing.

Fig. 13 is a diagram that shows the contents of setting conditions.

Fig. 14 is a flowchart that shows a first-time sales forecast processing.

Fig. 15 is a table that shows a sales forecast of respective goods.

Fig. 16 is a flowchart that shows an additional-time sales forecast processing.

Figs. 17A and 17B are tables that show actual data and week index data.

Fig. 18 is a table that shows sales forecast and order

data.

Fig. 19 is a schematic diagram that shows a method of calculating an order volume.

Fig. 20 is a flowchart that shows a method of calculating a necessary order volume.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

1. Total structure of a system

Fig. 1 shows a system structure when a sales forecasting system according to one embodiment of the invention is applied to sales management of apparel goods. In Fig. 1, a reference number 2 denotes a physical distribution center computer, 3 denotes a maker, 4 denotes a store register, 6 denotes a host computer, 9 denotes a database server, and 10 denotes a sales forecasting computer. In this embodiment, the sales forecasting computer 10 constitutes a sales forecasting apparatus. The host computer 6 receives goods arrival data and good shipment data from the physical distribution center computer 2 that integrally manages arrival, shipment, and storage of goods. The store register 4 is disposed at each store over the country, and each register sends sales data to the host computer 6. The host computer 6 makes orders to the maker computer 3.

In this embodiment, data is transferred to the host computer 6. It is also possible to send data via a recording medium like a flexible disk. Data printed on paper may also be input to the host computer 6. Further, the data output from the host computer 6 may also be recorded on a recording medium

or printed on paper.

The host computer 6 receives the data, and counts up the data at a predetermined time everyday, and updates a database 8 through communications with the database server 9. The sales forecasting computer 10 is connected to the database server 9 via a LAN, and carries out a sales forecast processing based on the data accumulated in the database 8.

2. Outline of the system

Fig. 2 schematically shows a flow of goods and a flow of information when the system shown in Fig. 1 is applied to sales forecast and ordering management. (1) headquarters 18 keeps record of sales results of the preceding year and before. The headquarters 18 carries out a sales forecast, based on a sales plan (or target) determined for respective goods and a past sales transition of a group to which the goods belong. (2) The headquarters 18 places a first-time order to a maker 19, based on a calculated sales forecast. (3) The maker 19 manufactures goods based on instructions of the order, and delivers the goods to a physical distribution center 12.

(4) The physical distribution center 12 that has received the goods ships the goods to stores 14 and 16 according to instructions from the headquarters 18. The physical distribution center 12 transmits goods arrival and goods shipment data, to the headquarters 18. (5) The stores 14 and 16 sell the received goods respectively. The stores 14 and 16 transmit sales data to the headquarters 18 respectively.

(6) The headquarters 18 groups goods based on a sales

starting period, and records data of sales transition for each group. The headquarters 18 forecasts sales of goods in future, based on the sales data (sales result) of respective goods and a past sales transition of the group to which the goods belong. (7) The headquarters 18 places an additional order to the maker 19 based on the calculated sales forecast. Thereafter, the processing at steps (3) to (7) is executed repeatedly.

As explained above, it is possible to carry out a sales forecast in high precision, and make orders based on this sales forecast. Based on this, it is possible to construct a system that has small occurrence of surplus stock and small loss of sales opportunity.

3. Host computer

Fig. 3 shows a hardware structure of the host computer 6. This host computer 6 comprises a CPU 20, a hard disk 22, a display 24, a communication section 26, a memory 28, a keyboard / mouse 30, a CD-ROM drive 32, a printer 34, and a flexible disk drive 36.

The communication section 26 communicates with the physical distribution center computer 2, the store register 4, the maker computer 3, and the sales forecasting computer 10. The hard disk 22 is recorded with a program for an operating system and a data count-up processing. The database 8 is built in the hard disk 22. The database 8 has record of goods master data that shows sales and stock data and goods prices that have been counted up.

A program for data count-up processing is installed on

the hard disk 22 from the CD-ROM 38 via the CD-ROM drive 32. Fig. 4 shows a flowchart of the program for data count-up processing.

