SYSTEM AND METHOD FOR EQUIPMENT RELIANCE PROGRAM SCORING

FIELD OF THE INVENTION

This invention relates generally to vendor performance measurement systems and methods, and more particularly to manufacturing equipment supplier measurement systems.

BACKGROUND OF THE INVENTION

In conventional systems and methods, improvement in manufacturing equipment that is supplied by a vendor is driven primarily by the vendee, and on an ad hoc basis when a crisis in the reliability or performance of the equipment occurs. The attention of the vendor or supplier is primarily focused on product development and industrial process issues because of the difficulty and/or expense in measuring the reliability or performance of the equipment that is installed in the field on-site at the vendee. Therefore, the vendor does not have a substantial role in the measurement of the reliability or performance of the equipment, leaving the role of measurement of the vendee who has a more direct and immediate interest in the reliability or performance of the equipment.

While the onus is on the vendee to objectively track and manage the performance of vendors, vendees only rarely implement a formal system for measuring vendor performance. When the systems are implemented, the systems do not provide for an overall measurement that encompasses a wide variety of issues that are important to the vendee.

Furthermore, communication with the vendor is performed only during monthly meetings between the vendor and the vendee or when a crisis arises. As a result, the vendor does not have the capability to access equipment performance information in order to understand the equipment track record.

Solutions that are designed to evaluate performance have been developed, but none of the solutions are directed to improving service of vendors of manufacturing equipment. For example, U.S. Patents 5,546,329 and 5,479,361 are directed to quantitatively ranking the performance of attributes contributing to a manufacturing process. However, the attributes are not related to service issues, and the patents explicitly teach against numeric evaluation. In addition, U.S. Patent 6,078,894 is unrelated to a manufacturing environment, and is limited to medical emergency dispatch. Finally, U.S. Patents 6,038,544; 5,950,201; 5,926,794; and 5,907,488 do not disclose weighted averages and thus are out of the scope of the present invention.

For the reasons stated above and for other reasons stated below which will become apparent to those skilled in the art upon reading and understanding the present specification, there is a need in the art for an improved formal system for measuring vendor performance and communicating with the vendor on the results of the measurements.

SUMMARY OF THE INVENTION

The above-mentioned shortcomings, disadvantages and problems are addressed by the present invention, which will be understood by reading and studying the following specification.

The present invention provides a feedback mechanism to equipment vendors or suppliers on their overall performance, and on specific aspects of their performance, in order to drive continuous improvement in the performance of the vendor. Vendor performance above or below specified levels triggers or prompts a reward or penalty to the vendor. Each vendor accesses a performance management system of the vendee to identify problem areas or areas of sub-optimal performance of the vendor based on historical data, and provide information to determine a solution to the problems, including corrective and preventive actions, and also to determine areas of superior performance and the reason for the superior performance.

The present invention also provides to vendees benchmarking information of

vendors.

In one aspect of the present invention, a computer implemented method for identifying high and low performing vendors includes comparing performance data of a number of performance measurements to specified levels of performance in order to determine performance scores for one or more vendors. A score that describes the level of performance, such as on a scale or range of 0-5, is derived from the comparison. The performance scores include measurements of equipment performance downtime, equipment spare part expense, vendor call-back responsiveness, vendor arrival responsiveness, stockout logistics support, outstanding technical support, failure analysis of technical support, and overall subjective evaluation. Thereafter, the method includes determining numerically weighted average performance scores of vendors from the performance scores of the vendors and from predetermined numerical weights. Thereafter, the vendors are ranked based on the weighted average performance scores, yielding a rank for each vendor. Optionally, one or more vendors are penalized or rewarded in reference to the rank of each vendor.

In another aspect of the present invention, a determiner of weighted average performance scores of vendors is coupled to a sorter of the vendors. The determiner uses performance scores of the vendors and predetermined weights to determine the weighted average performance score of each vendor. The sorter sorts in reference to the weighted average performance scores, yielding a rank for each vendor. There is one predetermined weight for each unique type of performance score.

The present invention describes systems, clients, servers, methods, and computer-readable media of varying scope. In addition to the aspects and advantages of the present invention described in this summary, further aspects and advantages of the invention will become apparent by reference to the drawings and by reading the detailed description that follows.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of the hardware and operating environment in which different embodiments of the invention can be practiced.

FIG. 2 is a block diagram that provides a system level overview of the operation of embodiments of the present invention for identifying high performing vendors.

FIG. 3 is a flowchart of a method for identifying high performing vendors performed according to an embodiment of the invention.

FIG. 4 is a flowchart of a method for identifying high performing vendors performed according to an embodiment of the invention.

FIG. 5 is a flowchart of a method for determining a weighted average performance score for each of the vendors in a variety of categories, performed according to an embodiment of the invention.

FIG. 6 is a flowchart of a method for scoring of downtime, performed according to an embodiment of the invention.

FIG. 7 is a flowchart of a method for scoring vendors' equipment spare part expense performed according to an embodiment of the invention.

FIG. 8 is a flowchart of a method for scoring of service responsiveness, performed according to an embodiment of the invention.

FIG. 9 is a flowchart of a method for scoring logistics support of vendors performed according to an embodiment of the invention.

FIG. 10 is a flowchart of a method for scoring vendors based on outstanding technical support, performed according to an embodiment of the invention.

FIG. 11 is a flowchart of a method for scoring vendors' failure analysis of technical support, performed according to an embodiment of the invention.

FIG. 12 is a flowchart of a method for scoring the subject evaluation of vendors, performed according to an embodiment of the invention.

FIG. 13 is table of exemplary values used for calculation of scores.

FIG. 14 is a block diagram of an apparatus for generating vendor performance information, according to an embodiment of the invention.

FIG. 15 is a block diagram of an apparatus for scoring numerically weighted vendor performance information, according to an embodiment of the invention.

FIG. 16 is a block diagram of an apparatus for scoring numerically weighted vendor performance information that is particular to measures of vendor performance, according to an embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

In the following detailed description of preferred embodiments of the invention, reference is made to the accompanying drawings which form a part hereof, and in which is shown by way of illustration specific embodiments in which the invention is be practiced. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention, and it is to be understood that other embodiments may be utilized and that logical, mechanical, electrical and other changes may be made without departing from the scope of the present invention. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present invention is defined only by the appended claims. In the following detailed description of embodiments of the invention, reference is made to the accompanying drawings which form a part hereof, and in which is shown by way of illustration specific embodiments in which the invention may be practiced. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention, and it is to be understood that other embodiments may be utilized and that logical, mechanical, electrical and other changes may be made without departing from the scope of the present invention. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present invention is defined only by the appended claims.

