

DESCRIPTION

Title of Invention: ELEVATOR INFORMATION DISPLAY DEVICE AND
ELEVATOR INFORMATION DISPLAY METHOD

Technical Field

[0001]

The present invention relates to an elevator information display device and an elevator information display method.

Background Art

[0002]

In general, a maintenance contract of an elevator includes a master contract that is a full maintenance contract or an inspection contract, and an optional individual contract. For example, PTL 1 discloses to "provide a system for selecting an appropriate maintenance plan in consideration of the degree of load of the elevator on a customer or needs of the customer" (abstract) to be used by a customer in determining what kind of maintenance contract is to be concluded. Moreover, this PTL 1 also describes that, in the case of contract change, a cost (contract fee) and the like for implementing the maintenance plan is displayed regarding each of a currently set maintenance plan and a recommended maintenance plan

(paragraphs 0029 and 0033).

Citation List

Patent Literature

[0003]

PTL 1: JP 2002-230196 A

Summary of Invention

Technical Problem

[0004]

However, in the system described in PTL 1, since how much performance effect is obtained under the current contract or how much performance effect can be expected in a case where a different contract is concluded is unclear, it is difficult for the customer to determine whether to change the contract content or not.

[0005]

An object of the present invention is to provide an elevator information display device and an elevator information display method that make it easier for the customer to determine whether to change the contract or not.

Solution to Problem

[0006]

The present invention is an elevator information display device that displays information on an elevator,

the elevator information display device including a comparison display unit that compares and displays a performance index under a current contract output using operation information or maintenance work information of the elevator, and a performance index under a different contract.

[0007]

Moreover, the present invention is an elevator information display method for displaying information on an elevator, the elevator information display method including a step of comparing and displaying a performance index under a current contract output using operation information or maintenance work information of the elevator, and a performance index under a different contract.

Advantageous Effects of Invention

[0008]

According to the present invention, it is possible to provide an elevator information display device and an elevator information display method that make it easier for a customer to grasp how much effect is obtained by a current contract or how much effect can be expected in a case where a different contract is concluded, and to determine whether to change the contract or not.

Brief Description of Drawings

[0009]

[FIG. 1] FIG. 1 is an overall configuration diagram of an elevator system according to an embodiment.

[FIG. 2] FIG. 2 is a diagram illustrating an example of a screen of a case where availability factors are compared and displayed according to Example 1.

[FIG. 3] FIG. 3 is a diagram illustrating an example of a screen of a case where availability factors are compared and displayed according to Example 2.

[FIG. 4] FIG. 4 is a diagram illustrating an example of a screen of a case where times and costs required for specific maintenance works are compared and displayed according to Example 3.

[FIG. 5] FIG. 5 is a diagram illustrating an example of a screen of a case where times and costs required for specific maintenance works are compared and displayed according to Example 4.

Description of Embodiments

[0010]

First, an embodiment of the present invention will be described with reference to FIG. 1. FIG. 1 is an overall configuration diagram of an elevator system including an elevator information display device according to the

present embodiment. As illustrated in FIG. 1, the elevator system of the present embodiment includes an elevator 1 located in a building of a customer, a maintenance server 3 located in a maintenance center, and a customer terminal 4 owned by the customer, which are connected with each other via a network 5.

[0011]

<Elevator>

Regarding the elevator 1, the car is moved up and down in a hoistway by rotating a hoisting machine, around which a main rope having one end attached to the car and the other end attached to a counterweight is wound. Moreover, the elevator 1 has a control panel, and the control panel has an elevator control device that controls the hoisting machine and the like, and an elevator monitoring device 2 that monitors the elevator 1. Moreover, the elevator monitoring device 2 includes a communication unit 21, and is communicably connected with the maintenance server 3 and the customer terminal 4 via the network 5. This elevator monitoring device 2 periodically collects operation data of the elevator 1 and transmits the operation data to the maintenance server 3, and also transmits an alert to the maintenance server 3 in a case where an abnormality is detected.

