

ELECTRONIC SYSTEMS AND COMPUTERIZED METHODS FOR PROCESSING BUSINESS-TO-BUSINESS TRANSACTIONS BETWEEN SUPPLIER AND MERCHANT

5 Cross Reference to Related Application(s)

The present disclosure claims the benefit of Singapore Patent Application No. 10201800220P filed on 09 January 2018, which is incorporated in its entirety by reference herein.

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Technical Field

The present disclosure generally relates to electronic systems and computerized methods for processing business-to-business transactions. Particularly, the present disclosure describes various embodiments of electronic systems and computerized methods for processing business-to-business transactions between a supplier and a number of merchants, each merchant having a number of outlets or retail stores.

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Background

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Merchants such as supermarkets and other retail outlets receive and stock up their supplies, e.g. groceries, sundries, food products, etc., periodically. Suppliers deliver the supplies according to schedules prearranged with the merchants. For example, a merchant may arrange with a supplier to deliver a predetermined quantity of food products, e.g. canned food, at certain intervals, e.g. monthly. The predetermined quantity may be estimated by the merchant based on expected sales. In such an arrangement, the merchant usually submits a purchase order to the supplier, and the supplier subsequently issues an invoice to the merchant. The invoice is issued after the supplier receives the purchase order, and may be issued before or after delivery of the supplies.

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However, for perishable food products or products that are marketed as being supplied to consumers freshly made or prepared for example on a daily basis, such as ready-

meals, premium meat, dairy, bakery and confectionary products, this type of arrangement between merchants and suppliers may not be feasible. Using ready-meals as an example, it can be difficult for the merchant to estimate the quantity of ready-meals to stock up and/or for the supplier to estimate the quantity to supply without first knowing the quantity of market surplus ready-meals that may be left on the retail shelves. For example, ready meals are supplied daily but which are unsold and returned to the supplier following day.

To elaborate upon the above, currently, the supplier goes to the merchant, e.g. a supplier delivery person ("supplier delivery person") delivers ready-meals to a particular store / retail outlet of the merchant and the supplier delivery person assesses the merchant shelf space used for displaying the ready-meals. Firstly, market surplus ready-meals that are left on the merchant's shelves are removed, counted, and collected by the supplier delivery person for returning to the supplier. Secondly, the delivery person undertakes the delivery of the day's fresh ready-meals to the merchants. The daily process for the collection of market surplus ready-meals and the delivery, invoicing and confirmation of delivery/ purchase of the fresh ready-meals, is generally as follows:

(a) Fresh ready-meals being delivered from the supplier are counted in a designated area in the presence of the supplier delivery person and the merchant person or merchant storekeeper. A count of market surplus ready-meals, which had been delivered the previous day, is also undertaken in the designated area in the presence of both the supplier delivery person and merchant storekeeper.

(b) On completion of the fresh ready-meals count as agreed to between the supplier delivery person and the merchant storekeeper, the supplier delivery person issues a physical paper invoice of the supplier setting out the quantities of the various fresh ready-meals delivered that day and total cost. The data and other information in the invoice is either handwritten by the supplier delivery person (with the figures numbers calculated manually with a calculator) or printed from an electronic device of the supplier delivery person, e.g. a portable

electronic terminal. The paper invoice is handed by the supplier delivery person to the merchant storekeeper on the spot.

(c) The fresh ready-meals are placed on the display shelves for sale to consumers.

(d) After the merchant storekeeper receives the paper invoice, the merchant processes the paper invoice through its internal protocols – the merchant storekeeper manually inputs the data and other information of the ready-meals delivered as described above into, for example, the merchant's backend system, e.g. a computerized or electronic inventory system. The merchant's system then produces a physical paper purchase order which serves as a confirmation by the merchant of the delivery. The paper purchase order is then given by the merchant to the supplier. The merchant is required to pay for the delivery within the commercially agreed timeframe, e.g. 3 months after the delivery. However, there may be some delay between the merchant receiving the invoice and the supplier receiving the purchase order, as further described below.

Various difficulties and inefficiencies may arise from the current process described above, including:

(a) The paper invoice process is prone to errors. As the data is manually calculated and entered, the supplier delivery person may input erroneous data into the invoice such as calculation errors. Such errors can result in financial penalties imposed by the merchant on the supplier, likely depending on the business agreement between them.

(b) There is often in practice a delay or time-lag between the time the supplier delivery person issues the invoice to the merchant and the time the merchant issues its purchase order confirming the subject delivery. Some merchants, particularly large corporations, may refuse to countersign the paper invoice when handed the paper invoice to acknowledge the quantity and the total cost for the delivery (e.g. in order to save time or for other reasons). The merchant may take time, e.g. several days depending on the merchant's internal protocols, after receipt of the paper invoice from the supplier delivery person, to manually input data from the paper invoice into the merchant's own backend system. Merchants who do not have a backend system may instead simply write a paper

purchase order based on the data from the supplier paper invoice, which could similarly take several days.

(c) Various errors can be made when the merchant inputs data into their backend system based on the paper invoice to generate the purchase order. These errors may be transcription errors as the purchase order was manually input by the merchant storekeeper based on the paper invoice.

(d) On receipt of the paper purchase order, the supplier processes the purchase order through its own internal protocols. For example, the paper purchase order is given by the supplier delivery person to the supplier's accounts department which counterchecks the purchase order against the invoice. At this stage, the supplier's accounts department may notice discrepancies between the two documents, and would need to carefully monitor payment of the invoice.