At step S1, the CPU 20 receives sales data (number of pieces of goods sold) from the store register 4 of each store, goods arrival/shipment data (number of pieces of goods arrived, and number of pieces of goods shipped) from the physical distribution center computer 2, and order data (number of pieces of goods ordered) from the sales forecasting computer 10. The CPU 20 accumulates the data into the database 8 of the database server 9. This processing is carried out repeatedly until when a predetermined time reaches (step S2).

At a predetermined time, the received data are counted up (step S3). Usually, this count-up processing is carried out in many cases at night when there is no occurrence of sales data and arrival/shipment data. In the data count-up processing, the sales data from each store is counted up for respective goods, and a result is recorded on the hard disk 22 as the sales volume for the day. Similarly, the arrival data and the shipment data are counted up for respective goods, and results are recorded on the database 8 of the database server 9. Thereby, sales, arrival, and shipment data of goods for each day are accumulated.

Further, for respective goods, sales during the week are accumulated (accumulation of the sales starting from Monday), purchase volumes during the week are accumulated, sales volumes during the week are accumulated, and stock volumes during the week are accumulated. These data are recorded on the database

8 of the database server 9 (step S4).

Fig. 5 shows an example of data recorded. As shown in Fig. 5, respective goods is specified based on a combination of brand and a goods code. In the present embodiment, it will be explained about a case where one brand includes a plurality of goods, and there are a plurality of brands.

Fig. 5 shows an example of sales and stock data accumulated in this way. A sales volume for each week shows a total sales volume of respective goods from Monday toe Sunday of the week. In Fig. 5, it is shown that sales volume of goods of a goods code "62421" in the first week is "0 piece", ---, "31 pieces" in the 30th week, "40 pieces" in the 31st week, and "48 pieces" in the 32nd week, respectively. The cumulative sales volume of the week (32ndweek, for example) is made firm at Sunday night.

A cumulative purchase volume of goods shows a cumulative arrival volume of the goods. A cumulative sales volume shows a cumulative sales volume up to the present. A stock volume shows a stock level calculated based on "cumulative purchase volume (-) sales volume (-) adjustment volume". This stock volume is also updated everyday. The adjustment volume refers to a volume of stock decreased for reasons other than sales. For example, this volume refers to a volume decreased due to a damaging or loss of the goods. This data of goods is also sent from each store.

A sales starting week shows a week when the sales volume does not become 0 for the first time (that is, the week when the goods were sold for the first time).

The database 8 has record of sales result data during the preceding year and before, as well as the sales and stock data for the current year. Fig. 6 shows an example of sales result data for the preceding year. Although not shown, the sales result data during the preceding year and before are also recorded in the database in a similar manner.

4. Hardware structure of sales forecasting computer

Fig. 7 shows a hardware structure of the sales forecasting computer. A basic structure is similar to that of the host computer. However, the hard disk 52 is recorded with a program for carrying out a sales forecast. In the present embodiment, a week index (sales index) for carrying out a sales forecast at the beginning of the year (or at the end of the year) is calculated in advance, and is recorded onto the hard disk 52.

5. Week index calculation processing

Fig. 8 shows a flowchart of a week index calculation program to be executed at the beginning of the year. First, the CPU 50 makes access to the database 8, and extracts data of goods having a large sales volume from among the sales result data in the preceding year (step S11). In the present embodiment, goods for which a cumulative sales volume structure rate is at least 70% are selected from among goods of large sales volumes laid out in order starting from a large number. By using the extracted sales result data of goods having a large sales volume in the above manner, it is possible to understand an accurate sales transition. Fig. 9A shows one example of extracted sales result data in the preceding year.

Next, the goods of the sales result data are grouped by item and by sales starting week (step S12). The item refers to a group of goods such as skirts, jackets, and shorts. In the data shown in Fig. 9A, only data of skirts of an item number "01" are shown. Similar data also exist for other items such as jackets and shorts. The sales starting week refers to a week when the goods were sold for the first time. In other words, this is a week when the sales volume became at least one for the first time.

In the data shown in Fig. 9A, a sales starting week of goods in the first row and a sales starting week of goods in the second row are both "01" (that is, the first week), which are common. Therefore, the goods in the first row and the second row are set in one group, and the sales results of these goods are totaled. Fig. 9B shows a result of grouped data. Sales results of goods in the preceding year that are grouped by item and by sales starting week are obtained in this way.