The detailed description is divided into five sections. In the first section, the hardware and the operating environment in conjunction with which embodiments of the invention may be practiced are described. In the second section, a system level overview of the invention is presented. In the third section, methods for an embodiment of the invention are provided. In the fourth section, a particular object-oriented Internet-based implementation of the invention is described. Finally, in the fifth section, a conclusion of the detailed description is provided.

Hardware and Operating Environment

FIG. 1 is a block diagram of the hardware and operating environment 100 in which different embodiments of the invention can be practiced. The description of FIG. 1 provides an overview of a computer hardware and a suitable computing environment in conjunction with which some embodiments of the present invention can be implemented. Embodiments of the present invention are described in terms of a computer executing computer-executable instructions. However, some embodiments of the present invention can be implemented entirely in computer hardware in which the computer-executable instructions are implemented in read-only memory. One embodiment of the invention can also be implemented in client/server computing environments where remote devices that are linked through a communications network perform tasks. Program modules can be located in both local and remote memory storage devices in a distributed computing environment.

Computer 110 is operatively coupled to display device 112, pointing device 115, and keyboard 116. Computer 110 includes a processor 118, commercially available from Intel, Motorola, Cyrix and others, random-access memory 120 (RAM), read-only memory 122 (ROM), one or more mass storage devices 124, and a system bus 126 that operatively couples various system components, including the system memory to the processing unit 118. Mass storage devices 124 are more specifically types of nonvolatile storage media and can include a hard disk drive, a floppy disk drive, an optical disk drive, and a tape cartridge drive. The memory 120, 122, and

mass storage devices 124 are types of computer-readable media. A user enters commands and information into the computer 110 through input devices such as a pointing device 115 and a keyboard 116. Other input devices (not shown) can include a microphone, joystick, game pad, satellite dish, scanner, or the like. The processor 118 executes computer programs stored on the computer-readable media. Embodiments of the present invention are not limited to any type of computer 110. In varying embodiments, computer 110 comprises a PC-compatible computer, a MacOS-compatible computer or a UNIX-compatible computer. The construction and operation of such computers are well known within the art.

Furthermore, computer 110 can be communicatively connected to the Internet 130 via a communication device 128. Internet 130 connectivity is well known within the art. In one embodiment, a communication device 128 is a modem that responds to communication drivers to connect to the Internet via what is known in the art as a "dial-up connection." In another embodiment, a communication device 128 is an Ethernet or similar hardware (network) card connected to a local-area network (LAN) that itself is connected to the Internet via what is known in the art as a "direct connection" (e.g., T1 line, etc.).

Computer 110 can be operated using at least one operating environment to provide a graphical user interface including a user-controllable pointer. Such operating environments include operating systems such as versions of the Microsoft Windows and Apple MacOS operating systems well-known in the art. Embodiments of the present invention are not limited to any particular operating environment, however, and the construction and use of such operating environments are well known within the art. Computer 110 can have at least one web browser application program executing within at least one operating environment, to permit users of computer 110 to access intranet or Internet World Wide Web pages as addressed by Universal Resource Locator (URL) addresses. Such browser application programs include Netscape Navigator and Microsoft Internet Explorer.

Display device 112 permits the display of information, including computer,

video and other information, for viewing by a user of the computer. Embodiments of the present invention are not limited to any particular display device 112. Such display devices include cathode ray tube (CRT) displays (monitors), as well as flat panel displays such as liquid crystal displays (LCD's). Display device 112 is connected to the system bus 126. In addition to a monitor, computers typically include other peripheral input/output devices such as printers (not shown), speakers, pointing devices and a keyboard. Speakers 113 and 114 enable the audio output of signals. Speakers 113 and 114 are also connected to the system bus 126. Pointing device 115 permits the control of the screen pointer provided by the graphical user interface (GUI) of operating systems such as versions of Microsoft Windows. Embodiments of the present invention are not limited to any particular pointing device 115. Such pointing devices include mouses, touch pads, trackballs, remote controls and point sticks. Finally, keyboard 116 permits entry of textual information into computer 110, as known within the art, and embodiments of the present invention are not limited to any particular type of keyboard.

The computer 110 can operate in a networked environment using logical connections to one or more remote computers, such as remote computer 150. These logical connections are achieved by a communication device coupled to, or a part of, the computer 110. Embodiments of the present invention are not limited to a particular type of communications device. The remote computer 150 can be another computer, a server, a router, a network PC, a client, a peer device or other common network node. The logical connections depicted in FIG. 1 include a local-area network (LAN) 151 and a wide-area network (WAN) 152. Such networking environments are commonplace in offices, enterprise-wide computer networks, intranets and the Internet.

When used in a LAN-networking environment, the computer 110 and remote computer 150 are connected to the local network 151 through a network interface or adapter 153, which is one type of communications device. When used in a conventional WAN-networking environment, the computer 110 and remote computer

150 communicate with a WAN 152 through modems (not shown). The modem, which can be internal or external, is connected to the system bus 126. In a networked environment, program modules depicted relative to the computer 110, or portions thereof, can be stored in the remote memory storage device.

System Level Overview

FIG. 2 is a block diagram that provides a system level overview of the operation of embodiments of the present invention for identifying high performing vendors and/or suppliers. Embodiments of the invention are described as operating in a multi-processing, multi-threaded operating environment on a computer, such as computer 110 in FIG. 1.

System 200 includes a determiner 210 of a numerically weighted average performance score 220 for each of a plurality of vendors 230. The weighted score 220 is determined from a plurality of performance scores 240 from each of the plurality of vendors 230, and from a plurality of predetermined weights 250. There is one numerical weight 250 for each type of performance score 240. The different types of performance scores 240 include equipment performance downtime, equipment spare part expense, vendor call-back responsiveness, vendor arrival responsiveness, stockout logistics support, outstanding technical support, failure analysis of technical support, and subjective evaluation by a human equipment program coordinator. In one example of the system, the score 220 is determined from data within a specified or predetermined time period, such as 12 months.