As can be seen above, errors can arise at the various stages of the process and accordingly, there would be discrepancies between the supplier's invoice and the merchant's purchase order. This may escalate into disputes between the merchant and the supplier, especially for settlement of the invoice. The settlement of the supplier's invoice may be delayed, e.g. for up to six months to a year, for discrepancies to be resolved and the supplier may end up with only a reduced amount under its invoice being paid or, in some cases, may not be paid at all. In some cases for example, vis-à-vis a particular merchant, the supplier may be faced with erroneous purchase orders issued by the merchant, which could represent a significant portion of the total invoices issued to the merchant.

Furthermore, in the case where there are discrepancies in terms of quantity or value between the supplier's invoices and merchant's purchase orders, some merchants may require copies of the paper invoices to be certified as original. This may mean requesting the respective party to rubber stamp on the paper documents. While such rubber-stamping is aimed at preventing either party from denying the invoice or purchase order, it is a laborious and inefficient procedure.

In addition, the paper invoices and paper purchase orders result in substantial amount of paper being used in the supplier's and the merchants' businesses. Where there are

disagreements over discrepancies, more papers are generated by the additional verification and dispute resolution process.

Therefore, in order to address or alleviate one or more of the aforementioned problems and/or disadvantages, there is a need to provide improved electronic systems and computerized methods for processing business-to-business transactions.

Summary

According to a first aspect of the present disclosure, there is a server of a supplier, a computerized method, and a non-transitory computer-readable storage medium comprising instructions for performing the computerized method. The method is implemented on and performed by the supplier server for processing business-to-business transactions between the supplier and a number of merchants, each merchant having a number of outlets. The supplier server comprises a data communication module and a verification module configured for performing steps of the method.

The data communication module is configured for: receiving a number of electronic invoices from an electronic device of the supplier, each electronic invoice associated with a transaction at each merchant outlet, each electronic invoice comprising quantity details of products transacted in the respective transaction, cost details of the transacted products, and identification details of the respective merchant and merchant outlet; and receiving a number of electronic purchase orders from a number of servers of the merchants, the purchase orders generated by the merchant servers for the products transacted in the respective transactions based on the respective electronic invoices.

The verification module is configured for: verifying the electronic invoices and electronic purchase orders against each other to complete said processing of the transactions.

The electronic invoices are generated by the supplier electronic device; and each electronic invoice is communicated from the supplier electronic device to a merchant electronic device at the respective merchant outlet for subsequent communication to the respective merchant server.

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According to a second aspect of the present disclosure, there is an electronic device of a supplier, a computerized method, and a non-transitory computer-readable storage medium comprising instructions for performing the computerized method. The method is implemented on and performed by the supplier electronic device for processing
10 business-to-business transactions between the supplier and a number of merchants, each merchant having a number of outlets. The supplier server comprises a data input module, an invoicing module, and a data communication module configured for performing steps of the method.

15 The data input module is configured for: receiving, from a user of the supplier electronic device, quantity details of products transacted in a transaction at each merchant outlet.

The invoicing module is configured for: generating, for each transaction, an electronic
20 invoice comprising the product quantity details, cost details of the transacted products, and identification details of the respective merchant and merchant outlet.

The data communication module is configured for: communicating, for each transaction, the respective electronic invoice to a merchant electronic device at the
25 respective merchant outlet; and communicating the electronic invoices to a server of the supplier for subsequent verification against a number of electronic purchase orders of the merchants.

The electronic invoices are communicated from the respective merchant electronic
30 devices to a number of servers of the merchants for generating the electronic purchase orders; the electronic purchase orders are communicated from the merchant servers to the supplier server, the electronic purchase orders generated for the products transacted in the respective transactions; and the electronic invoices and electronic

purchase orders are verified, by the supplier server, against each other to complete said processing of the transactions.

5 According to a third aspect of the present disclosure, there is an electronic system, a computerized method, and a non-transitory computer-readable storage medium comprising instructions for performing the computerized method. The electronic system comprises a server and an electronic device of a supplier, as well as a number of servers and a number of electronic devices of a number of merchants. The method is implemented on the electronic system for processing business-to-business
10 transactions between the supplier and merchants, each merchant having a number of outlets. The method comprises: receiving, by the supplier electronic device, quantity details of products transacted in a transaction at each merchant outlet, the product quantity details provided by a user of the supplier electronic device; generating, by the supplier electronic device, an electronic invoice for each transaction, each electronic
15 invoice comprising the product quantity details, cost details of the transacted products, and identification details of the respective merchant and merchant outlet; communicating, for each transaction, the respective electronic invoice from the supplier electronic device to the merchant electronic device at the respective merchant outlet; communicating the electronic invoices from the respective merchant electronic
20 devices to the merchant servers; generating, by the merchant servers, electronic purchase orders for the products transacted in the respective transactions based on the respective electronic invoices; communicating the electronic purchase orders from the merchant servers to the supplier server; communicating the electronic invoices from the supplier electronic device to the supplier server; and verifying, by the supplier
25 server, the electronic invoices and electronic purchase orders against each other to complete said processing of the transactions.

An advantage of one or more aspects of the present disclosure is that the communication of electronic invoices and electronic purchase orders between the
30 supplier and merchants provides for more seamless transmission of data exchange therebetween. With such improved communication, supplier delivery persons delivering products to the merchant outlets do not need to manually calculate the total cost chargeable to the merchants, as the calculation is automatically and electronically

done by the software application in the supplier electronic device based on the product quantities.