Next, the CPU 50 calculates group sales data for which sales starting week is one week before the current week, the current week, and one week after the current week, and an average $Savg (Item, Ws, Wf)$, for the sales result data of each week (step S13). In other words, an average of the sales results is calculated according to the following expression.

$$Savg (Item, Ws, Wf) = (S (Item, Ws - 1, Wf) + S (Item, Ws, Wf) + S (Item, Ws + 1, Wf)) / 3.$$
 In this expression, Item represents an item number, and Ws represents a sales starting week. In other words, a group is specified based on Item and Ws. Wf

represents a week number when the sales starting week is the "first week". $Savg (Item, Ws, Wf)$ represents an average of a sales result in the Wf -th week of a group specified by Item and Ws . $S(X,Y,Z)$ represents a sales result of a group in which a sales starting week of an item X is Y , in a Z -th week.

Figs. 10A and 10B show an average sales result during weeks including one week before and one week after respectively. In Figs. 10A and 10B, data are shown up to only the seventh week. When there are sales results in the eighth week afterward, these data are also recorded. By averaging the sales results for three weeks that include one week before and one week after the sales result of the current week in the above manner, it is possible to minimize a variation in the sales results due to a sudden factor.

In the present embodiment, goods sales volume is forecast based on a sales starting week as described later. Therefore, it is preferable that each week is a sales starting week of a certain goods group. However, when an item does not have sales result data of a sufficient volume, it may not be possible to obtain sufficient data for a specific week as a sales starting week. For example, as shown in Figs. 9A and 9B, there is no goods for which sales starting week is the fourth week. However, when an average sales result is calculated by including a group that has a sales starting week as one week before and one week after, it is possible to obtain the data as shown in Fig. 10A. A total of $Savg (Item, Ws, Wf)$ for all weeks is recorded as $T (Item, Ws)$.

After calculating the average sales result as shown in Fig. 10A in the manner as described above, a week index (sales index) is calculated for each group (step S14). A week index Index (Item, Ws, Wf) is calculated according to the following expression.

$$\text{Index (Item, Ws, Wf)} = \text{Savg (Item, Ws, Wf)} / \text{T (Item, Ws)}$$

Fig. 10B shows an example of an Index (Item, Ws, Wf) calculated based on the above expression.

Further, the CPU 50 weighted-averages a week index two years before, a week index three years before, and a week index of the preceding year that have been calculated in the manner as described above (step S15). In the present embodiment, the week indexes of the preceding year, two years before, and three years before respectively are weighted as 5: 3: 2. An average value is calculated by placing these weights to the respective indexes. Fig. 11 shows a week index obtained by weighted-averaging week indexes of three years. The CPU 50 records the obtained weighted-averaged week index on the hard disk 52.

By weighted-averaging the indexes of the three years, the indexes reflected by the nearest sales trend can be made while removing the sales variations due to the special factor.

A weighted-averaged week index for carrying out a sales forecast is recorded on the hard disk 52 of the sales forecasting computer 10, as explained above.

6. Sales forecast and order volume calculation processing

6.1 Condition setting

Fig. 12 shows a flowchart of a sales forecast and order volume calculation processing program recorded on the hard disk 52 of the sales forecasting computer 10.

First, the CPU 50 displays a screen for setting various conditions on the display 54, and urges an input (step S21). Fig. 13 shows a screen for setting conditions. On this screen, it is possible to input a lead time (a period required from a dispatch of an order till an arrival of goods) and a week number, for each material of goods.

"K" denotes goods using a knit material, and "C" denotes goods using a material mainly in a cut state. "J" denotes goods using a material to be used for a trainer or the like, and "miscellaneous" denotes such goods as shoes, mufflers, and hats. In the example shown in Fig. 12, a lead time of four weeks is input to "K", a lead time of three weeks is input to "C", a lead time of three weeks is input to "J", and a lead time of three weeks is input to "miscellaneous". These lead times are used at the time of determining order volumes.

In the column of "missing-goods correction", either "valid" or "invalid" is selectively input. The missing-goods correction refers to a correction of a sales result, by assuming a state of not being able to sell goods missed in the show-windows, at the time of calculating a sales result of the preceding week to carry out a sales forecast. When "valid" is input, the missing-goods correction is carried out, and when "invalid" is input, the missing-goods correction is not carried out.