[0012]

<Maintenance server 3>

The maintenance server 3 corresponds to an elevator information display device, and is laid in a maintenance center that is a building different from the elevator 1 to be subjected to the maintenance work. Moreover, the maintenance server 3 includes a communication unit 31, a CPU 32, a database 33, a current contract index output unit 34, a different contract index prediction unit 35, and a comparison display unit 36. The communication unit 31 is connected with the network 5, and can transmit and receive data to and from the communication unit 21 of the elevator monitoring device 2, and a communication unit 41 of the customer terminal 4. The CPU 32 is configured to manage the entire operation of the maintenance server 3, and operates by execution of a predetermined OS.

[0013]

<<Database 33>>

The database 33 includes a contract DB 33a that stores contract information of each elevator, an operation DB 33b that stores operation information of each elevator, and a maintenance work DB 33c that stores maintenance work information of each elevator.

[0014]

Here, the contract information is information on a customer (administrator) who is a contractor, the content

of the contract, or the like. Assumed as the content of the contract is what the master contract is (whether the master contract is a "full maintenance contract" or an "inspection contract"), whether there is an optional contract (various services such as predictive diagnosis, automatic recovery at the time of earthquake, and remote flooding evacuation) or not, or the like. Note that the contract DB 33a can also store information such as a type, a usage mode, installation environment, or the like of the elevator. Moreover, the operation information includes information indicating whether the elevator 1 is normally operating or not, or whether the elevator 1 is at a stop due to maintenance work or the like or not. This operation information is transmitted to the maintenance server 3 by the elevator monitoring device 2 at predetermined time intervals. Furthermore, the maintenance work information includes details of a failure (part name, date and time, etc.), the content of work implemented, a work time, a cost, or the like regarding an abnormality that has occurred in the past.

[0015]

<<Current contract index output unit>>

The current contract index output unit 34 is configured to output a performance index under a current contract using the operation information stored in the

operation DB 33b or the maintenance work information stored in the maintenance work DB 33c. The performance index is an operation index indicating whether the elevator 1 is normally operated or not, or an index indicating how short the work time of the maintenance engineer can be when an abnormality occurs in the elevator 1. As the operation index, for example, an availability factor, a failure rate, a stop time, the number of failures, a waiting time, a long waiting rate, or the like can be considered. Note that the performance index is not limited to a current or past index, and may be an index expected in the future.

[0016]

<<Different contract index prediction unit>>

The different contract index prediction unit 35 is configured to predict a value of the performance index on an assumption that the administrator of the elevator 1 has concluded a contract different from the current contract. In prediction of the performance index under the different contract, the different contract index prediction unit 35 may use past operation information or maintenance work information of the elevator 1, or may use operation information or maintenance work information of another elevator.

[0017]

In a case where a performance index is predicted

using information on another elevator, the different contract index prediction unit 35 refers to the contract information DB 33a, and extracts an elevator (similar condition elevator) that has relevance to the elevator 1 and is under the different contract. An elevator having relevance to the elevator 1 is an elevator having a type (model, etc.), a usage mode (traveling time, etc.), or installation environment (floor, etc.) closer than other elevators. Thereafter, the different contract index prediction unit 35 reads operation information or maintenance work information of the similar condition elevator from the operation DB 33b or the maintenance work DB 33c, and outputs the performance index of the similar condition elevator. The different contract index prediction unit 35 regards the performance index of this similar condition elevator as a performance index of a case where the elevator 1 is under the different contract. It is possible to accurately predict the performance index under the different contract by using information on an elevator under a condition similar to the elevator 1 as described above.

[0018]

<<Comparison display unit>>

The comparison display unit 36 is configured to compare and display the performance index under the current

contract output by the current contract index output unit 34 and the performance index under the different contract predicted by the different contract index prediction unit 35. Examples of the comparison display by this comparison display unit 36 include a method of displaying the performance indexes of the current contract and the different contract side by side in numerical values or graphs, or displaying the difference between the performance indexes in numerical values or graphs on the customer terminal 4.

[0019]

<Customer terminal 4>

The customer terminal 4 is a personal computer or a smartphone owned by a customer, and has the communication unit 41, a control unit 42, and a display unit 43. The communication unit 41 is connected with the network 5, and can transmit and receive data to and from the elevator monitoring device 2 and the maintenance server 3. The control unit 42 is configured to manage the entire operation of the customer terminal 4, includes a CPU, for example, and operates by a predetermined OS. The display unit 43 is a display that displays a numerical value or a graph of a performance index transmitted from the maintenance server 3 on a screen.