The system also includes a ranker or sorter 260 of the vendors 230, using the weighted average performance scores 220, that selects or identifies the one or more vendors 230 having a low and/or high ranking 270, and/or a transmitter 280 of the rankings 270, to a recipient, such as one or more of the vendors 230, or the vendee. Where the recipient is a vendee, the present invention provides to vendees benchmarking information of vendors.

The system level overview of the operation of an embodiment of the invention

has been described in this section of the detailed description. A system for gathering and/or receiving performance data on one or more performance measurements from one or more vendors, evaluating the performance using numerical weighting, and providing the evaluation to the vendors or other interested parties. While the invention is not limited to any particular transmitter, sorter, ranker, or determiner, for sake of clarity a simplified transmitter, sorter, ranker, and determiner has been described.

Methods of an Embodiment of the Invention

In the previous section, a system level overview of the operation of an embodiment of the invention was described. In this section, the particular methods performed by the server and the clients of such an embodiment are described by reference to a series of flowcharts. Describing the methods by reference to a flowchart enables one skilled in the art to develop such programs, firmware, or hardware, including such instructions to carry out the methods on suitable computerized clients (the processor of the clients executing the instructions from computer-readable media). Similarly, the methods performed by the server computer programs, firmware, or hardware are also composed of computer-executable instructions. Describing the methods by reference to flowcharts enables one skilled in the art to develop programs, firmware, or hardware, including instructions to carry out the methods on a suitable computerized server (the processor of the clients executing the instructions from computer-readable media). Methods 300-1200 are performed by a program executing on, or performed by firmware or hardware that is a part of, a computer, such as computer 110 in FIG. 1.

FIG. 3 is a flowchart of a method 300 for identifying high performing vendors performed according to an embodiment of the invention.

Method 300 includes determining a numerically weighted average performance score for each of a plurality of vendors 310. The determining 310 is performed by the score determiner 210 in FIG. 2. The score is determined from a

plurality of performance scores from each of the plurality of vendors, and from a plurality of predetermined weights. The weights are depicted as block 250 in FIG. 2. Weights are also known as weightages. The number of items in the performance scores of each vendor is equal to the number of items of the predetermined weights. There is a one-to-one association between the weights and each performance score. Each weight is identified with one particular performance score. In one embodiment, the score is determined from data within a specified or predetermined time period, such as one year.

The method also includes ranking the vendors from, based on, or in reference to, the weighted average performance scores 320, identifying the vendors having low and/or high rankings, and electronically transmitting the ranking of the vendors to a recipient. The ranking 320 is performed by the score sorter 260 in FIG. 2.

FIG. 4 is a flowchart of a method 400 for identifying high performing vendors performed according to an embodiment of the invention.

Method 400 includes receiving the plurality of weighted average performance scores from a database manager 410 before the performance of step 310. The method 400 also includes receiving the plurality of predetermined weights used in step 310 either from the database manager, or from another source 420, before the performance of step 310. In another embodiment, method 400 includes rewarding a vendor or vendors for a high ranking 430 determined in step 320 in FIG. 3. In one embodiment, a reward is a trophy. As a result, the present invention provides a feedback mechanism to equipment vendors on their overall performance, and on specific aspects of their performance, in order to drive continuous improvement in the performance of the vendor.

FIG. 5 is a flowchart of a method 500 for determining a weighted average performance score for each of the vendors in a variety of categories 310 of FIG. 3, performed according to an embodiment of the invention.

In another embodiment of the method 500, the determining 310 also includes determining a performance score describing an equipment performance downtime of

all of the vendors 510 and determining a performance score describing an equipment spare part expense of all of the vendors 520. The method 500 also includes determining a performance score describing a service responsiveness of all of the vendors 530, determining a performance score describing a logistics support of all of the vendors 540, determining a performance score describing an outstanding technical support of all of the vendors 550, determining a performance score describing a failure analysis of technical support of all of the vendors 560. An additional embodiment of method 500 also includes determining a performance score based on a subjective evaluation by a human equipment program coordinator of all of the vendors 570. In varying embodiments, the steps of method 500 are performed in any sequential order, or in parallel, or any combination thereof.

FIG. 6 is a flowchart of a method 600 for scoring of downtime, as in step 510 in FIG. 5, performed according to an embodiment of the invention.

Method 600 includes retrieving equipment performance downtime data of each and all of the vendors. The downtime is associated with a particular time period 610, such as one year. The method also includes calculating the average equipment performance downtime of all of the vendors, in which the average is calculated from the equipment performance downtime that is associated with the particular time period 620. Method 600 also includes calculating the equipment performance downtime score of all of the vendors, in which the score is calculated from the average equipment performance downtime and an instance of the predetermined weights associated with equipment performance downtime 630. In one variation of method 600, the equipment performance downtime data is received from an associated vendor before the retrieving 610.

FIG. 7 is a flowchart of a method 700 for scoring vendors' equipment spare part expense, as in step 520 in FIG. 5, performed according to an embodiment of the invention.

One embodiment of method 700 includes retrieving equipment spare part expense associated with a predetermined time period of all of the vendors 710,

followed by calculating the average equipment spare part expense of all of the vendors, in which the average is calculated from the equipment spare part expense associated with a predetermined time period of all of the vendors 720. Followed by calculating the performance score describing an equipment spare part expense of all of the vendors, from the average equipment spare part expense and an instance of the plurality of predetermined weights associated with equipment spare part expense 730.

In one variation of method 700, the equipment spare part expense data is received from an associated vendor before the retrieving 710.

FIG. 8 is a flowchart of a method 800 for scoring of service responsiveness, as in step 530 in FIG. 5, performed according to an embodiment of the invention.

Method 800 includes retrieving service responsiveness data of all of the vendors, in which the downtime is associated with a particular time period 810. Service responsive includes, in varying embodiments, any combination of callback time after a service alert to the vendor, and/or arrival time after a service alert to the vendor. In one variation of method 800, the service responsiveness data is received from an associated vendor before the retrieving 810.

The retrieving 810 is followed by calculating the service responsiveness score of all of the vendors, in which the score is calculated from the average service responsiveness and an instance of the predetermined weights associated with service responsiveness 830. Lastly, method 800 includes calculating the average service responsiveness of all of the vendors, in which the average is calculated from the service responsiveness that is associated with the particular time period 820.