In the column of "estimate stock level", an estimate number

of weeks of stock corresponding to a number of weeks of sales is input. In Fig. 13, it is specified to keep a stock volume that corresponds to four weeks of sales.

Each piece of the above information is recorded on the hard disk 52, and is used to carry out the sales forecast and order volume determination processing.

6.2 Sales forecast

After the conditions have been set as explained above, a sales forecast is carried out (step S22).

Fig. 14 and Fig. 16 show flowcharts of a sales forecast processing. In the present embodiment, a forecast processing is carried out in two states; a sales forecast (a first-time sales forecast) when there is no sales result of goods concerned; and a sales forecast (an additional sales forecast) after a sales result of the goods is obtained. Fig. 14 shows a flowchart of a first-time sales forecast, and Fig. 16 shows a flowchart of an additional sales forecast.

In the first-time sales forecast, the CPU 50 obtains a sales plan for the current year determined in advance, for goods of which sales forecast is to be carried out (step S31). This sales plan is determined based on a sale target of the brand and characteristics of the goods, and is recorded in the database 8.

Next, a scheduled date of starting sales of the goods is obtained from the database 8. This scheduled sales starting date is also determined based on the characteristics of the goods, and is recorded in the database. Based on the scheduled sales

starting date and the item classification of the goods, it is decided to which group the goods belong, and a weighted-averaged index of the group is obtained from the hard disk 52 (step S32).

Next, the CPU 50 forecasts a sales SP (good, Wf) for each week, based on the sales plan of the goods and the weighted-averaged week index (step S33).

$$SP \text{ (good, Wf)} = ST \times \text{Index (Item, Ws, Wf)}$$

In the above expression, SP (good, Wf) represents a sales forecast volume of goods (good) during a period from a scheduled sales starting week till the Wf-th week. ST represents a total sales plan of the goods during the current period. Index (Item, Ws, Wf) represents a weighted-averaged week index. Item represents an item classification of the goods (good). Ws represents a scheduled sales starting week of the goods (good). In other words, a total sales plan is distributed to each week according to a weighted-averaged week index, and a sales forecast for each week is carried out.

The CPU 50 records the sales forecast onto the hard disk 52, and outputs data in the form of a printout or as data (step S34).

The above processing is carried out for all goods for which a sales forecast is to be carried out. Usually, this processing is occasionally carried out after a sales plan of respective goods has been determined. Based on this, sales forecast data for respective goods as shown in Fig. 15 is recorded onto the hard disk 52. In Fig. 15, SKU denotes a code that specifies individual goods.

The calculated sales forecast of respective goods is calculated again based on a new sales result of the goods when it occurs. Fig. 16 shows a flowchart of the processing. The sales forecast processing shown in Fig. 16 is executed usually on the first day of each week (Monday in the embodiment).

The CPU 50 first obtains result data of respective goods from the database 8 (step S41). The CPU 50 calculates a consumption rate based on the obtained data. Fig. 17A shows an example of the obtained result data. The CPU 50 receives these data from each store and the physical distribution center, and the server computer counts up the data and records a result onto the database 8.

In Fig. 17A, "goods code", "SZ", and "COL" denote a goods code, size, and color of goods respectively. It is possible to specify individual goods based on these data. A combination of the three data becomes the SKU. The classification of "K", "C", "J", and "miscellaneous" is recorded on "material name". A sales starting week of the goods is recorded on "sales starting week". A standard selling price at the store is shown in "price".

In the column of "five weeks before", a sales volume in the week of five weeks before is recorded. In the columns of "four weeks before", "three weeks before", "two weeks before", and "one week before", there are recorded sales volumes in four weeks before, three weeks before, two weeks before, and one week before, respectively. The column of "purchase cumulative" shows a cumulative purchase volume of the goods up to the preceding week. The column of "sales cumulative" shows a cumulative sales

volume of the goods up to the preceding week. The column of "week end stock" shows a stock level at the end of the preceding week. The column of "arrival this week" shows a volume already ordered and is scheduled to arrive this week. Similarly, the columns of "arrival next week", "arrival in three weeks", and "arrival in four weeks" show volumes scheduled to arrive in the next week, in three weeks, and in four weeks, respectively.

