COMPUTER-IMPLEMENTED GROCERY REPLENISHMENT SYSTEM AND METHOD

TECHNICAL FIELD

[0001] The present invention relates to grocery shopping and more particularly, to grocery replenishment system and method based on RFID and IoT.

BACKGROUND

[0002] Online grocery shopping and selling is a repetitive, time consuming task on part of both the consumer and the grocer as it involves browsing through an exhaustive list of grocery items, selecting them, ordering them upon which, the grocer reactively needs to gather the large number of items, pack them, and have them delivered within a reasonable time window. Although, the Internet has eased the process by a great margin, it still takes relatively long time because of the sheer volume of the items involved. Technologies like RFID and IoT may hold the key to further ease up the process resulting in saving a great deal of time for all the parties involved.

SUMMARY

[0003] An embodiment of the present invention is a grocery stock replenishment system for automatically compiling a grocery purchase list, ordering the groceries corresponding to the purchase list and arranging for the delivery thereof. The grocery replenishment system comprises a consumer database, which is listed with a plurality of

consumer entries wherein, each consumer entry is representative of a consumer that has “subscribed” thereto. Each consumer entry is associated with an editable grocery master list comprising a plurality of grocery items. Each grocery item therein is in turn associated with the quantity thereof that is already in consumer stock, the price thereof, the number of days until the expiry thereof (if applicable) and the rate of consumption thereof. The master list is configured to be automatically updated in accordance with the consumer consumption of the groceries along with other factors.

[0004] The system further comprises a “smart-bin” comprising an RFID reader built into it. The RFID-fitted smart-bin is particularly for receiving discarded grocery item packaging, which includes an RFID tag. The RFID tag stores the corresponding grocery item details including what the grocery item is, the price thereof, the expiry date thereof (if applicable) and the quantity thereof. The RFID reader is adapted to track the packaging of the grocery items that are discarded thereinto. The system further comprises an RFID module that interfaces between the RFID reader and the consumer database. The data tracked by the RFID reader is captured by the RFID module and accordingly updates the master list within the consumer database.

[0005] The system further comprises a compilation module for populating a grocery purchase list, which comprises a list of groceries that have been expensed and going to be expensed by the consumer. A plurality of factors account for populating a purchase list including discarded packaging, the expiry dates, the rate of consumption and a combination thereof. The system is configured such that, the purchase list is populated based on expiry dates, volume of populated content and delivery schedules.

[0006] The purchase list of the consumer is, as enabled by a grocer UI, directly accessible by the one or more grocers whereby, the one or more grocers are enabled to view, “lock” and pack the groceries from the purchase list at their own discretion. Depending on the delivery schedules to other consumers, the one or more grocers may ship the order to the consumer in way to optimize the delivery volume and thereby the cost. However, at times, it may be incumbent upon the one or more grocers to “honor” the demand for groceries within the purchase list based on the approaching expiry date and forecasted shortage, which is due to the rate of consumption and the shortage of consumer stock. This is so that, ultimately, the end consumer may never experience lack of consumer stock, which is the whole point of the present invention.

[0007] The system further comprises a delivery module for assigning a delivery person to deliver a shipment of groceries to one or more consumers. In the event of there being more than one consumer, the delivery module is configured to treat the location of a grocer as a nodal point and thereafter “chooses” the consumers based on the congruity of delivery routes from the grocer to the consumers. Further, the delivery module is configured to choose the number of delivery personnel based on the number of assembled orders wherein, as the congruence of delivery routes is a given at this point, an assembled order is assembled based on, as mentioned earlier, the weight and volume thereof. Once the groceries are delivered, the master list is updated accordingly.

[0008] Other features and advantages will become apparent from the following description of the preferred embodiments, taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF FIGURES

[0009] FIG. 1 is an illustration of a block diagram of the grocery replenishment system;

[00010] FIG. 2 is a flowchart depicting the grocery replenishment method up until the point of populating the grocery purchase list;

[00011] FIGs. 3 to 6 are flowcharts depicting the grocery replenishment system divided into four layers; and

[00012] FIG. 7 is a block diagram of a computer system, according to an embodiment.