FIG. 9 is a flowchart of a method 900 of scoring logistics support of vendors performed according to an embodiment of the invention.

Method 900 starts with retrieving logistics support data, associated with a specified time period, of the vendors 910, then calculating the average logistics support data of all of the vendors, in which the calculation is based on the logistics support associated with the specified time period for all of the vendors 920, then calculating the performance score of logistics support of all of the vendors 930. The

score is calculated from the average logistics support, and from one of the predetermined weights associated with logistics support. In one variation of method 900, the logistics support is received from an associated vendor before the retrieving 910.

FIG. 10 is a flowchart of a method 1000 for scoring vendors based on outstanding technical support 550, performed according to an embodiment of the invention. Outstanding technical support is technical support that has not been completed.

Method 1000 includes retrieving outstanding technical support data of all of the vendors, in which the outstanding support is associated with a particular time period 1010. In one embodiment of method 1000, the outstanding technical support data is received from an associated vendor before the retrieving 1010.

Method 1000 also includes calculating the average outstanding technical support of all of the vendors, in which the average is calculated from the outstanding technical support that is associated with the particular time period 1020, and/or includes calculating the outstanding technical support score of all of the vendors. The score is calculated from the average outstanding technical support data and an instance of the predetermined weights associated with outstanding technical support 1030.

FIG. 11 is a flowchart of a method 1100 for scoring vendors' failure analysis of technical support 560 in FIG. 5, performed according to an embodiment of the invention.

The method includes retrieving failure analysis of technical support data associated with a predetermined time period of all of the vendors 1110, thereafter calculating the average failure analysis of technical support of all of the vendors, from the failure analysis of technical support associated with a predetermined time period of all of the vendors 1120. Lastly, method 1110 includes calculating the performance score of a failure analysis of technical support of all of the vendors, from the average

failure analysis of technical support and an instance of the plurality of predetermined weights associated with failure analysis of technical support 1130.

In one embodiment of method 1100, the failure analysis of technical support data is received from an associated vendor before the retrieving 1110.

FIG. 12 is a flowchart of a method 1200 for scoring the subject evaluation of vendors, as in step 570 in FIG. 5, performed according to an embodiment of the invention.

Scoring the subject evaluation of vendors includes, in one alternative, retrieving subjective evaluations of all of the vendors by a human equipment program coordinator that are associated with a predetermined time period 1210. In one variation of method 1200, the subjective evaluation data is received from an associated vendor before the retrieving 1210.

The method also includes calculating the average subjective evaluation by a human equipment program coordinator of all of the vendors 1220. The average is calculated from the subjective evaluation by a human equipment program coordinator associated with a predetermined time period, for all of the vendors, followed by calculating the performance score describing a subjective evaluation by a human equipment program coordinator of all of the vendors 1230. The score is calculated based on the average subjective evaluation by a human equipment program coordinator, and an instance of the plurality of predetermined weights associated with a subjective evaluation by a human equipment program coordinator.

FIG. 13 is table 1300 of exemplary values used for calculation of scores. The values used for calculation of equipment performance downtime scores is in the column labeled 1310.

In one example of score calculation 630 in FIG. 600, a score or rating (block 1301) of 0 (block 1302) is calculated or assigned to a vendor for an average equipment performance downtime (block 1320) that is calculated in step 620 of more than 250 minutes (block 1330). Continuing the example, a score of 1 (block 1303) is calculated or assigned for an average equipment performance downtime of no less

than 201 minutes and no more than 250 minutes (block 1340).

The values used for calculation of equipment spare part expense scores is in the column labeled 1311. In one example of score calculation 730 in FIG. 700, a score or rating (block 1301) of 0 (block 1302) is calculated or assigned to a vendor for an average equipment spare part expense (block 1321) that is calculated in step 720 of more than 500 dollars (block 1331). Continuing the example, a score of 1 (block 1303) is calculated or assigned for an average equipment spare part expense of no less than 401 dollars and no more than 500 dollars (block 1341).

The values used for calculation of return calls service responsiveness scores is in the column labeled 1312. In one example of score calculation 830 in FIG. 800, a score or rating (block 1301) of 0 (block 1302) is calculated or assigned to a vendor for an average service responsiveness (block 1322) that is calculated in step 820 of more than .040 non-conformance penalty points (block 1332). The non-conformance penalty is described below in this section. Continuing the example, a score of 1 (block 1303) is calculated or assigned for an average service responsiveness of no less than .031 non-conformance penalty points and no more than .040 non-conformance penalty points (block 1342).

The calculation of the score for arrival time after placing a service call with the vendor (block 1313) is similar to the calculation of return call service responsiveness scores in column 1312.

The values used for calculation of scores for stockout logistics support, outstanding technical support, failure analysis of technical support that correspond to FIGS. 9, 10 and 11, are in columns labeled 1314, 1315, and 1316, respectively. The calculations use the table 1300 as in the calculation of equipment spare part expense scores in column 1312.

The values used for calculation of scores generated by subjective evaluations of all of the vendors by a human equipment program coordinator is in the column labeled 1317. In one example of score calculation 1230 in FIG. 1200, a score or rating (block 1301) of 0 (block 1302) is calculated or assigned to a vendor for an

average subjective evaluation of all of the vendors by a human equipment program coordinator (block 1327) that is calculated in step 1220 of more than 250 non-conformance penalty points (block 1337). Continuing the example, a score of 1 (block 1303) is calculated or assigned for an average subjective evaluations of all of the vendors by a human equipment program coordinator of no less than 201 non-conformance penalty points and no more than 250 non-conformance penalty points (block 1347).

The non-conformance penalty (NCP) is used in the calculation of scores for measures of vendor performance. Measures of vendor performance include vendor call-back responsiveness in method 800, vendor arrival responsiveness, stockout logistics support in method 900, outstanding technical support in method 1000, and failure analysis of technical support in method 1100.

NCP is calculated by dividing a count of all non-conforming events associated with the measure of vendor performance, by a measure of the time period. An example of a measure of a time period is 12, where the time period is 12 months. The count of all non-conforming events is the number of occurrences of performance that does not meet a specified extent or level. For example, with regard to vendor call-back responsiveness, a non-conforming event occurs when a vendor does not return a call to customer support within a specified time period.