The CPU 50 calculates a rate of the number of pieces of goods sold among a total purchased volume (a consumption rate), based on the purchase cumulative and the sales cumulative, and records a calculated result into the column of "cumulative consumption rate". Further, the CPU 50 calculates a rate of the number of pieces of goods sold among a purchased volume (a single week consumption rate), based on the purchase cumulative in the preceding week and the sales cumulative in the preceding week. The CPU 50 records a calculated result into the column of "single week consumption rate". In the present embodiment, the sales in the preceding week is added to the week end stock, and the sales in the preceding week is divided by this added result, thereby to obtain the single week consumption rate.

Next, the CPU 50 decides whether the "missing-goods correction" set in the column shown Fig. 13 is "valid" (step S42). When the "missing-goods correction" is not "valid", the missing-goods correction is not carried out, and the process proceeds to step S45. When the "missing-goods correction" is set to "valid", the CPU 50 executes the processing at step S43 afterward, and carries out the missing-goods correction.

There arises such a situation that goods concerned are sold more than expected at some store, and this store cannot sell the goods because of a stock shortage (missing goods). A sales result under this situation does not reflect a sales volume that should have been when the volume had been available. Therefore, when a sales forecast is carried out based on this sales result, a resultant sales forecast might be misleading. To avoid this risk, the sales result to be used for making a sales forecast is corrected. In the present embodiment, this correction is called a missing-goods correction.

The CPU 50 estimates whether the missing goods occurred, at step S43. In the present embodiment, presence or absence of missing goods is estimated based on a cumulative consumption rate and a single week consumption rate. In other words, when the cumulative consumption rate exceeds 60%, and also when the single week consumption rate exceeds 60%, a decision is made that missing goods occurred at some store.

When it has been decided that there was no occurrence of missing goods, the process proceeds to step S45. When it has been decided that there was occurrence of missing goods, the sales result in the preceding week is corrected according to the following expression (step S44).

$$\begin{aligned} \text{Sales in the preceding week} = & ((\text{sales in the preceding} \\ & \text{week} / 0.6) - (\text{week end stock} + \text{sales in the preceding week})) \\ & \times 0.6 + \text{sales in the preceding week} \end{aligned}$$

Based on this, the sales in the preceding week of the goods in the first row in Fig. 17A is corrected to 386.4. (refer to

the column of "sales after missing-goods correction" The sales in the preceding week of the goods in the second row and the third row that do not satisfy the above conditions are not corrected, and remain 277 and 241 respectively.

Next, the CPU 50 calculates a sales forecast volume SG (good, n) of respective goods in n weeks, according to the following expression.

$$SG(\text{good}, n) = (SR(\text{good}) / \text{Index}(\text{Item}, Ws, Wc - 1)) \times \text{Index}(\text{Item}, Ws, Wc+n)$$

In the above expression, SR (good) represents a sales result in the preceding week (after a missing-goods correction, if any). Index (Item, Ws, Wc-1) represents a week index of a goods Item, a starting week group Ws, in the preceding week Wc-1. Wc means this week. Wc+n means a week that is n weeks after this week. In the present embodiment, this week is the 39-th week. A sales forecast for each week starting from this week to the sixth week is carried out, by changing n from 0 to 6. This forecast is carried out for respective goods.

Fig. 17B shows an example of a week index (three-year weighted average) that is used for the forecast. Fig. 18 shows a calculated sales forecast for each week. Fig. 18 shows a calculated sales forecast from the "39-th week" (this week) till the "45-th week".

6.3 Calculation of necessary order volume

After calculating the sales forecast for each week for the first time and additionally, the CPU 50 calculates a necessary order volume (step S23 in Fig. 12).

Fig. 19 schematically shows how to calculate a necessary order volume in the present embodiment. The goods to be ordered from now on in this week (39-th week) will arrive in the 42-nd week (a controllable head week) after a lead time LT. This lead time LT is set in the column shown in Fig. 13.