Brief Description of Drawings

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Figure 1 is an illustration of an electronic system for processing business-to-business transactions between a supplier and a number of merchants, in accordance with embodiments of the present disclosure.

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Figure 2 is a flowchart illustration of a computerized method implemented on a supplier electronic device for processing the transactions, in accordance with embodiments of the present disclosure.

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Figure 3 is a flowchart illustration of a computerized method implemented on a supplier server for processing the transactions, in accordance with embodiments of the present disclosure.

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Figure 4 is a schematic illustration of a computerized method implemented on the electronic system for processing the transactions, in accordance with embodiments of the present disclosure.

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Figure 5 to Figure 17 illustrate various graphical user interfaces (GUIs) displayed on the supplier electronic device during said processing of the transactions, in accordance with embodiments of the present disclosure.

Detailed Description

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In the present disclosure, depiction of a given element or consideration or use of a particular element number in a particular figure or a reference thereto in corresponding descriptive material can encompass the same, an equivalent, or an analogous element or element number identified in another figure or descriptive material associated therewith. The recitation of a particular numerical value or value range herein is understood to include or be a recitation of an approximate numerical value or value

range. For purposes of brevity and clarity, descriptions of embodiments of the present disclosure are directed to electronic systems and computerized methods for processing business-to-business transactions, in accordance with the figures. While the present disclosure will be described in conjunction with the embodiments provided
5 herein, it will be understood that they are not intended to limit the present disclosure to these embodiments. On the contrary, the present disclosure is intended to cover alternatives, modifications and equivalents to the embodiments described herein, which are included within the scope of the present disclosure. Furthermore, specific details are set forth in order to provide a thorough understanding of the present
10 disclosure. However, it will be recognized by a skilled person that the present disclosure may be practiced without specific details and/or with multiple details arising from combinations of aspects of particular embodiments. In a number of instances, known systems, methods, procedures, and components have not been described in detail so as to not unnecessarily obscure aspects of the embodiments of the present
15 disclosure.

References to “an embodiment / example”, “another embodiment / example”, “some embodiments / examples”, “some other embodiments / examples”, and so on, indicate that the embodiment(s) / example(s) so described may include a particular feature,
20 structure, characteristic, property, element, or limitation, but that not every embodiment / example necessarily includes that particular feature, structure, characteristic, property, element or limitation. Furthermore, repeated use of the phrase “in an embodiment / example” or “in another embodiment / example” does not necessarily refer to the same embodiment / example.

25 The terms “comprising”, “including”, “having”, and the like do not exclude the presence of other features / elements / steps than those listed in an embodiment. Recitation of certain features / elements / steps in mutually different embodiments does not indicate that a combination of these features / elements / steps cannot be used in an
30 embodiment.

As used herein, the terms “component”, “module,” “system”, “interface”, and the like are generally intended to refer to a computer-related entity, either hardware, a

combination of hardware and software, software, or software in execution. For example, a component or a module may be, but is not limited to being, a process running on a processor, a processor, an object, an executable, a thread of execution, a program, and/or a computer. By way of illustration, both an application running on a controller and the controller can be a component / module. One or more components / modules may reside within a process and/or thread of execution. A component / module may be localized on one computer and/or distributed among a plurality of computers.

As used herein, the terms “a” and “an” are defined as one or more than one. The term “a number” is defined as a non-empty finite organization of elements in a set that mathematically exhibits a cardinality of at least one (e.g. a set as defined herein can correspond to a unit, singlet, or single-element set, or a multiple-element set), in accordance with known mathematical definitions. The recitation of a particular numerical value or value range herein is understood to include or be a recitation of an approximate numerical value or value range.

In representative or exemplary embodiments of the present disclosure, there is an electronic system 100 including a server 102 of a supplier 104 for processing business-to-business transactions between the supplier 104 and a number of merchants 106, as illustrated in Figure 1. The merchant 106 is a business or commercial entity that purchases supplies from the supplier 104 and sells the supplies as products to consumers / customers. Each merchant 106 has and operates a number of outlets or retail stores (collectively referred to as merchant outlets) for selling the products to consumers / customers. The electronic system 100 further includes a number of servers 108 of the merchants 106 for processing the business-to-business transactions. In many embodiments, each merchant 106 operates a merchant server 108 for processing the business-to-business transactions. The supplier 104 designates a number of personnel 110, e.g. supplier delivery person or delivery staff, to deliver supplies, e.g. food products, to the merchant outlets of the merchants 106. Similarly, each merchant 106 designates a number of merchant personnel 112, e.g. merchant storekeeper, at the merchant outlets to receive the supplies from the supplier delivery person 110.

In many embodiments, the transactions relate to food products including perishable food products or food products with short shelf lives. For example, the supplier 104 supplies various types of perishable food products, and one of the merchants 106 is a supermarket chain with multiple merchant outlets for receiving these products. Some non-limiting examples of perishable food products include ready-meals, premium meat, dairy, bakery and confectionary products. More specific examples of perishable food products include, but are not limited to, juices, fresh milk, cheese, eggs, and yogurts. The supplier delivery person 110 drives a vehicle, e.g. truck or van, containing perishable food products to various merchant outlets at a prearranged route and schedule, e.g. daily, to ensure there is regular supply of such food products. The prearranged route may include other merchant outlets of other merchants 106, such as another supermarket chain with several merchant outlets, a number of convenience stores, and/or a number of small provision stores.