Production Equipment Implementation

Referring to FIGS. 14-16, the invention is described in conjunction with the methods shown in FIGS. 3-12.

FIG. 14 is a block diagram of an apparatus 1400 for generating vendor performance information, according to an embodiment of the invention.

Apparatus 1400 includes a determiner 1410 of a weighted average performance score 1420 for each of a plurality of vendors 1430. The weighted score 1420 is determined from a plurality of performance scores 1440 from each of the

plurality of vendors 1430, and from a plurality of predetermined weights 1450. There is one weight 1450 for each type of performance score 1440. The different types of performance scores 1440 include equipment performance downtime, equipment spare part expense, vendor call-back responsiveness, vendor arrival responsiveness, stockout logistics support, outstanding technical support, failure analysis of technical support, and subjective evaluation by a human equipment program coordinator. In one example of the apparatus, the score 1420 is determined from data within a specified or predetermined time period, such as 12 months. The determiner 1410 corresponds to the score determiner 210 in FIG. 2, and implements the action of step 310 in FIG. 3.

The apparatus also includes a ranker or sorter 1460 of the vendors 1430, using the weighted average performance scores 1420, that selects or identifies the one or more vendors 1430 having a low and/or high ranking 1470, and/or a transmitter 1480 of the rankings 1470, to a recipient, such as one or more of the vendors 1430.

In another aspect of the present invention, a computerized apparatus for identifying high performing vendors 1400 includes a determiner 1410 of a plurality of weighted average performance scores 1420 of a plurality of vendors 1430, from a plurality of performance scores 1440 of the plurality of vendors 1430 and from a representation of the relative value of the performance scores 1450, such as a predetermined weight to a vendee. The apparatus 1400 also includes a sorter 1460 of the plurality of weighted average performance scores 1420 that yields a rank 1470 for each vendor of the plurality of vendors 1430. Each of the plurality of performance scores 1440 is uniquely associated with one of the predetermined weights 1450. In one alternative, the representation 1450 of the relative value of the performance scores 1440 to a vendee is a number of predetermined weights of the performance scores 1440. Each of the performance scores 1440 is uniquely associated with one of the predetermined weights 1450.

In another alternative, the computerized apparatus 1400 also includes a plurality of scorers 1490. Each of the scorers 1490 are operably coupled to the

determiner, providing to the determiner the plurality of performance scores of the plurality of vendors. The scorers 1490 are equal in number to the types of vendor quality performance data, one scorer for each type. Varieties of performance scores are as follows:

- a performance score describing an equipment performance downtime of the vendor.
- a performance score describing an equipment spare part expense of the vendor.
- a performance score describing a service responsiveness of the vendor.
- a performance score describing a logistics support of the vendor.
- a performance score describing an outstanding technical support of the vendor.
- a performance score based on a subjective evaluation by a human equipment program coordinator of the vendor.

In another alternative, the computerized apparatus 1400 also includes a groupware application distributed database server 1493 that is operably coupled to the plurality of scorers. The groupware application distributed database server 1493 provides the vendor quality performance data to the plurality of scorers 1490 from a database 1494. The groupware application distributed database server 1493 has firewalls preventing access of vendor quality performance data by an entity that is not authorized to access the data by the vendor 1430. The computerized apparatus 1400 also includes a receiver 1495 of the vendor quality performance data. The receiver 1495 provides the vendor quality performance data to the groupware application distributed database server 1493.

A groupware application distributed database server supports a distributed database of documents that could be accessed by users across an intranet using a local area network or using a wide-area network using the Internet. Replication features enable users to work with local copies of documents and have their modifications propagated throughout an entire network. Lotus Notes™ is one example of a groupware application distributed database server.

In another alternative, the computerized apparatus 1400 also includes an

Internet interface 1497. The Internet interface 1497 is operably coupled to the groupware application distributed database server 1493 and is also operably coupled between the transmitter 1480 and the vendors 1430. The interface 1497 receives vendor quality performance data from at least one vendor 1430 through the Internet and the vendee (not shown) through an intranet (not shown). The interface 1497 transmits the rank of at least one vendor to the vendor through the Internet, and transmits the rank for the at least one vendor to the vendee through the intranet.

FIG. 15 is a block diagram of an apparatus 1500 for scoring numerically weighted vendor performance information, according to an embodiment of the invention.

In one aspect of the present invention, each of the scorers 1460 includes a retriever 1510, a calculator of the average measure of vendor performance 1520, and a calculator of the performance score 1530. The retriever 1510 retrieves the vendor quality performance data from a store, such as the groupware application distributed database server 1493 in FIG 14. Retriever 1510 implements the method of the retrieving steps 610, 710, 810, 910, 1010, 1110 and 1210 in FIGS. 6, 7, 8, 9, 10, 11, and 12, respectively. The vendor quality performance data is associated with a predetermined time period, such as 12 months, of each of the plurality of vendors 1430 in Fig. 14. The calculator 1520 of the average measure of vendor performance of each of the plurality of vendors uses a measure of vendor performance associated with the predetermined time period, of each of the plurality of vendors 1430. Calculator 1520 implements the method of the calculating steps 620, 720, 820, 920, 1020, 1120 and 1220 in FIGS. 6, 7, 8, 9, 10, 11, and 12, respectively. The calculator 1530 of the performance score calculates from the average measure of vendor performance and an instance of the plurality of predetermined weights associated with measure of vendor performance. The performance score describes a measure of vendor performance of each of the plurality of vendors. Calculator 1530 implements the method of the calculating steps 630, 730, 830, 930, 1030, 1130 and 1230 in FIGs.

6, 7, 8, 9, 10, 11, and 12, respectively.

FIG. 16 is a block diagram of an apparatus 1600 for scoring numerically weighted vendor performance information that is particular to measures of vendor performance, according to an embodiment of the invention.

In another aspect of the scorers 1460, the scorers 1460 include:

- A scorer of equipment performance downtime of each of the vendors 1610.
- A scorer of equipment spare part expense of each of the vendors 1620.
- A scorer of service responsiveness of each of the vendors 1630.
- A scorer of logistics support of each of the vendors 1640.
- A scorer of outstanding technical support of each of the vendors 1650.
- A scorer of failure analysis of technical support of each of the vendors 1660.
- A scorer of subjective evaluation by a human equipment program coordinator of each of the vendors 1670.