[0020]

Hereinafter, Examples 1 and 2 in which the availability factors are compared and displayed as the operation indexes, and Examples 3 and 4 in which the times and costs required for maintenance works are compared and displayed will be described separately in detail.

[Example 1]

[0021]

Example 1 is a case where the availability factor under a current contract is lower than the availability factor under a different contract. FIG. 2 is a diagram illustrating an example of a screen of a case where the availability factors are compared and displayed on the display of the customer terminal 4 by the elevator information display device according to the present embodiment.

[0022]

In the present example, since the current contract includes only a master contract and no individual contract is concluded, each service content (failure prevention by predictive diagnosis, early recovery by automatic diagnosis at the time of earthquake, or failure prevention by remote flooding evacuation) is displayed as "without" for the current contract as illustrated in FIG. 2.

[0023]

The current contract index output unit 34 outputs the

availability factor under the current contract on the basis of the operation information stored in the operation DB 33b. Here, the availability factor of the elevator is calculated by dividing the operating time by the total value of the operating time and the stop time. The operating time refers to a time during which service is available, and also includes a time during which the car is at a stop as long as the car can operate at any time by call registration at the landing. The stop time refers to a time during which service cannot be performed due to inspection work or the like. Moreover, the target period for calculating the availability factor may be the entire period after the installation of the elevator 1, or may be the latest predetermined period (e.g., past several months). [0024]

The different contract index prediction unit 35 calculates a value of the availability factor on an assumption that the administrator of the elevator 1 has concluded an individual contract regarding various optional services in addition to the master contract. A specific calculation method is as follows. First, the different contract index prediction unit 35 refers to the contract DB 33a, and extracts an elevator, for which a different contract, that is, a contract of various services is concluded, from similar condition elevators. Thereafter,

the different contract index prediction unit 35 reads the operation information of the similar condition elevator from the operation DB 33b, and outputs the availability factor of the similar condition elevator as an availability factor that can be expected in a case where the individual contract is concluded.

[0025]

The comparison display unit 36 displays the availability factor ("90%" in FIG. 2) under the current contract output by the current contract index output unit 34 and the availability factor ("99%" in FIG. 2) under the different contract predicted by the different contract index prediction unit 35 in a pie chart and also in numerical values. In a case where there is a plurality of individual contracts that can be concluded overlappingly, the comparison display unit 36 may display the expected degree of contribution to the improvement of the availability factor for each service of the individual contract. For example, as illustrated in FIG. 2, the comparison display unit 36 clearly indicates that the availability factor is expected to be improved by "5%" when a service of "failure prevention by predictive diagnosis" is contracted.

[0026]

As described above, according to the present example,

since it is possible to easily grasp how much performance improvement is specifically expected when which contract is concluded, there is an advantage that the customer can easily determine whether to change the contract to a new contract or not.

[Example 2]

[0027]

Example 2 is a case where the availability factor under a current contract is higher than the availability factor under a different contract. FIG. 3 is a diagram illustrating an example of a screen of a case where the availability factors are compared and displayed on the display of the customer terminal 4 by the elevator information display device according to the present embodiment.

[0028]

In the present example, since a plurality of individual contracts are already concluded in addition to the master contract as the current contract, each service content is displayed as "with" for the current contract as illustrated in FIG. 3.

[0029]

The current contract index output unit 34 outputs the availability factor under the current contract on the basis of the operation information stored in the operation DB 33b.

Moreover, the different contract index prediction unit 35 calculates a value of the availability factor on an assumption that all the individual contracts have not been concluded. Specifically, the different contract index prediction unit 35 extracts an elevator having only the master contract among the similar condition elevators, regards the availability factor of this extracted elevator as the availability factor under the different contract, and outputs the availability factor. Then, the comparison display unit 36 displays the availability factor ("99%" in FIG. 3) under the current contract output by the current contract index output unit 34 and the availability factor ("90%" in FIG. 3) under the different contract predicted by the different contract index prediction unit 35 in a pie chart and also in numerical values.

[0030]

Note that the comparison display unit 36 may display the degree of contribution to the improvement of the availability factor for each service of the individual contract. For example, as illustrated in FIG. 3, the comparison display unit 36 clearly indicates that the effect of improvement of the availability factor by "5%" is obtained by contracting the service of "failure prevention by predictive diagnosis".