The electronic system 100 further includes an electronic device 114 operated by the supplier delivery person 110 and a number of electronic devices 116 of the merchants 106, the merchant electronic devices 116 operated by the respective merchant storekeepers 112 at the respective merchant outlets. The supplier electronic device 114 and each merchant electronic device 116 are configured for processing the transactions between the supplier 104 and the respective merchant 106 in cooperation with the supplier server 102 and respective merchant server 108. Notably, the supplier server 102 is communicatively linked to the supplier electronic device 114, and the supplier server 102 is communicatively linked to various merchant servers 108 of the various merchants 106. Furthermore, each merchant server 108 is communicatively linked to multiple merchant electronic devices 116 from various merchant outlets of the various merchants 106. The supplier electronic device 114 and each merchant electronic device 116 may be a mobile phone, smartphone, personal digital assistant (PDA), tablet, laptop, or computer. Software / mobile applications are installed on the supplier electronic device 114 and merchant electronic devices 116. The applications are executable by the supplier delivery person 110 and merchant storekeepers 112, respectively, to perform the transactions. The applications are operative on various operating systems / platforms, such as Android, iOS, and Windows.

Each of the supplier server 102, merchant servers 108, supplier electronic device 114, and merchant electronic devices 116 is communicable with one or more of the others through a communication network 118. The communication network 118 is a medium
5 or environment through which content, notifications, and/or messages are communicated among various entities, including the supplier server 102, merchant servers 108, supplier electronic device 114, and merchant electronic devices 116. Some non-limiting examples of the communication network 118 include a virtual private network (VPN), wireless fidelity (Wi-Fi) network, light fidelity (Li-Fi) network,
10 local area network (LAN), wide area network (WAN), metropolitan area network (MAN), satellite network, Internet, fiber optic network, coaxial cable network, infrared (IR) network, radio frequency (RF) network, and any combination thereof. Various entities in the communication network 118 may connect to the communication network 118 in accordance with various wired and wireless communication protocols, such as
15 Transmission Control Protocol / Internet Protocol (TCP/IP), User Datagram Protocol (UDP), 2nd to 5th Generation (2G to 5G) communication protocols, Long Term Evolution (LTE) communication protocols, and any combination thereof.

Additionally, the supplier 104 operates a transaction database 120 which may reside
20 locally on the supplier server 102, or alternatively on a remote or cloud server communicatively linked to the supplier server 102. Each merchant 106 operates a transaction database 122 which may reside locally on the respective merchant server 108, or alternatively on a remote or cloud server communicatively linked to the respective merchant server 108. The supplier electronic device 114 includes a
25 database 124 and each merchant electronic device 116 includes a database 126. The databases 120, 122, 124, and 126 are configured for storing information from said processing of the transactions.

In various embodiments with reference to Figure 2, there is a computer-implemented
30 or computerized method 200 implemented on the electronic system 100, and specifically performed by the supplier electronic device 114, for processing business-to-business transactions between the supplier 104 and a number of merchants 106, each merchant 106 having a number of merchant outlets. Further with reference to

Figure 3, there is a computer-implemented or computerized method 300 implemented on the electronic system 100, and specifically performed by the supplier server 102, for processing the transactions.

- 5 The supplier delivery person 110 is scheduled to deliver supplies to a number of merchant outlets. The merchant outlets may belong to one or more merchants 106. A transaction between the supplier 104 and the respective merchant 106 is performed at each merchant outlet by the supplier delivery person 110 and respective merchant storekeeper 112 using the supplier electronic device 114 and merchant electronic
10 device 116, respectively. The supplier delivery person 110 is also referred to as a user of the supplier electronic device 114.

In a step 202 of the method 200, a data input module of the supplier electronic device 114 receives, from the supplier delivery person / user 110 of the supplier electronic
15 device 114, quantity details of products transacted in a transaction at each merchant outlet. The products may be fresh milk and juices and the quantity details may be the number of packets of the fresh milk and juices delivered to the merchant outlet. In a step 204, an invoicing module of the supplier electronic device 114 generates, for each transaction, an electronic invoice including the product quantity details, cost details of
20 the transacted products, and identification details of the respective merchant 106 and merchant outlet. The invoicing module is preconfigured with unit costs / prices of each type of product, such as based on the product's stock keeping unit (SKU).

In a step 206, a data communication module of the supplier electronic device 114
25 communicates, for each transaction, the respective electronic invoice to the merchant electronic device 116 at the respective merchant outlet. In a step 208, the data communication module communicates the electronic invoices to the supplier server 102 for subsequent verification against a number of electronic purchase orders of the merchants 106. The electronic invoices may be communicated as a single batch to
30 the supplier server 102 for all the transactions performed by the supplier delivery person 110 with the various merchant outlets.

In some embodiments, the steps 206 and 208 of communicating the electronic invoice are performed one after the other. In some other embodiments, the steps 206 and 208 are performed at the same time.

5 Corresponding to the step 208, in a step 302 of the method 300, a data communication module of the supplier server 102 receives a number of electronic invoices from the supplier electronic device 114, each electronic invoice associated with a transaction at each merchant outlet. In a step 304, the data communication module receives a number of electronic purchase orders from the respective merchant servers 108, i.e.
10 the merchant servers 108 of the merchants 106 operating the various merchant outlets. The purchase orders are generated by the merchant servers 108 for the products transacted in the respective transactions based on the respective electronic invoices.