Apparatus 1400, 1500 and 1600 components can be embodied as computer hardware circuitry or as a computer-readable program, or a combination of both. In another embodiment, apparatus 1400 is implemented in an application service provider (ASP) system.

More specifically, in the computer-readable program embodiment, the programs can be structured in an object-orientation using an object-oriented language such as Java, Smalltalk or C++, and the programs can be structured in a procedural orientation using a procedural language such as COBOL or C. The software components communicate in any of a number of means that are well-known to those skilled in the art, such as application program interfaces (A.P.I.) or interprocess communication techniques such as remote procedure call (R.P.C.), common object request broker architecture (CORBA), Component Object Model (COM), Distributed Component Object Model (DCOM), Distributed System Object Model (DSOM) and Remote Method Invocation (RMI) . The components execute on as few as one computer as in computer 110 in FIG. 1, or on at least as many computers as there are components.

Conclusion

In conclusion, a computerized method for identifying high performing vendors is disclosed. The method includes determining a weighted average performance score for each of a plurality of vendors 310. The score is determined from a plurality of performance scores from each of the plurality of vendors, and the score is determined from a plurality of predetermined weights. Weights are also known as weightages. The count or quantity of items or instances of the performance scores of each vendor is equal to the number of items of the predetermined weights. There is a one-to-one association between the weights and each performance score. Each weight is identified with one particular performance score.

The method also includes ranking the vendors from, based on, or in reference to, the weighted average performance scores 320.

In one aspect of the method, the plurality of weighted average performance scores is received from a database manager 410. The method also includes receiving the plurality of predetermined weights either from the database manager, or from another source 420.

In another aspect of the method, the determining 310 includes determining a performance score describing a measure of vendor performance of each of the plurality of vendors 500. A further aspect of the determining further includes retrieving the measure of vendor performance associated with a predetermined time period of each of the plurality of vendors, 610, 710, 810, 910, 1010, 1110 and 1210, calculating the average measure of vendor performance of each of the plurality of vendors, from the measure of vendor performance associated with a predetermined time period of each of the plurality of vendors 620, 720, 820, 920, 1020, 1120 and 1220, and calculating the performance score describing a measure of vendor performance of each of the plurality of vendors, 630, 730, 830, 930, 1030, 1130 and 1230. The performance score is calculated from the average measure of vendor

performance and an instance of the plurality of predetermined weights associated with measure of vendor performance. In one aspect of the measure of vendor performance, the measure includes and/or is selected from the group consisting of equipment performance downtime, equipment spare part expense, vendor call-back responsiveness, vendor arrival responsiveness, stockout logistics support, outstanding technical support, and failure analysis of technical support.

In another aspect of the method, the determining 310 also includes determining a performance score describing an equipment performance downtime of all of the vendors 510, determining a performance score describing an equipment spare part expense of all of the vendors 520, determining a performance score describing a service responsiveness of all of the vendors 530, determining a performance score describing a logistics support of all of the vendors 540, determining a performance score describing an outstanding technical support of all of the vendors 550, determining a performance score describing a failure analysis of technical support of all of the vendors 560. An additional aspect of the determining 310 also includes determining a performance score based on a subjective evaluation by a human equipment program coordinator of all of the vendors 570. In varying aspects, the steps of determining 310 are performed in any sequential order, or in parallel, or any combination thereof.

The scoring of downtime 510 includes retrieving equipment performance downtime of all of the vendors, in which the downtime is associated with a particular time period 610, calculating the average equipment performance downtime of all of the vendors, in which the average is calculated from the equipment performance downtime that is associated with the particular time period 620, and/or calculating the equipment performance downtime score of all of the vendors, in which the score is calculated from the average equipment performance downtime and an instance of the predetermined weights associated with equipment performance downtime 630.

One aspect of scoring vendors' equipment spare part expense 520 includes retrieving equipment spare part expense associated with a predetermined time period

of all of the vendors 710, followed by calculating the average equipment spare part expense of all of the vendors, from the equipment spare part expense associated with a predetermined time period of all of the vendors 720, and again followed by calculating the performance score describing an equipment spare part expense of all of the vendors, from the average equipment spare part expense and an instance of the plurality of predetermined weights associated with equipment spare part expense 730.

The scoring of service responsiveness 530 includes retrieving service responsiveness of all of the vendors, in which the downtime is associated with a particular time period 810, calculating the service responsiveness score of all of the vendors, in which the score is calculated from the average service responsiveness and an instance of the predetermined weights associated with service responsiveness 830, and/or calculating the average service responsiveness of all of the vendors, in which the average is calculated from the service responsiveness that is associated with the particular time period 820.

One aspect of scoring logistics support of vendors 540 starts by retrieving logistics support, associated with a specified time period, of the vendors 910, then calculating the average logistics support of all of the vendors, in which the calculation is based on the logistics support associated with the specified time period, for all of the vendors 920, and later calculating the performance score describing logistics support of all of the vendors 930. The score is calculated from the average logistics support, and from one of the predetermined weights associated with logistics support.

The scoring of vendors' outstanding technical support 550 also includes retrieving outstanding technical support of all of the vendors, in which the outstanding support is associated with a particular time period 1010, calculating the average outstanding technical support of all of the vendors, in which the average is calculated from the outstanding technical support that is associated with the particular time period 1020, and/or calculating the outstanding technical support score of all of the vendors, in which the score is calculated from the average outstanding technical support and an instance of the predetermined weights associated with outstanding

technical support 1030.

One alternative of scoring vendors' failure analysis of technical support 560 includes retrieving failure analysis of technical support associated with a predetermined time period of all of the vendors 1110, calculating the average failure analysis of technical support of all of the vendors, from the failure analysis of technical support associated with a predetermined time period of all of the vendors 1120, and/or calculating the performance score describing a failure analysis of technical support of all of the vendors, from the average failure analysis of technical support and an instance of the plurality of predetermined weights associated with failure analysis of technical support 1130.