DETAILED DESCRIPTION

[00013] Embodiments of the present disclosure are explained in detail below with reference to the various figures. In the following description, numerous specific details are set forth to provide an understanding of the embodiments and examples. However, those of ordinary skill in the art will recognize a number of equivalent variations of the various features provided in the description. Furthermore, the embodiments and examples may be used together in various combinations.

[00014] Embodiments of the present invention are directed to a grocery stock replenishment system and method for, with minimum manual intervention, automatically

compiling a grocery purchase list, ordering the groceries corresponding to the purchase list and arranging for the delivery thereof. The present invention achieves its objective by embodying applications of Radio Frequency Identification (RFID) and Internet of Things (IoT). Although, the system and method are preferably adapted for home use, said system and method may also be adapted for commercial use such as, for restaurants, grocers, and the like. Notably, groceries, in the context of the present invention may also refer to other consumables such as, for example, chocolates, biscuits, soft drinks, etc.

[00015] Referring to FIG. 1, the grocery replenishment system comprises a consumer database, which is listed with a plurality of consumer entries wherein, each consumer entry is representative of a consumer that has “subscribed” thereto. Each consumer entry is associated with his/her login details including user ID, password and security question, his/her identity details including name, age, gender, etc., contact details including his/her postal address (for delivery), one or more phone numbers and email addresses and his/her payment details including his/her credit/debit card details, payment gateway details, and electronic wallet details. The identity and contact details are obtained by the consumer during a registration or a “sign up” process.

[00016] Referring to **FIG. 1**, each consumer entry is further associated with an editable grocery master list comprising a plurality of grocery items. Each grocery item therein is in turn associated with the quantity thereof that is already in consumer stock, the price thereof, the number of days until the expiry thereof (if applicable), the rate of consumption thereof, the maximum quantity thereof that can be within the consumer stock and the break-up of nutrients therein. The list of grocery items may initially be compiled by the consumer himself/herself or maybe collected over time, as may be apparent from the

following body of text. The login details, identity details, contact details, payment details and the master list may be, as enabled by the consumer user interface (UI), accessed by the consumer anytime via a smartphone app or a website over a radio communications network (such as the Internet) in order to modify it. The consumer UI is provided by a consumer user terminal such as a smartphone, tablet PC, etc. As will be apparent from the following body of text, the master list is configured to be automatically updated in accordance with the consumer consumption of the groceries along with other factors.

[00017] Referring to **FIG. 1**, the system further comprises a “smart-bin” comprising an RFID reader built into it. Notably, the RFID reader circuitry is fully contained within the smart-bin. In alternate embodiments, a different tracking technology may be employed in lieu of RFID. The RFID-fitted smart-bin is simply a trashcan or a dustbin but, which is particularly for receiving discarded grocery item packaging. The packaging of each grocery item includes an RFID tag, which stores item details including what the grocery item is, the price thereof, the expiry date thereof (if applicable) and the quantity thereof. The packaging may further include item weight and volume, type of material of packaging and nutrient breakdown of the contents. The RFID reader is adapted to track the packaging of the grocery items that are discarded thereinto. The system further comprises an RFID module that interfaces between the RFID reader and the consumer database. The data tracked by the RFID reader is captured by the RFID module and accordingly updates the master list within the consumer database. For example, if the master list indicates that the consumer stock has two boxes of

ziplock bags and when the RFID reader tracks one discarded box of ziplock bags within the smart-bin, the RFID module updates master list accordingly whereby, the master list now indicates that the consumer stock has only one box of ziplock bags. In an additional embodiment, the smart-bin is further fitted with one or more sensors for alerting the consumer in the event of the contents therein exceeding or about to exceed the capacity. In an additional embodiment, the smart-bin is, based on the weight of the contents therein and the RFID data, is configured to generate reports of waste breakdown by type of waste viz., plastic, paper, glass, etc. The smart-bin may be powered by a direct power outlet, a solar panel, or a combination thereof. In an additional embodiment, the smart-bin comprises a light display (preferably one ro more LEDs) to indicate the smart-bin capacity, if an order is going to be replenished (apparent from the following body of text). These values may be delivered to the consumer's smartphone app (or website) as well.