In a step 306, a verification module of the supplier server 102 verifies the electronic
15 invoices and electronic purchase orders against each other to complete said processing of the transactions. Specifically, the verification includes checking if a particular electronic invoice matches an electronic purchase order and vice versa. Some conditions for the verification may include transaction cost amount and details of transacted products, e.g. SKU identifiers.

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In various embodiments with reference to Figure 4, there is a computer-implemented or computerized method 400 implemented on the electronic system 100 for processing business-to-business transactions between the supplier 104 and a number of merchants 106, each merchant 106 having a number of merchant outlets. In any one
25 delivery day, the supplier 104 designates a number of personnel 110, e.g. delivery person or delivery staff, to deliver supplies, such as perishable food products, to the merchant outlets of the merchants 106. In one embodiment, a supplier delivery person 110 is designated to a number of outlets of a particular merchant 106. Similarly, each merchant 106 designates a number of merchant storekeepers 112, at the merchant
30 outlets to receive the supplies from the supplier delivery person 110.

In some embodiments, the supplier delivery person 110 is designated to a number of outlets of one particular merchant 106, e.g. a supermarket chain company or

organization. In some other embodiments, a supplier delivery person 110 is designated to merchant outlets of a plurality of different merchants 106, such as some supermarket stores and some convenience / provision stores operated by different companies / organizations. More generally, various aspects of the method 400 with
5 reference to Figure 4 are applicable in embodiments wherein the supplier delivery person 110 is designated to one or more merchant outlets operated by one or more merchants 106. The supplier delivery person 110 is usually designated to a total of about 30 to 35 merchant outlets.

10 In various embodiments of the method 400, the supplier delivery person 110 is given a supplier electronic device 114 for processing transactions at the designated merchant outlets. A software / mobile application including non-transitory computer-readable instructions is installed on the supplier electronic device 114. The application is executed by the supplier delivery person 110 / user of the supplier electronic device
15 114 to perform the transactions.

Figure 5 illustrates a graphical user interface (GUI) 500 presented on a display of the supplier electronic device 114 upon execution of the application thereon. The GUI 500 depicts an opening or access menu. The GUI 500 displays the company profile 502 of
20 the supplier 104, e.g. company / organization name and logo. The GUI 500 additionally displays a user identification field 504 and user authentication field 506 for the supplier delivery person 110 to input his/her unique login details, e.g. user login identifier and password. The GUI 500 additionally displays a route field 508 relating to a route leading to the merchant outlets designated to the supplier delivery person 110. In one
25 embodiment, the supplier electronic device 114 is specific for use in a particular route and the route field 508 is pre-populated with a route identifier. In another embodiment, the supplier delivery person 110 inputs the route identifier which he/she is already aware of. The input route identifier may be used as additional layer of authentication.

30 The supplier delivery person 110 logs in and accesses the application via the GUI 500 after inputting the login details. In a step 402 of the method 400, the data communication module of the supplier electronic device 114 communicates an access request including the login details to the supplier server 102

for authentication of the login details. In a step 404, the data communication module of the supplier electronic device 114 receives an access response from the supplier server 102. The supplier delivery person 110 is presented with a main menu on the supplier electronic device 114 in response to successful access.

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Figure 6A and Figure 6B illustrate GUI 600 depicting the main menu. On the main menu, the supplier delivery person 110 can see information such as date, time, and user login identifier, and route identifier. The GUI 600 displays a “Load Master Data” icon or picture representing a function 602 for loading data related to the merchant outlets for the supplier delivery person 110.

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In a step 406, the supplier delivery person 110 selects the “Load Master Data” function 602 to load master data from the supplier server 102 to display the designated merchant outlets for the day. The designated merchant outlets may be operated by different merchants 106. The step 406 is usually done at the beginning of the day for the supplier delivery person 110. Figure 7A illustrates a GUI 700 depicting a confirmation screen 702 requesting the supplier delivery person 110 to confirm whether to load the master data. Figure 7B illustrates the GUI 700 depicting a downloading screen 704 in response to confirmation by the supplier delivery person 110 to load the master data. In a step 408, the data communication module of the supplier electronic device 114 receives, from the supplier server 102, details of the route based on the route identifier. The route details provide information on the various merchant outlets designated to the supplier delivery person 110, and a specific route and schedule for the supplier delivery person 110 to undertake for timely delivery to the merchant outlets.

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As shown in Figure 6A and Figure 6B, the GUI 600 depicting the main menu also displays other icons or pictures representing functions that include an “Outlet” function 604, a “Stock Adjustment” function 606, an “Unload Document” function 608, a “Reports” function 610, a “Stock Count” function 612, an “Eject Paper” function 614, and a “Logout” function 616. For example, the “Logout” function 616 logs the supplier delivery person 110 out of the application, such at the end of the day after the supplier delivery person 110 has delivered to all the merchant outlets.

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The supplier delivery person 110 selects the “Stock Adjustment” function 606 to check on the quantities of products to be supplied to all the merchant outlets. The supplier delivery person 110 then loads a supplier vehicle with the products in their respective total quantities. The supplier vehicle may be parked at a warehouse or supply depot of the supplier 104 for loading the products. The total quantities of the products are recorded in the application as a stock balance or inventory of the supplier vehicle.