In this embodiment, an order volume this week is decided such that a stock level coincides with a forecast sales during the coming four weeks starting from this week (39-th week), when the week (42-nd week) corresponding to the lead time LT of the goods starts. A stock level that coincides with a forecast sales volume during the coming weeks starting from now, is called a forecast number of weeks of stock. In the present embodiment, the forecast number of weeks of stock is set "4". In other words, based on the sales forecast, a stock level that can cover the sales volume up to four weeks ahead is secured.

Fig. 20 shows a flowchart of a program for calculating a necessary order volume. The CPU 50 totals forecast sales volumes of goods concerned starting from this week (39-th week) till the controllable head week (42-nd week), and sets this total volume as "sales forecast 1" (step S51). For example, for the goods in the first row shown in Fig. 18, the sales forecasts for the 39-th week to the 41-st week are totaled to obtain "773", and this number is recorded.

Next, the CPU 50 totals a scheduled goods arrival volume during the same period (step S52). In other words, for the goods, volumes already ordered and not yet arrived are totaled, and this total is set as "stock in progress 1". It is possible to

obtain this volume based on an order record and a goods arrival record of respective goods. In Fig. 18, the "stock in progress 1" is calculated as "1100", and this number is recorded.

Next, a stock volume at a point of time when the controllable head week (42-nd week) starts is calculated as "stock 1" (step S53). It is possible to calculate this "stock 1" by adding the "stock in progress 1" to the "stock at the last week end", and subtracting the "sales forecast 1" from this added value.

Next, the CPU 50 totals sales volumes during the period of a forecast number of weeks of stock starting from the controllable head week (42-nd week) (step S54). In other words, the forecast sales volumes during the period from the 42-nd week to the 45-th week are totaled. Next, the "stock in progress 1" is subtracted from a "total stock in progress", thereby to calculate a "stock in progress 2" (step S55). The "total stock in progress" shows a volume of goods that is in progress (that is, the volume already ordered and not yet arrived). In other words, the "stock in progress 2" shows a stock of goods scheduled to arrive after the controllable head week.

The CPU 50 calculates an "order frame" based on the following expression, when the "stock 1" is greater than 0 (steps S56 and S57).

"order frame" = "sales forecast 2" - ("stock 1" + "stock in progress 2")

When the "stock 1" is smaller than 0, the "order frame" is calculated based on the following expression (steps S56 and S58).

"order frame" = "sales forecast 2" - "stock in progress

2"

When the "order frame" obtained from the calculation is greater than 1, this order volume is set as the "stock frame" (steps S59 and S60). When the "order frame" is not greater than 0, no order is made this time (steps S59 and S61).

Fig. 18 shows calculated examples of the "order frame" and the "order volume". There is no order this time for the goods in the first row and the goods in the second row. The goods in the third row show that it is necessary to make order for 270 pieces this time.

The calculated order volumes are output to the database and are recorded there, and are also printed out. The calculated order volumes are also transmitted to the maker 3 via the host computer 6. The maker 3 receives the data and manufacture goods based on the data (refer to Fig. 1).

While the "order frame" = the "order volume" in the above explanation, it is also possible to arrange such that the "order frame" is an upper limit, and a person determines the order volume.

Further, while orders are made to the maker 3 by online transmitting the instruction in the above explanation, it is also possible to arrange such that the orders are transmitted via a recording medium or by printing on paper.

7. Other embodiments

(1) In the above embodiment, explanation has been made based on apparel goods as an example. However, it is also possible to apply the invention to other goods for which it is possible to manage the goods from manufacturing to selling of

the goods, such as industrial products and processed foods. It is also possible to apply the invention to other goods for which purchase management is important, such as goods sold in convenience stores. The invention can be applied to the order management of the goods handled there.

(2) While order volumes are calculated based on sales volumes in the above embodiment, it is also possible to determine production volumes, purchase volumes, and acquisition volumes, based on sales forecasts.

(3) While forecast sales volumes are calculated in the above embodiment, it is also possible to arrange such that sales volumes and sales proceeds are calculated.

(4) In the above embodiment, an order volume is calculated for a first-time order of goods based on a sales forecast. However, it is also possible to arrange such that the first-order volume is determined based on other method (such as, for example, a breakdown from a total plan), and only the additional order volume is determined based on a sales forecast.