[00018] Referring to **FIG. 1**, the system further comprises a compilation module for populating a grocery purchase list. More particularly, the grocery purchase list comprises a list of groceries that have been expensed and going to be expensed by the consumer within a delivery cycle. A plurality of factors account for populating a purchase list including discarded packaging, the expiry dates, the rate of consumption and a combination thereof. Notably, groceries are divided into different categories based on their shelf life, rate of consumption, based on their packaging, item type. For example, certain grocery items are contained within the original packaging thereof until they are fully utilized. In another example, some grocery items, upon purchase, are immediately

transferred to another container and the original packaging thereof is discarded fairly immediately thereafter. Considering the earlier example, populating the purchase list with the grocery item of a box of ziplock bags is straightforward as ziplock bags do not have shelf life and ziplock boxes are generally discarded only after the all the ziplock bags therein are expensed. However, the integrity of some grocery items are bound by an expiry date and therefore, in such cases, the compilation module may proceed to populate the purchase list based on expiry date and the RFID data. For example, say there are two packets of cheese in consumer stock and the expiry of one of them is fast approaching as sourced from the master list. The system is configured such that, irrespective of RFID data, the compilation module proceeds to include a packet of cheese within purchase list.

[00019] Referring to **FIG. 1**, the system is further configured to determine, over time, the rate of consumption of a grocery item based on how often many of them are ordered within a delivery cycle, how often, within the delivery cycle, the packaging thereof is discarded. Therefore, for some grocery items, the rate of consumption may be factored in for inclusion within the purchase list. For example, for a consumer, say, wheat flour has a rate of consumption of one kilogram per month and the one kilogram of wheat flour in consumer stock has a long shelf life, the system is configured such that, the compilation module adds one kilogram of wheat flour to the purchase list irrespective of the RFID and expiry data thereof. This is because, wheat flour comes in a packaging when purchased and, usually, before usage, wheat flour is transferred to a designated container and thereafter the packaging is discarded. Further referring to the **TABLE**, which tabulates

an exemplary consumer stock wherein, the compilation module is configured to include within the purchase list a new carton of milk within the next 22-24 days when the carton of milk in stock is less than or equal to one (as determined by the master list) and the expiry date of the carton of milk in stock is less than 14 days. Similarly, the compilation module is configured to include within the purchase list a new jar of jam if the expiration of the jar of jam in consumer stock is within the next 15 days. In this example, the addition to the purchase list is triggered by the expiry date alone as, usually, the jar of jam is only discarded only after the entire consumption thereof. The system is configured such that, the purchase list is populated based on expiry dates, volume of populated content and delivery schedules.

[00020] Referring to **FIG. 1**, the purchase list of the consumer is, as enabled by a grocer UI, directly accessible by the one or more grocers (over a radio communications network such as, the Internet) whereby, the one or more grocers are enabled to view, “lock” and pack the groceries from the purchase list at their own discretion. The grocer UI is provided by a grocer user terminal such as, a smartphone, tablet PC, laptop, etc. Notably, the system is configured such that, the purchase list is accessible by the one or more grocers who are closest to consumer delivery location. The purchase list is associated with the consumer’s identity and contact details. Depending on the delivery schedules to other consumers, the one or more grocers may ship the order to the consumer in way to optimize the delivery volume and thereby the cost. However, at times, it may be incumbent upon the one or more grocers to “honor” the demand for groceries within the purchase list based on the approaching expiry date and forecasted shortage,

which is due to the rate of consumption and the shortage of consumer stock. This is so that, ultimately, the end consumer may never experience lack of consumer stock, which is the whole point of the present invention.