The supplier delivery person 110 selects the “Outlet” function 604 which leads to a merchant outlet menu showing information on the merchant outlets designated to the supplier delivery person 110 for delivery. Figure 8 illustrates a GUI 800 depicting the merchant outlet menu. The GUI 800 displays details of each merchant outlet 802 in the merchant outlet menu. For each merchant outlet 802, the merchant outlet details include name data 804, address data 806, and code data 808. The name data 804 includes the name of the merchant 106 operating the merchant outlet 802 and an identifier of the merchant outlet 802, such as a branch name. The address data 806 includes the full location address of the merchant outlet 802. The code data 808 includes a unique identifier assigned by the supplier 104 to the merchant outlet 802. The unique identifiers of the merchant outlets 802 allow the supplier 104 to quickly identify the various merchant outlets 802 of the various merchants 106. The GUI 800 further includes a search function 810 that allows the supplier delivery person 110 to search for details of the merchant outlets 802 along the route. For example, the supplier delivery person 110 may search for the location address of a particular merchant outlet 802 if he/she only knows the merchant name and branch name for the merchant outlet 802.

In a step 410, the supplier delivery person 110 visits one of the merchant outlets and performs a transaction with the merchant storekeeper 112 at the merchant outlet. At the merchant outlet, the supplier delivery person 110 selects the respective merchant outlet 802 in the GUI 800 depicting the merchant outlet menu. Figure 9A illustrates a GUI 900 depicting a product quantity menu for the selected merchant outlet.

At the merchant outlet, the supplier delivery person 110 assesses the shelves containing existing products and determines the quantities of products to replenish. Specifically, for each type of product, the supplier delivery person 110 determines the quantities to stock up and replenish the shelves. Each type of product is indicated with a unique product code or SKU identifier. Each SKU identifier is indicated with the recommended quantity for the product type at the merchant outlet, the issued quantity from the supplier vehicle to the merchant outlet, and optionally the returned quantity from the merchant outlet to the supplier vehicle. The GUI 900 includes a column 902 listing the SKU identifiers of the products, a column 904 listing the recommended quantities of the products, a column 906 listing the issued quantities of the products, and a column 908 listing the returned quantities of the products. The returned quantities may refer to surplus products at the merchant outlet, such as expired ready-meals that may be close to expiry and cannot be sold to consumers anymore.

The supplier delivery person 110 determines the issued and returned quantities and inputs the data accordingly. In a step 412, the data input module of the supplier electronic device 114 receives the quantity details of the products transacted in the transaction at the merchant outlet. The product quantity details are provided by a user of the supplier electronic device 114, i.e. the supplier delivery person 110. In a step 414, the invoicing module of the supplier electronic device 114 generates an electronic invoice for the transaction, the electronic invoice including the product quantity details, cost details of the transacted products, and identification details of the merchant 106 and merchant outlet. The electronic invoice may be stored on the database 124 of the supplier electronic device 114.

The cost details of the transacted products are determined based on the issued and returned quantities of the transacted products and the unit cost for each transacted product. The invoicing module is preconfigured with the unit costs or prices of each type of product. The cost details of the transacted products include the total cost chargeable for the merchant outlet. The GUI 900 includes a cost section 910 indicating the total cost including the relevant taxes.

In some embodiments, the product quantity menu provides filtering options to allow the supplier delivery person 110 to filter the various product types, such as if the supplier 104 has a multitude of product types which may cause difficulty in locating a particular product type. For example, the filtering options may be by brands of the products. Figure 10A illustrates a GUI 1000 depicting a selection screen 1002 that provides a dropdown box for the supplier delivery person 110 to select the product brand. Figure 10B illustrates the GUI 1000 depicting a selection list 1004 of the available product brands.

In a step 416, the data communication module of the supplier electronic device 114 communicates the electronic invoice from the supplier electronic device 114 to the merchant electronic device 116 at the merchant outlet. The merchant electronic device 116 is operated by the merchant storekeeper 112 at the merchant outlet. The merchant storekeeper 112 may check the electronic invoice to ensure the details are correct before the electronic invoice is communicated. If there is any discrepancy, the merchant storekeeper 112 may request the supplier delivery person 110 to amend the details.

The electronic invoice is communicated from the supplier electronic device 114 to the merchant electronic device 116 via a wireless / contactless communication protocol, such as near field communication (NFC), Bluetooth, infrared, and Wi-Fi. Optionally, the data communication module of the supplier electronic device 114 communicates the electronic invoice to a printer device of the supplier 104 for generating a printout of the electronic invoice. The printout is a paper copy of the electronic invoice and may be requested by the merchant storekeeper 112 for records keeping. The merchant storekeeper 112 may use the merchant electronic device 114 to capture an image of the paper invoice, thereby obtaining an electronic copy of the invoice. In one embodiment, the supplier electronic device 110 and supplier printer device are communicatively linked via a wireless / contactless communication protocol, such as Bluetooth and Wi-Fi. In another embodiment, the supplier electronic device 110 and supplier printer device are communicatively linked by a wired connection, such as a Universal Serial Bus (USB) cable.