Scoring the subject evaluation of vendors includes in one alternative retrieving subjective evaluations of all of the vendors by a human equipment program coordinator that are associated with a predetermined time period 1210, followed by calculating the average subjective evaluation by a human equipment program coordinator of all of the vendors, from the subjective evaluation by a human equipment program coordinator associated with a predetermined time period of all of the vendors 1220, and again followed by calculating the performance score describing a subjective evaluation by a human equipment program coordinator of all of the vendors, from the average subjective evaluation by a human equipment program coordinator and an instance of the plurality of predetermined weights associated with a subjective evaluation by a human equipment program coordinator 1230.

In another aspect of the present invention, a computerized apparatus for identifying high performing vendors 1400 includes a determiner 1410 of a plurality of weighted average performance scores 1420 of a plurality of vendors 1430, from a plurality of performance scores 1440 of the plurality of vendors 1430 and from a representation of the relative value of the performance scores 1450, such as a predetermined weight to a vendee. The apparatus 1400 also includes a sorter 1460 of the plurality of weighted average performance scores 1420 that yields a rank 1470 for each vendor of the plurality of vendors 1430. Each of the plurality of performance

scores 1440 is uniquely associated with one of the predetermined weights 1450. In one alternative, the representation 1450 of the relative value of the performance scores 1440 to a vendee is a number of predetermined weights of the performance scores 1440. Each of the performance scores 1440 is uniquely associated with one of the predetermined weights 1450.

In another alternative, the computerized apparatus 1400 also includes a plurality of scorers 1490. Each of the scorers 1490 are operably coupled to the determiner, providing to the determiner the plurality of performance scores of the plurality of vendors. The scorers 1490 are equal in number to the types of vendor quality performance data, one scorer for each type. Varieties of performance scores are as follows:

- a performance score describing an equipment performance downtime of the vendor.
- a performance score describing an equipment spare part expense of the vendor.
- a performance score describing a service responsiveness of the vendor.
- a performance score describing a logistics support of the vendor.
- a performance score describing an outstanding technical support of the vendor.
- a performance score based on a subjective evaluation by a human equipment program coordinator of the vendor.

In another alternative, the computerized apparatus 1400 also includes a groupware application distributed database server 1493 that is operably coupled to the plurality of scorers. The groupware application distributed database server 1493 provides the vendor quality performance data to the plurality of scorers 1490. The groupware application distributed database server 1493 has firewalls preventing access of vendor quality performance data by an entity that is not authorized to access the data by the vendor 1430. The computerized apparatus 1400 also includes a receiver 1495 of the vendor quality performance data. The receiver 1495 provides the vendor quality performance data to the groupware application distributed database server 1493.

In another alternative, the computerized apparatus 1400 also includes an Internet interface 1497. The Internet interface 1497 is operably coupled to the groupware application distributed database server 1493 and is also operably coupled between the transmitter 1480 and the vendors 1430. The interface 1497 receives vendor quality performance data from at least one vendor 1430 through the Internet, and the vendee (not shown) through an intranet (not shown). The interface 1497 transmits the rank for at least one vendor to the vendor through the Internet, and transmits the rank for at least one vendor to the vendee through the intranet.

In one aspect of the present invention, each of the scorers 1460 includes a retriever 1510, a calculator of the average measure of vendor performance 1520, and a calculator of the performance score 1530. The retriever 1510 retrieves the vendor quality performance data from a store, such as the groupware application distributed database server 1493 in FIG 14. The vendor quality performance data is associated with a predetermined time period, such as 12 months, of each of the plurality of vendors 1430. The calculator 1520 of the average measure of vendor performance of each of the plurality of vendors uses a measure of vendor performance associated with the predetermined time period of each of the plurality of vendors 1430. The calculator 1530 of the performance score calculates from the average measure of vendor performance and an instance of the plurality of predetermined weights associated with measure of vendor performance. The performance score describes a measure of vendor performance of each of the plurality of vendors.

In another aspect of the scorers 1460 in FIG. 14, the scorers 1460 include:

- A scorer of equipment performance downtime of each of the vendors 1610.
- A scorer of equipment spare part expense of each of the vendors 1620.
- A scorer of service responsiveness of each of the vendors 1630.
- A scorer of logistics support of each of the vendors 1640.
- A scorer of outstanding technical support of each of the vendors 1650.
- A scorer of failure analysis of technical support of each of the vendors 1660.
- A scorer of subjective evaluation by a human equipment program coordinator of each of the vendors 1670.

Systems and methods are provided through which performance measurement data of one or more criteria is gathered and/or received from one or more vendors, the performance is evaluated using numerical weighting, and the evaluation is provided to the vendors or other interested parties. As an incentive to the vendor, the vendee may optionally provide a reward for higher performance, or a penalty for inferior performance. Each vendor is ranked in terms of overall performance, and also within specific areas. The ranking is used to drive vendors in continuous service improvements by providing a common basis for comparison of service between vendors, which spurs the vendors to compete amongst themselves to improve service.

It is to be understood that the above description is intended to be illustrative, and not restrictive. Many other embodiments will be apparent to those of skill in the art upon reviewing the above description. The scope of the invention should, therefore, be determined with reference to the appended claims, along with the full scope of equivalents to which such claims are entitled.

CLAIMS

We claim:

1. A computerized method for identifying high performing vendors comprising steps of:

(a) determining a plurality of weighted average performance scores of a plurality of vendors, from a plurality of performance scores of the plurality of vendors, and from a plurality of representations of the relative value of the performance scores to a vendee,

wherein the plurality of weighted average performance scores having a number of items,

wherein the plurality of performance scores of the plurality of vendors having a number of items,

wherein the number of items in the plurality of weighted average performance scores is equal to the number of items in the plurality of predetermined weights; and.

(b) ranking vendors from the plurality of weighted average performance scores, yielding a rank for each vendor of the plurality of vendors;

2. The computerized method of claim 1, the representation of the relative value of the performance scores to a vendee further comprises a plurality of predetermined weights of the performance scores;

wherein each of the plurality of performance scores is uniquely associated with one of the predetermined weights.

3. The computerized method of claim 2, further comprising steps of:

(c) receiving the plurality of weighted average performance scores; and

(d) receiving the plurality of predetermined weights.

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4. The computerized method of claim 2, further comprising a step of:

(c) rewarding at least one vendor in reference to the rank of each vendor.

5. The computerized method of claim 1, wherein the determining step (a) further comprises a step of:

(a)(i) determining a performance score describing a measure of vendor performance of each of the plurality of vendors.