[00021] Referring to **FIG. 1**, in one embodiment, the system is configured to notify a grocer of the expected grocery items to be delivered a few days (say, one to three days) in advance. Once the order is packed and ready, the consumer is intimated of the scheduled delivery wherein, the payment for the shipment may be paid beforehand or once the groceries are delivered. In one embodiment, the system is configured such that, the consumer is required to authorize the delivery, preferably by way of payment for the same. In one embodiment, the consumer is enabled to manually modify the purchase list in an ad hoc manner or add a comment or two thereto, such as, for example, at what time the groceries need to be delivered, etc. In an additional embodiment, the system comprises an assembly module for automatically assembling the “in demand” groceries from one or more consumers into an optimum delivery load in terms of weight, volume and delivery routes. Notably, the purchase list is updated in real-time or by the end of the day.

[00022] Referring to **FIG. 1**, the system alternatively comprises an order module for ordering, i.e., transmitting, the populated grocery purchase list to one or more grocers. The question of when the purchase list is ordered is dependent upon the expiry dates of grocery items in consumer stock (as sourced from the master list), the volume of the order and the delivery schedule. For example, the order module may proceed to place the order with the one or more grocers in the event where the shelf life of the contents of the

purchase list is short. The order module may further order the purchase list upon the arrival of the scheduled delivery cycle. For example, the order may be placed such that, the delivery happens within the first week of month. In one embodiment, the system is configured such that, the consumer is required to authorize the order, preferably by way of payment for the same.

[00023] Referring to **FIG. 1**, the system further comprises a delivery module for assigning a delivery person to deliver a shipment of groceries to one or more consumers. In the event of there being more than one consumer, the delivery module is configured to treat the location of a grocer as a nodal point and thereafter “chooses” the consumers based on the congruity of delivery routes from the grocer to the consumers. Further, the delivery module is configured to choose the number of delivery personnel based on the number of assembled orders (defined by means of distinct delivery loads) wherein, as the congruence of delivery routes is a given at this point, an assembled order is assembled based on, as mentioned earlier, the weight and volume thereof. Once the groceries are delivered, the master list is updated accordingly. The delivery personnel may be in-house personnel of the grocer or provided by a third party service provider or can be crowd sourced from a database. The delivery person interacts with the system via a delivery person UI over a radio communications network (such as, the Internet) wherein, the delivery person UI is provided by a delivery person user terminal such as a smartphone, tablet PC, etc.

[00024] In an additional embodiment, the system further comprises a recipe module for delivering to the consumer one or more recipes based on the current consumer stock. In one embodiment, along with the recipes, the consumer is presented with micronutrients such as, calories, fat, carbohydrates, etc., associated with each recipe.

[00025] Referring to **FIG. 2**, the grocery stock replenishment method comprises listing a plurality of consumer entries within a consumer database wherein, each consumer entry is representative of a consumer that has "subscribed" thereto. Each consumer entry is associated with his/her login details including user ID, password and security question, his/her identity details including name, age, gender, etc., contact details including his/her postal address (for delivery), one or more phone numbers and email addresses and his/her payment details including his/her credit/debit card details, payment gateway details, and electronic wallet details. The identity and contact details are obtained by the consumer during a registration or a "sign up" process.

[00026] Referring to **FIG. 2**, each consumer entry is further associated with an editable grocery master list comprising a plurality of grocery items. Each grocery item therein is in turn associated with the quantity thereof that is already in consumer stock, the price thereof (per unit), the number of days until the expiry thereof (if applicable), the rate of consumption thereof, the maximum quantity thereof that can be within the consumer stock and the break-up of nutrients therein. The list of grocery items may initially be compiled by the consumer himself/herself or maybe collected over time, as may be apparent from the following body of text. The login details, identity details, contact details, payment

details and the master list may be accessed by the consumer anytime via a smartphone app or a website in order to modify it. As will be apparent from the following body of text, the master list is configured to be automatically updated in accordance with the consumer consumption of the groceries along with other factors.