What is Claimed is :

1. A sales forecasting apparatus that forecasts a sales in future based on a past sales result, wherein the sales forecasting apparatus

obtains a sales result of respective goods to be handled, sets respective goods into groups by using a sales period of respective goods as at least one index, based on the sales result,

decides to which group the goods to be forecast belong, based on a sales period of the goods to be forecast, and

calculates a sales forecast of the goods to be handled, based on a sales result of the group of goods handled during a past period corresponding to the forecast period having a similarity with the period to be forecast.

2. A sales forecasting apparatus that forecasts a sales in future based on a past sales result, wherein the sales forecasting apparatus

is structured to be able to make access to a recording section that has a record of a sales result of each group, for respective goods to be handled that are set into groups by using a sales period of the goods as one index,

decides to which group the goods to be forecast belong, based on a sales period of the goods to be forecast, and

obtains a sales result of the group of goods to be handled during a past period corresponding to the forecast period having a similarity with the period to be forecast, and calculates a sales forecast of the goods to be handled based on the sales

result.

3. The sales forecasting apparatus according to claim 1, wherein

the sales forecasting apparatus carries out a forecast for a predetermined unit period, and calculates a sales forecast of a plurality of unit periods for each predetermined unit period.

4. The sales forecasting apparatus according to claim 2, wherein

the sales forecasting apparatus carries out a forecast for a predetermined unit period, and calculates a sales forecast of a plurality of unit periods for each predetermined unit period.

5. The sales forecasting apparatus according to claim 3, wherein

the sales forecasting apparatus carries out a sales forecast as at least a calculation of a relative sales rate during each unit period.

6. The sales forecasting apparatus according to claim 4, wherein

the sales forecasting apparatus carries out a sales forecast as at least a calculation of a relative sales rate during each unit period.

7. The sales forecasting apparatus according to claim 5, wherein

the sales forecasting apparatus carries out a sales forecast for a unit period not yet passed, based on a relative sales rate and a sales result during a past unit period for which sales result is already available among the plurality of unit

periods, and a relative sales rate during a unit sales forecast period not yet passed.

8. The sales forecasting apparatus according to claim 6, wherein

the sales forecasting apparatus carries out a sales forecast for a unit period not yet passed, based on a relative sales rate and a sales result during a past unit period for which sales result is already available among the plurality of unit periods, and a relative sales rate during a unit sales forecast period not yet passed.

9. The sales forecasting apparatus according to claim 7, wherein

the sales forecasting apparatus uses a nearest past unit period as the past unit period.

10. The sales forecasting apparatus according to claim 8, wherein

the sales forecasting apparatus uses a nearest past unit period as the past unit period.

11. The sales forecasting apparatus according to claim 7, wherein

the sales forecasting apparatus uses a plurality of unit periods as the past unit period.

12. The sales forecasting apparatus according to claim 8, wherein

the sales forecasting apparatus uses a plurality of unit periods as the past unit period.

13. The sales forecasting apparatus according to any one

of claims 7 to 12, wherein

the sales forecasting apparatus estimates presence or absence of a stock in shortage based on goods arrival and sales, for a sales result during a past unit period, and forecasts a sales by using a corrected sales result obtained by correcting the sales result, when it has been decided that there is a stock in shortage.

14. The sales forecasting apparatus according to any one of claims 3 to 12, wherein

the predetermined unit period is time, time zone, day, week, month, or year.

15. The sales forecasting apparatus according to claim 1, wherein

the corresponding period is a period of the preceding year or before, the preceding month or before, or the preceding day or before, corresponding to the forecast period.

16. The sales forecasting apparatus according to claim 2, wherein

the corresponding period is a period of the preceding year or before, the preceding month or before, or the preceding day or before, corresponding to the forecast period.

17. The sales forecasting apparatus according to claim 1, wherein

the similarity of the corresponding period includes a common characteristics of day, month, week, day of the week, time, or weather.

18. The sales forecasting apparatus according to claim

2, wherein

the similarity of the corresponding period includes a common characteristics of day, month, week, day of the week, time, or weather.

19. The sales forecasting apparatus according to any one of claims 15 to 18, wherein

the sales forecasting apparatus carries out a sales forecast by using a sales result during a plurality of corresponding periods.