6. The computerized method of claim 4, wherein the determining step (a)(i) further comprises steps of:

(a)(i)(1) retrieving the measure of vendor performance associated with a predetermined time period of each of the plurality of vendors;

(a)(i)(2) calculating the average measure of vendor performance of each of the plurality of vendors, from the measure of vendor performance associated with a predetermined time period of each of the plurality of vendors; and

(a)(i)(3) calculating the performance score describing a measure of vendor performance of each of the plurality of vendors, from the average measure of vendor performance and an instance of the plurality of predetermined weights associated with measure of vendor performance.

7. The computerized method of claim 4, wherein the measure of vendor performance is selected from the group consisting of: equipment performance downtime, equipment spare part expense, vendor call-back responsiveness, vendor arrival responsiveness, stockout logistics support, outstanding technical support, and failure analysis of technical support.

8. The computerized method of claim 2, wherein the determining step (a) further

comprises steps of:

(a)(i) determining a performance score describing an equipment performance downtime of each of the plurality of vendors;

(a)(ii) determining a performance score describing an equipment spare part expense of each of the plurality of vendors;

(a)(iii) determining a performance score describing a service responsiveness of each of the plurality of vendors;

(a)(iv) determining a performance score describing a logistics support of each of the plurality of vendors;

(a)(v) determining a performance score describing an outstanding technical support of each of the plurality of vendors; and

(a)(vi) determining a performance score describing a failure analysis of technical support of each of the plurality of vendors.

9. The computerized method of claim 8, wherein the determining step (a)(ii) further comprises steps of:

(a)(ii)(1) retrieving equipment performance downtime associated with a predetermined time period of each of the plurality of vendors;

(a)(ii)(2) calculating the average equipment performance downtime of each of the plurality of vendors, from the equipment performance downtime associated with a predetermined time period of each of the plurality of vendors; and

(a)(ii)(3) calculating the performance score describing an equipment performance downtime of each of the plurality of vendors, from the average equipment performance downtime and an instance of the plurality of predetermined weights associated with equipment performance downtime.

10. The computerized method of claim 8, wherein the determining step (a) further

comprises a step of:

(a)(vii) determining a performance score based on a subjective evaluation by a human equipment program coordinator of each of the plurality of vendors.

11. The computerized method of claim 9, wherein the determining step (a)(vii) further comprises steps of:

(a)(vi)(1) retrieving a subjective evaluation by a human equipment program coordinator associated with a predetermined time period of each of the plurality of vendors;

(a)(vi)(2) calculating the average subjective evaluation by a human equipment program coordinator of each of the plurality of vendors, from the subjective evaluation by a human equipment program coordinator associated with a predetermined time period of each of the plurality of vendors; and

(a)(vi)(3) calculating the performance score based on a subjective evaluation by a human equipment program coordinator of each of the plurality of vendors, from the average subjective evaluation by a human equipment program coordinator and an instance of the plurality of predetermined weights associated with a subjective evaluation by a human equipment program coordinator.

12. A computerized apparatus for generating vendor performance information comprising:

a determiner of a plurality of weighted average performance scores of a plurality of vendors, from a plurality of performance scores of the plurality of vendors, and from a representation of the relative value of the performance scores to a vendee; and

a sorter of vendors, wherein sorting is in reference to the plurality of weighted

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average performance scores, yielding a rank for each vendor of the plurality of vendors, the sorter operably coupled to the determiner.

13. The computerized apparatus of claim 12, further comprising a plurality of scorers of an equal number of a plurality of vendor quality performance data of each of the plurality of vendors, wherein each of the scorers are operably coupled to the determiner, providing to the determiner the plurality of performance scores of the plurality of vendors.

14. The computerized apparatus of claim 13, further comprising:

a groupware application distributed database server

operably coupled to the plurality of scorers, providing the vendor quality performance data to the plurality of scorers, and

having firewalls preventing access of vendor quality performance data by an entity that is not the vendor; and

a receiver of the vendor quality performance data, providing the vendor quality performance data to the groupware application distributed database server.

15. The computerized apparatus of claim 14, further comprising an Internet interface, operably coupled to the groupware application distributed database server and operably coupled to the ranker wherein the interface receives vendor quality performance data from at least one vendor through the Internet and the vendee through an intranet, and transmits the rank for at least one vendor to the vendor through the Internet, and transmits the rank for at least one vendor to the vendee through the intranet.

16. The computerized apparatus of claim 13, each of the plurality of scorers

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further comprising:

a retriever of the vendor quality performance data associated with a predetermined time period of each of the plurality of vendors;

a calculator of the average measure of vendor performance of each of the plurality of vendors, from the measure of vendor performance associated with the predetermined time period, of each of the plurality of vendors; and

a calculator of the performance score describing a measure of vendor performance of each of the plurality of vendors, from the average measure of vendor performance and an instance of the plurality of predetermined weights associated with measure of vendor performance.

17. The computerized apparatus of claim 13, the plurality of scorers further comprising:

a scorer of equipment performance downtime of each of the plurality of vendors;

a scorer of equipment spare part expense of each of the plurality of vendors;

a scorer of service responsiveness of each of the plurality of vendors;

a scorer of logistics support of each of the plurality of vendors;

a scorer of outstanding technical support of each of the plurality of vendors;

a scorer of failure analysis of technical support of each of the plurality of vendors; and

a scorer of subjective evaluation by a human equipment program coordinator of each of the plurality of vendors.

18. A computerized method of claim 11, wherein the plurality of performance scores further comprises:

a performance score describing an equipment performance downtime of the

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vendor;

a performance score describing an equipment spare part expense of the vendor;

a performance score describing a service responsiveness of the vendor;

a performance score describing a logistics support of the vendor;

a performance score describing an outstanding technical support of the vendor; and

a performance score based on a subjective evaluation by a human equipment program coordinator of the vendor.

19. A computerized method of claim 18, wherein the plurality of performance scores further comprises a performance score describing a subjective evaluation by a human equipment program coordinator of the vendor.

20. An information handling system comprising:

a groupware application distributed database server operably coupled to the Internet, receiving and storing the vendor quality performance data to the plurality of scorers; and

means for determining a plurality of weighted average performance scores of a plurality of vendors, in reference to the vendor quality performance data stored in the groupware application distributed database server, and in reference to a plurality of predetermined weight