[00027] Referring to **FIG. 2**, the method further includes tracking the packaging of the grocery items that are discarded into a “smart-bin”, which comprises an RFID reader built into it. The RFID-fitted smart-bin is simply a trashcan or a dustbin but, which is particularly for receiving discarded grocery item packaging. The packaging of each grocery item includes an RFID tag, which stores item details including what the grocery item is, the price thereof, the expiry date thereof (if applicable) and the quantity thereof. Notably, the RFID reader circuitry is fully contained within the smart-bin. In alternate embodiments, a different tracking technology may be employed in lieu of RFID. The method, as enabled by an RFID module, further comprises automatically updating the master list within the consumer database as the consumer’s RFID data is collected. Notably, the RFID module interfaces between the RFID reader and the consumer database. For example, if the master list indicates that the consumer stock has two boxes of ziplock bags and when the RFID reader tracks one discarded box of ziplock bags within the smart-bin, the method RFID module updates master list accordingly whereby, the master list now indicates that the consumer stock has only one box of ziplock bags. In an additional embodiment, the smart-bin is further fitted with one or more sensors for alerting the consumer in the event of the contents therein exceeding or about to exceed the capacity. In an additional embodiment, the smart-bin is, based on the weight of the contents therein and the RFID

data, is configured to generate reports of waste breakdown by type of waste viz., plastic, paper, glass, etc. The smart-bin may be powered by a direct power outlet, a solar panel, or a combination thereof. In an additional embodiment, the smart-bin comprises a light display (preferably one or more LEDs) to indicate the smart-bin capacity, if an order is going to be replenished (apparent from the following body of text). These values may be delivered to the consumer's smartphone app (or website) as well.

[00028] Referring to **FIG. 2**, the method further comprises a populating, as enabled a compilation module, a grocery purchase list comprising a list of groceries that have been expensed and going to be expensed by the consumer within a delivery cycle. A plurality of factors account for populating the purchase list including discarded packaging within the smartbin as tracked by the RFID reader, the expiry dates, the rate of consumption and a combination thereof. Notably, groceries are divided into different categories based on their shelf life, rate of consumption, based on their packaging, item type. For example, certain grocery items are contained within the original packaging thereof until they are fully utilized. In another example, some grocery items, upon purchase, are immediately transferred to another container and the original packaging thereof is discarded fairly immediately thereafter. Considering the earlier example, populating the purchase list with the grocery item of a box of ziplock bags is straightforward as ziplock bags do not have shelf life and ziplock boxes are generally discarded only after the all the ziplock bags therein are expensed. However, the integrity of some grocery items are bound by an expiry date and therefore, in such cases, the compilation module may proceed to populate the purchase list based on expiry date and the RFID data. For example, say there are

two packets of cheese in consumer stock and the expiry of one of them is, as sourced from the master list, fast approaching. The method, at this point, comprises including a packet of cheese within purchase list system, irrespective of RFID data.

[00029] Referring to **FIG. 2**, the method further comprises determining, over time, the rate of consumption of a grocery item based on how often many of them are ordered within a delivery cycle, how often, within the delivery cycle, the packaging thereof is discarded. Therefore, for some grocery items, the rate of consumption may be factored in for inclusion within the purchase list. For example, for a consumer, say, wheat flour has a rate of consumption of one kilogram per month and the one kilogram of wheat flour in consumer stock has a long shelf life. In light of these variable, the method, at this point, includes adding one kilogram of wheat flour to the purchase list irrespective of the RFID and expiry data thereof. This is because, wheat flour comes in a flexible plastic packaging when purchased and, usually, before usage, wheat flour is transferred to a designated container and thereafter the packaging is discarded.