In some embodiments, the GUI 900 includes a “QR” function 916 for generating a Quick Response (QR) code. The generated QR code is encoded with details of the electronic invoice, including the product quantity details, cost details of the transacted products, and identification details of the merchant 106 and merchant outlet. Figure 11 illustrates a GUI 1100 depicting a QR code 1102 for an electronic invoice. In the step 416, the electronic invoice is communicated from the supplier electronic device 114 to the merchant electronic device 116 as the QR code 1102. Specifically, the QR code 1102 is displayed on the supplier electronic device 114 and the merchant electronic device 116 captures an image of the QR code 1102. The merchant electronic device 116 decodes the QR code 1102 to obtain the electronic invoice. The electronic invoice may be stored on the database 126 of the merchant electronic device 116.

In a step 418, the merchant electronic device 116 communicates the electronic invoice to the merchant server 108 of the merchant 106 for the merchant outlet. In a step 420, the merchant server 108 generates an electronic purchase order for the products transacted in the transaction based on the electronic invoice. The electronic invoice and electronic purchase order may be stored on the merchant transaction database 122 of the merchant 106.

The electronic purchase order includes similar details as the electronic invoice, such as the product quantity details and cost details. In some cases, the merchant 106 uses a different SKU identifier from the supplier 104 for the same product type. The SKU identifiers from the electronic invoice would be matched against the SKU identifiers of the merchant 106, such as through a mapping table stored on the merchant transaction database 122. The electronic purchase order is generated accordingly and includes the SKU identifiers of the merchant 106. Optionally, the electronic purchase order also includes the SKU identifiers of the supplier 104 for ease of reference.

In a step 422, the merchant server 108 communicates the electronic purchase order to the supplier server 102. In one embodiment, the data communication module of the supplier server 102 receives the electronic purchase order after the transaction is performed. More specifically, the data communication module of the supplier server

102 receives the electronic purchase orders for various transactions individually after each transaction is performed. In another embodiment, the data communication module of the supplier server 102 receives the electronic purchase orders collectively after all the transactions are performed.

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In a step 424, the data communication module of the supplier electronic device 114 communicates the electronic invoice to the supplier server 102. In one embodiment, the data communication module of the supplier server 102 receives the electronic invoice after the transaction is performed. More specifically, the data communication
10 module of the supplier server 102 receives the electronic invoices for various transactions individually after each transaction is performed. For example as shown in Figure 9A, the GUI 900 includes an “Invoice” function 912 for finalizing and submitting / communicating the electronic invoice to the supplier server 102. Figure 12A illustrates a GUI 1200 depicting a confirmation screen 1202 requesting the supplier delivery
15 person 110 to confirm whether to submit the electronic invoice. Figure 12B illustrates the GUI 1200 depicting a screen 1204 confirming successful submission of the electronic invoice to the supplier server 102. In another embodiment, the data communication module of the supplier server 102 receives the electronic invoices collectively after all the transactions are performed.

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In some embodiments, the steps 416 and 424 of communicating the electronic invoice are performed one after the other. In some other embodiments, the steps 416 and 424 are performed at the same time. The electronic invoice and/or electronic purchase order may be stored on the supplier transaction database 120 of the supplier 104.

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After completing the transaction with the merchant storekeeper 112 at the merchant outlet, the supplier delivery person 110 may check the stock balance or inventory of the supplier vehicle. As shown in Figure 9A, the GUI 900 includes a “Stock” function 914 for viewing the current stock balance or inventory in the supplier vehicle. The stock
30 balance or inventory is automatically updated based on the issued and returned quantities in the transaction at this merchant outlet.

The supplier delivery person 110 then visits another one of the merchant outlets and performs a transaction with the merchant storekeeper 112 at the second merchant outlet. At the second merchant outlet, the supplier delivery person 110 selects the respective merchant outlet 802 in the GUI 800 depicting the outlet menu, as shown in Figure 8. Figure 9B illustrates a GUI 900 depicting a product quantity menu for the selected second merchant outlet. Accordingly, the steps 410 to 424 are repeated for the second merchant outlet, and for subsequent merchant outlets until transactions have been performed at all the merchant outlets designated to the supplier delivery person 110 for delivery.

In some embodiments, the supplier server 102 includes a data processing module configured for modifying the electronic invoices and/or electronic purchase orders to be tamperproof. The tamperproofing of the electronic invoices and/or electronic purchase orders prevents information contained therein to be modified after they have been finalized and communicated to the supplier server 102.

Additionally or alternatively, the supplier electronic device 114 includes a data processing module configured for modifying the electronic invoices to be tamperproof. The tamperproofing of the electronic invoices by the supplier electronic device 114 prevents information contained therein to be modified after they have been finalized so that the electronic invoices can be securely communicated to the supplier server 102.

In some embodiments, the electronic invoices and/or electronic purchase orders are digitally signed. For example, the supplier electronic device 114 includes a validation module configured for digitally signing the electronic invoices before communicating the electronic invoices to the supplier server 102. Similarly, the merchant server 108 may digitally sign the electronic purchase orders before communicating the electronic purchase orders to the supplier server 102. Conventionally, invoices and/or purchase orders are rubber-stamped. In some embodiments herein, a digital signature may be embedded to the electronic invoices and/or electronic purchase orders. The supplier 104 and each merchant 106 may have its unique company / organization digital signature. Furthermore, each supplier delivery person 110 and each merchant

storekeeper 112 may have personalized digital signatures so that the supplier delivery person 110 and merchant storekeepers 112 involved in the transactions can be traced in future.