[0031]

As described above, according to the present example, since it is possible to easily grasp how much performance improvement effect is specifically obtained by which contract of the current contract, there is an advantage that the customer can easily determine whether to maintain the current contract or not. Moreover, by clearly indicating the difference ("9%" in FIG. 3) of the performance indexes as an effect of the current contract, it becomes further easier for the customer to make a determination.

[Example 3]

[0032]

Example 3 is a case where the current master contract is an "inspection contract", and the maintenance work time is longer and the maintenance cost is higher than the case of a "full maintenance contract". FIG. 4 is a diagram illustrating an example of a screen of a case where times and costs required for specific maintenance works are compared and displayed on the display of the customer terminal 4 by the elevator information display device according to the present embodiment.

[0033]

The current contract index output unit 34 outputs the time and cost of a specific maintenance work performed for an abnormality that has actually occurred under the current

contract on the basis of the maintenance work information stored in the maintenance work DB 33c. Here, the maintenance work includes part preparation, part replacement, travel confirmation, and the like. In the present example, since the current contract is an "inspection contract", the part replacement is onerous, and a cost of 20,000 yen is generated as illustrated in FIG. 4 in the case of a magnet brake, for example. Moreover, in the case of an "inspection contract", it takes time for part preparation, and it takes 1 day as illustrated in FIG. 4 in the case of a magnet brake, for example.

[0034]

The different contract index prediction unit 35 calculates the values of the time and cost of the maintenance work on an assumption that the master contract is a "full maintenance contract". In the case of a "full maintenance contract," part replacement is free, and no time for part preparation is required.

[0035]

The comparison display unit 36 compares and displays the time and cost of the maintenance work output by the current contract index output unit 34 and the time and cost of the maintenance work predicted by the different contract index prediction unit 35. Specifically, it is clearly indicated that the total of maintenance work requires a

work time of 1 day plus 2 hours and 10 minutes and a cost of 20,000 yen in the case of an "inspection contract" that is the current contract, whereas the total of maintenance work requires only a work time of 2 hours and 10 minutes and a cost of 0 yen when the contract is changed to the "full maintenance contract" as illustrated in FIG. 4.

[0036]

As described above, according to the present example, since it is possible to easily grasp how much performance improvement (time saving) can be expected and how much cost can be saved in a case where the "full maintenance contract" is concluded, there is an advantage that the customer can easily determine whether to change the contract or not.

[Example 4]

[0037]

Example 4 is a case where the current master contract is a "full maintenance contract", and the maintenance work time is shorter and the maintenance cost is lower than the case of an "inspection contract". FIG. 5 is a diagram illustrating an example of a screen of a case where times and costs required for specific maintenance works are compared and displayed on the display of the customer terminal 4 by the elevator information display device according to the present embodiment.

[0038]

The current contract index output unit 34 outputs the time and cost of a specific maintenance work performed for an abnormality that has actually occurred under the current contract on the basis of the maintenance work information stored in the maintenance work DB 33c. In the present example, since the current contract is a "full maintenance contract", the part replacement is free, and no time for part preparation is required.

[0039]

The different contract index prediction unit 35 calculates the values of the time and cost of the maintenance work on an assumption that the master contract is an "inspection contract". In the case of an "inspection contract", a cost of 20,000 yen is generated, and it takes 1 day for part preparation as illustrated in FIG. 5 in the case of a magnet brake, for example.

[0040]

The comparison display unit 36 compares and displays the time and cost of the maintenance work output by the current contract index output unit 34 and the time and cost of the maintenance work predicted by the different contract index prediction unit 35. Specifically, it is clearly indicated that the total of maintenance work requires only a work time of 2 hours and 10 minutes and a cost of 0 yen

in the case of a "full maintenance contract" that is the current contract, whereas the total of maintenance work requires a work time of 1 day plus 2 hours and 10 minutes and a cost of 20,000 yen when the contract is changed to an "inspection contract" as illustrated in FIG. 5.