TABLE -1

			1st Layer process			2nd layer process-Algorithm							2nd layer process-Determine actual and estimated delivery date range						3rd layer process			4th Layer process	
Example	ast delivery date	QTY delivered and details stored in cloud	has shelf life?	Expiry date stance	Total stock qty available	Category type	Logic for programme with agreed requests/recommendation	Usage tracking actor - Bin, delivery and re-order date,	Trigger point	Average days Usage rate- Consumed date delivery	Expected delivery (Total stock * Usage rate days) * +2	RFID label in Bin as of 3rd June Monday	Customer scenario stock el as of 3rd June Monday	Balance Expiry Days as of 3rd June Monday	Customer agreed Day delivery schedule	Actual delivery	Expected delivery	Match actual delivery date	Match expected delivery date to maximise item delivery	Notify end user nd alert stores.	Upon confirmation roup location f users	Algorithm result s group drivers s location.
QTY:1 Box of Ziplock bags	Friday, 31st May		No	NA	3	1	If stock is less or equal to "1" deliver in next schedule.	Wh RFID Bin	RFID	4	0-12 days later : June 10th - June 2th	1	2	NA	Tuesday, Wednesday, Friday	1-8 days later : June 9th - June 1th	1-8 days later : June 9th - June 1th	No	No	Yes	Location C	Notify 3rd party to deliver
QTY:1 Carton of milk.	Thursday 23rd day		Yes	Expire in 2 days, Expire in 30 days	2	3	If expiry date - today's date is more than 28 and stock is less or equal to "1" deliver in next schedule, if expiry date - today's date is less than 14 & current stock is more than "1" deliver	Expiry & RFID Bin	Expiry or RFID whichever comes first	12	12-24 days later: June14th - June 6th	1	1	Expire in 19 days	Tuesday, Wednesday, Friday	0-12 days later: June 13th - June 5th	12-24 days later: June14th - June 16th	Yes, June 14th Friday which is also customer		Yes	Location B	Inhouse truck driver B to deliver
QTY:1Tub of yogurt.	Thursday 22nd day		Yes	Expire in 30 days	2	4	If expiry date - today's date is more than 52 and stock is less or equal to "1" deliver in next + 14 day schedule, if expiry date - today's date is less than 28 & current stock is more than "1" deliver + 14 day schedule,	Expiry & RFID Bin	Expiry or RFID whichever comes first	20	38-40 days later: June 29th - July st	0	2	Expire in 17 days	Tuesday, Wednesday, Friday	4 days later: June 13th - 15th	38-40 days later: June 29th - July 1st	Yes, June 14th Friday which is also customer		Yes	Location A	Inhouse truck driver A to deliver
QTY:1 Jar of jam	Wednesday 1st day		Yes	NA-Nothing delivered	1	1	If expiry date - today's date is less han 15 deliver within 14 days.	By expiry	Expiry	360	By expiry date	0	1	Expire in 15 days	Tuesday, Wednesday, Friday	4 days later: June 15th	NA	Yes, June 14th Friday which is also customer		Yes	Location B	Inhouse truck driver B to deliver
QTY:1 Packaged tooth brush	Wednesday 30th February		No	NA	0		Manual entry			NA	Every 6 months	0	0	NA	Tuesday, Wednesday,	June 16th	n June	No	Yes-This is in June delivery	Yes	Location A	Inhouse truck driver A to deliver

Further referring to the **TABLE**, which tabulates an exemplary consumer stock wherein, the compilation module is configured to include within the purchase list a new carton of milk within the next 22-24 days when the carton of milk in stock is less than or equal to one (as determined by the master list) and the expiry date of the carton of milk in stock is less than 14 days. Similarly, the compilation module is configured to include within the purchase list a new jar of jam if the expiration of the jar of jam in consumer stock is within the next 15 days. In this example, the addition to the purchase list is triggered by the expiry date alone as, usually, the jar of jam is only discarded only after the entire

consumption thereof. The method further includes populating a purchase list based on expiry dates, volume of populated content and delivery schedules.