20. The sales forecasting apparatus according to any one of claims 1 to 12, wherein

the sales forecasting apparatus carries out a sales forecast by taking into account a sales result of other group during a sales period before or after or both before and after a sales period of a group to which the goods to be forecast belong.

21. The sales forecasting apparatus according to any one of claims 1 to 12, wherein

the sales forecasting apparatus calculates a sales forecast of goods to be handled during each unit period, based on a total sales plan of the goods during a total period of a plurality of periods, and a transition of a sales result of a group to which the goods belong during the corresponding period.

22. The sales forecasting apparatus according to claim 1, wherein

the sales forecasting apparatus calculates a necessary delivery volume of goods to be handled, based on a calculated sales forecast, and outputs delivery order data.

23. The sales forecasting apparatus according to claim 2, wherein

the sales forecasting apparatus calculates a necessary delivery volume of goods to be handled, based on a calculated sales forecast, and outputs delivery order data.

24. The sales forecasting apparatus according to claim 22, wherein

the sales forecasting apparatus sets the predetermined unit time to a period shorter than a period of deviation required from the ordering of the goods till the delivery.

25. The sales forecasting apparatus according to claim 23, wherein

the sales forecasting apparatus sets the predetermined unit time to a period shorter than a period of deviation required from the ordering of the goods till the delivery.

26. The sales forecasting apparatus according to claim 24, wherein

the sales forecasting apparatus calculates the necessary delivery volume as a volume that is necessary for a future unit period that takes into account the deviation period, and calculates the delivery volume necessary for a future unit period, based on the sales forecast.

27. The sales forecasting apparatus according to claim 25, wherein

the sales forecasting apparatus calculates the necessary delivery volume as a volume that is necessary for a future unit period that takes into account the deviation period, and

calculates the delivery volume necessary for a future unit period, based on the sales forecast.

28. The sales forecasting apparatus according to claim 26 or 27, wherein

the sales forecasting apparatus determines a forecast stock volume during a unit period so that the stock volume becomes equal to a total forecast sales volume during a predetermined number of unit periods ahead the unit period or has a predetermined relationship with the total forecast sales volume, and determines the delivery volume during the future unit period, based on the forecast stock volume.

29. The sales forecasting apparatus according to any one of claims 1 to 12, wherein

the sales forecasting apparatus forecasts sales of goods of which sales volume varies due to seasonal factors.

30. The sales forecasting apparatus according to any one of claims 1 to 12, wherein

the sales forecasting apparatus forecasts sales of goods that are classified according to their attributes, and are grouped based on a combination of the attributes and the sales period.

31. The sales forecasting apparatus according to any one of claims 1 to 12, wherein

the sales forecasting apparatus sets the sales period used for the grouping, as a sales starting period.

32. A sales forecasting program that realizes a sales forecasting apparatus by making a computer carry out the

processing of:

obtaining a sales result of respective goods to be handled,
setting respective goods into groups by using a sales
period of respective goods as at least one index, based on the
sales result,

deciding to which group the goods to be forecast belong,
based on a sales period of the goods to be forecast, and

calculating a sales forecast of the goods to be handled,
based on a sales result of the group of goods handled during
a past period corresponding to the forecast period having a
similarity.

33. A recording medium that is recorded with the program
according to claim 32.

34. A sales forecasting program that realizes a sales
forecasting apparatus by making a computer carry out the
processing of:

deciding to which group the goods to be forecast belong,
based on a sales period of the goods to be forecast,

making access to a recording section that has a record
of a sales result of each group, for respective goods to be handled
that are set into groups by using a sales period of the goods
as one index, and

obtaining a sales result of the group of goods to be handled
during a past period corresponding to the forecast period having
a similarity, and calculating a sales forecast of the goods to
be handled based on the sales result, for respective goods to
be forecast.

35. A recording medium that is recorded with the program according to claim 34.

36. A sales forecasting method for forecasting a sales in future based on a sales result in the past, by using a computer, the method comprising the steps of:

obtaining a sales result of respective goods to be handled;

deciding to which one of existing goods the goods to be forecast belong, based on a sales period of the goods to be forecast; and

calculating a sales forecast of the goods to be handled, based on a sales result of the goods handled during a past period corresponding to the forecast period having a similarity with the period to be forecast.