[0041]

As described above, according to the present example, since it is possible to easily grasp how much performance improvement (time saving) effect is obtained and how much cost can be saved by a "full maintenance contract" that is the current contract, there is an advantage that the customer can easily determine whether to maintain the current contract or not. Moreover, by clearly indicating the difference ("work time 1d" reduction in FIG. 5) of the performance indexes as an effect of the current contract, it becomes further easier for the customer to make a determination.

[0042]

Note that the present invention is not limited to Examples 1 to 4 described above, and includes various modifications. For example, the cumulative maintenance cost which is expected to be generated in a case where the current contract is continued for a predetermined period, and the cumulative maintenance cost which is expected to be generated in a case where a different contract is continued

for a predetermined period may be compared and displayed, including not only the maintenance cost necessary for part replacement or the like but also the cost paid for the contract itself.

[0043]

Moreover, a part of the configuration of a certain example can be replaced with the configuration of another example, and the configuration of a certain example can be added to the configuration of another example. Moreover, it is also possible to employ a configuration for addition, deletion, or replacement of a part of another configuration of each embodiment.

Reference Signs List

[0044]

- 1 elevator
- 2 elevator monitoring device
- 21 communication unit
- 3 maintenance server
- 31 communication unit
- 32 CPU
- 33 database
- 33a contract DB
- 33b operation DB
- 33c maintenance work DB
- 34 current contract index output unit

- 35 different contract index prediction unit
- 36 comparison display unit
- 4 customer terminal
- 41 communication unit
- 42 control unit
- 43 display unit
- 5 network

CLAIMS

[Claim 1]

An elevator information display device that displays information on an elevator, the elevator information display device comprising

a comparison display unit that compares and displays a performance index under a current contract output using operation information or maintenance work information of the elevator, and a performance index under a different contract.

[Claim 2]

The elevator information display device according to claim 1, further comprising:

a database that stores operation information of the elevator;

a current contract index output unit that outputs an operation index by using the operation information;

a different contract index prediction unit that predicts an operation index on an assumption of a different contract; and

a comparison display unit that compares and displays an operation index under the current contract and an operation index under the different contract.

[Claim 3]

The elevator information display device according to

claim 2, wherein

the operation index is at least one of an availability factor, a failure rate, the number of failures, or a stop time.

[Claim 4]

The elevator information display device according to claim 2, wherein

the different contract is a plurality of contracts that can be overlapped, and

the comparison display unit displays a degree of contribution to the operation index for each different contract.

[Claim 5]

The elevator information display device according to claim 1, the elevator information display device comprising:

a database that stores maintenance work information of the elevator;

a current contract index output unit that outputs a time and a cost required for a specific maintenance work performed on the elevator by using the maintenance work information;

a different contract index prediction unit that predicts a time and a cost required for the specific maintenance work on an assumption of a different contract;

and

a comparison display unit that compares and displays a time and a cost under the current contract and a time and a cost under the different contract.

[Claim 6]

The elevator information display device according to claim 2 or 5, wherein

the different contract index prediction unit predicts the performance index by using operation information or maintenance work information of an elevator that has relevance to the elevator and is under the different contract among the operation information or the maintenance work information stored in the database.

[Claim 7]

The elevator information display device according to claim 6, wherein

the elevator that has relevance is an elevator having a type, a usage mode, or installation environment closer than other elevators.

[Claim 8]

An elevator information display device that displays information on an elevator, the elevator information display device comprising:

a database that stores maintenance work information of the elevator;

a current contract index output unit that outputs a cumulative maintenance cost of a case where a current contract is continued for a predetermined period, by using the maintenance work information;

a different contract index prediction unit that predicts a cumulative maintenance cost of a case where a different contract is continued for a predetermined time; and

a comparison display unit that compares and displays a cumulative maintenance cost under the current contract and a cumulative maintenance cost under the different contract.

[Claim 9]

The elevator information display device according to claim 5 or 8, wherein

one of the current contract or the different contract is a full maintenance contract, and the other is an inspection contract.

[Claim 10]

The elevator information display device according to claim 1, wherein

the comparison display unit displays a difference between performance indexes as an effect of the current contract in a case where a performance index under the current contract is higher than a performance index under

the different contract.

[Claim 11]

An elevator information display method for displaying information on an elevator, the elevator information display method comprising

a step of comparing and displaying a performance index under a current contract output using operation information or maintenance work information of the elevator, and a performance index under a different contract.