[00030] The purchase list of the consumer is directly accessible by the one or more grocers wherein, the one or more grocers are enabled to view, “lock” and pack the groceries from the purchase list at their own discretion. Notably, the purchase list is accessible by the one or more grocers who are closest to consumer delivery location. The purchase list is associated with the consumer’s identity and contact details. Depending on the delivery schedules to other consumers, the one or more grocers may ship the order to the consumer in way to optimize the delivery volume and thereby cost. However, at times, it may be incumbent upon the one or more grocers to “honor” the demand for groceries within the purchase list based on the approaching expiry date and forecasted shortage, which is due to the rate of consumption and the shortage of consumer stock. This is so that, ultimately, the end consumer may never experience lack of consumer stock, which is the whole point of the present invention. In one embodiment, the method includes notifying a grocer of the expected grocery items to be delivered a few days (say, one to three days) in advance. Once the order is packed and ready, the method includes intimating the consumer of the scheduled delivery. The method further includes receiving the payment for the shipment beforehand or once the groceries are delivered. In one embodiment, the method includes receiving a consumer-authorization for the delivery, preferably by way of payment for the same. In one embodiment, the method further comprises receiving manual modification of the purchase list by the consumer in an ad hoc manner. In one additional embodiment, the method further

comprises associating consumer comments with the purchase list such as, for example, at what time the groceries need to be delivered, etc. In an additional embodiment, the method further comprises automatically assembling, as enabled by an assembly module, the “in demand” groceries from one or more consumers into an optimum delivery load in terms of weight, volume and delivery routes. Notably, the purchase list is updated in real-time or by the end of the day.

[00031] In an alternate embodiment, the method further comprises transmitting, as enabled by an order module, the populated grocery purchase list to one or more grocers. The question of when the purchase list is transmitted is dependent upon the expiry dates of grocery items in consumer stock (as sourced from the master list), the volume of the order and the delivery schedule. For example, the method includes placing the order with the one or more grocers in the event where the shelf life of the contents of the purchase list is short. The method may alternatively include ordering the purchase list upon the arrival of the scheduled delivery cycle. For example, the order may be placed such that, the delivery happens within the first week of month. In one embodiment, the method includes receiving an order-authorization from consumer, preferably by way of payment for the same.

[00032] The method further comprises assigning, as enabled by a delivery module, a delivery person to deliver a shipment of groceries to one or more consumers. In the event of there being more than one consumer, the method includes treating the location of a grocer as a nodal point and thereafter “choosing” the consumers based on the congruity

of delivery routes from the grocer to the consumers. Further, the method includes choosing the number of delivery personnel based on the number of assembled orders (defined by means of distinct delivery loads) wherein, as the congruence of delivery routes is a given at this point, an assembled order is assembled based on, as mentioned earlier, the weight and volume thereof. Once the groceries are delivered, the master list is updated accordingly. The delivery personnel may be in-house personnel of the grocer or provided by a third party service provider.

[00033] In an additional embodiment, the method further comprises delivering to the consumer one or more recipes based on the current consumer stock. In one embodiment, along with the recipes, the consumer is presented with micronutrients such as, calories, fat, carbohydrates, etc., associated with each recipe.

[00034] The entire method of the present invention is broken down into four layers depicted by the flowcharts from **FIG. 3** to **FIG. 6** and the **TABLE**. Referring to **FIG. 3**, which illustrates the first layer by way of a flowchart, the process initiates with grocery items being delivered to the consumer wherein, the packaging of the grocery items comprise RFID tags, which may include product details such as, the name, price, quantity, expiry date/ shelf life of the item, etc. Upon delivery, the grocery master list is accordingly updated within the consumer database. In order to track each grocery item, the system is configured to determine if each grocery item has shelf life or expiry date. If so, said shelf life is factored in to determine the mileage thereof. If not, the consumption of the grocery item is based on the discarded packaging thereof and the rate of consumption

thereof (if applicable). Referring to **FIG. 4**, layer 2 initiates with the item category determination for a grocer item. Once determined, based on the category of the item, shelf life and consumer stock thereof, said grocery item is tracked accordingly. If the expiry date is impeding, an actual date range is set for the delivery of a replacement within the date range. However, if the expiry date is not approaching, and the packaging thereof is found in the smart-bin, then the same process of setting up of an actual date range is followed wherein, a replacement is delivered within the actual date range. The expected date range is then communicated to the consumer. On the other hand, if the expiry date is not approaching and if there is no RFID data thereon, then the expected delivery date range is forecasted based on the rate of consumption thereof. The expected date range is then communicated to the consumer.

[00035] Referring to **FIG. 5**, layer 3 initiates with a grocery purchase list being populated wherein, each grocery item therein is associated with a delivery date range, which could be an actual or an expected date range. At this point, the system determines if all items can be delivered within the delivery date range. If yes, all items are indeed delivered accordingly. If not, the system is configured to match grocery items in both expected and actual date ranges in order to maximize the volume of grocery items for optimum delivery purposes. In any case, the consumer is notified of the same and the grocers may be alerted. Referring to **FIG. 6**, layer 4 initiates with the consumer approving of the delivery. The address of the consumer is locked down and the grocers are notified of the same. At this point, the system is configured to group addresses of other consumers as well in order to maximize delivery loading. If the grocer comprises in-house

transportation, the delivery is performed by the grocer himself/herself. If not, the delivery is performed by third-party delivery personnel.

[00036] **FIG. 7** is a block diagram of an exemplary computer system. The computer system includes a processor that executes software instructions or code stored on a non-transitory computer readable storage medium to perform methods of the present disclosure. The instructions on the computer readable storage medium are read and stored the instructions in storage or in random access memory (RAM). The storage provides space for keeping static data where at least some instructions could be stored for later execution. The stored instructions may be further compiled to generate other representations of the instructions and dynamically stored in the RAM. The processor reads instructions from the RAM and performs actions as instructed.

[00037] The computer system further includes an output device to provide at least some of the results of the execution as output including, but not limited to, visual information to users. The output device can include a display on computing devices. For example, the display can be a mobile phone screen or a laptop screen. GUIs and/or text are presented as an output on the display screen. The computer system further includes input device to provide a user or another device with mechanisms for entering data and/or otherwise interact with the computer system. The input device may include, for example, a keyboard, a keypad, a mouse, or a touchscreen. The output device and input device are joined by one or more additional peripherals.

[00038] A network communicator may be provided to connect the computer system to a network and in turn to other devices connected to the network including other clients, servers, data stores, and interfaces, for instance. A network communicator may include, for example, a network adapter such as a LAN adapter or a wireless adapter. Computer system includes a data source interface to access data source. A data source is an information resource. As an example, a training corpus can be a data source. Furthermore, knowledge repositories and curated data may be other examples of data sources.

[00039] Embodiments and examples are described above, and those skilled in the art will be able to make various modifications to the described embodiments and examples without departing from the scope of the embodiments and examples. Although the processes illustrated and described herein include series of steps, it will be appreciated that the different embodiments of the present disclosure are not limited by the illustrated ordering of steps, as some steps may occur in different orders, some concurrently with other steps apart from that shown and described herein. In addition, not all illustrated steps may be required to implement a methodology in accordance with the present disclosure. Moreover, it will be appreciated that the processes may be implemented in association with the apparatus and systems illustrated and described herein as well as in association with other systems not illustrated.

What is claimed is:

1. A grocery stock replenishment system comprising:

(a) a consumer database listed with a plurality of consumer entries, each of which representative of a consumer, each consumer entry associated with a list of grocery items, each of which in turn associated with the quantity thereof that is already in consumer stock, the number of days until the expiry thereof, if applicable, the maximum quantity thereof that can be within consumer stock, and the rate of consumption thereof;

(b) a smart-bin for receiving discarded packaging of the grocery items, each discarded packaging comprising an RFID tag that stores therein the corresponding grocery item details including what the grocery item is, the quantity thereof and the expiry date thereof if applicable, the smart-bin comprising with an RFID reader for reading said grocery item details;

(c) a compilation module for, over time, populating a grocery purchase list based on the discarded packaging from the smart-bin, the expiry dates, rate of consumption, the availability thereof in the consumer stock as sourced from the consumer database, and a combination thereof, the purchase list accessible by one or more grocers at which point, the one or more grocers, over a grocer user interface, are enabled to view, “lock” and pack one or more purchase list items; and

(d) a delivery module for assigning one or more delivery persons to the one or more grocers in order for the packed groceries to be delivered to the consumer.