5 At the end of the day after delivering to all the merchant outlets, the supplier delivery person 110 returns to the warehouse or supply depot to unload any remaining quantities and returned quantities of products. The supplier delivery person 110 selects the “Unload Document” function 608 in the GUI 600 or main menu as shown in Figure 6A and Figure 6B, confirming that the supplier delivery person 110 has
10 completed the deliveries. Figure 13A illustrates a GUI 1300 depicting a confirmation screen 1302 requesting the supplier delivery person 110 to confirm whether to unload. Figure 13B illustrates the GUI 1300 depicting a screen 1304 confirming successful unloading. The supplier delivery person 110 may thereafter logout of the application using the “Logout” function 616. Figure 14 illustrates a GUI 1400 depicting a logout
15 screen 1402.

Optionally, the supplier delivery person 110 may select the “Reports” function 610 in the main menu as shown in the GUI 600 in Figure 6A and Figure 6B. The “Reports” function 610 leads to a reports menu allowing the supplier delivery person 110 to
20 access and optionally print various reports related to the transactions. Figure 15 illustrates a GUI 1500 depicting the reports menu. The GUI 1500 includes various reports, such as Inventory Summary 1502, Issue Variance Report 1504, Exchange Variance Report 1506, Free of Charge Summary 1508, Document Listing 1510, Voided Document Listing 1512, and Daily Stock Control 1514. For example, the Issue
25 Variance Report 1504 and Exchange Variance Report 1506 relate to variances in the issued and returned quantities of products transacted with the various merchant outlets.

In a step 426, after the supplier server 102 receives the electronic invoices and
30 electronic purchase orders for all the transactions at the various merchant outlets of the various merchants 106, the verification module of the supplier server 102 verifies the electronic invoices and electronic purchase orders against each other to complete said processing of the transactions. Specifically, the verification includes checking if a

particular electronic invoice matches an electronic purchase order and vice versa. Some conditions for the verification may include transaction cost amount and details of transacted products, e.g. SKU identifiers. For example, in a particular pair of electronic invoice and electronic purchase order, the SKU identifiers contained therein
5 are matched to determine if they correspond correctly, especially since the supplier 104 and merchant 106 use different SKU identifiers for the same product type. If any discrepancy is found in the verification for a particular transaction, it would be easier for both supplier 104 and merchant 106 to address the discrepancy, as both have records of the electronic invoice and electronic purchase order for said transaction.

10 In some embodiments, the supplier server 102 receives the electronic invoices collectively after all the transactions are performed. Specifically, the electronic invoices are received collectively after a consolidation of the product quantity details of the transactions and a stocktake performed using the supplier electronic device 114. More
15 specifically, said consolidation and stocktake is performed by another user (second user) of the supplier electronic device 114 and after the first user (supplier delivery person 110) has unloaded and logged out of the application. The second user may be referred to as a stock checker who is responsible for accounting the stock / inventory of issued and returned products.

20 The stock checker logs in and accesses the application on the supplier electronic device 114 via the GUI 500 after inputting his/her login details, as shown in Figure 5. The stock checker accesses a stocktake or stock count menu by selecting the "Stock Count" function 612 in the GUI 600, as shown in Figure 6A and Figure 6B. Figure 16A
25 and Figure 16B illustrate a GUI 1600 depicting the stocktake menu. In one example, the GUI 1600 includes a column 1602 listing the products by their SKU identifiers, and a column 1604 listing the aggregated quantities of the returned products. The aggregated quantities are consolidated from all the transactions at all the merchant outlets that are designated to the supplier delivery person 110. The GUI 1600 includes
30 a column 1606 which can be checked by the stock checker after assessing the physical quantities of the returned products, as shown by the checked marks under column 1606 in Figure 16B.

The supplier electronic device 114 includes a stocktake module configured for receiving an input, via the “Confirm” function 1608 in the GUI 1600, from the stock checker that confirms the assessed physical quantities. Optionally, the stock checker may include an electronic signature to accompany the stocktake confirmation. For example, Figure 17 illustrates a GUI 1700 depicting an example of the electronic signature 1702.

As used herein, a server is a physical or cloud data processing system on which a server program runs. The server may be implemented in hardware or software, or a combination thereof. Some non-limiting examples of the supplier server 104 and merchant servers 108 include computers, laptops, mini-computers, mainframe computers, any non-transient and tangible machines that can execute a machine-readable code, cloud-based servers, distributed server networks, and a network of computer systems. Additionally, each of the supplier server 102, supplier electronic device 114, each merchant server 108, and each merchant electronic device 116 includes a processor, a memory, and various other modules or components. The modules and components thereof are configured for performing various operations or steps of the methods 200 / 300 / 400 and are configured as part of the processor. Such operations or steps are performed in response to non-transitory instructions operative or executed by the processor. The memory is used to store instructions and perhaps data which are read during program execution. The memory may be referred to in some contexts as computer-readable storage media and/or non-transitory computer-readable media. Non-transitory computer-readable media include all computer-readable media, with the sole exception being a transitory propagating signal per se.

Various embodiments for processing transactions between the supplier 104 and a number of merchants 106 are thus disclosed herein. The communication of electronic invoices and electronic purchase orders between the supplier 104 and merchants 106 provides for more seamless transmission of data exchange therebetween. With such improved communication, supplier delivery persons 110 delivering products to the merchant outlets do not need to manually calculate the total cost chargeable to the merchants 106, as the calculation is automatically and electronically done by the

software application in the supplier electronic device 114 based on the product quantities.

The electronic invoices are issued from the supplier 104 to the merchants 106 and the electronic purchase orders are issued from the merchants 106 to the supplier 104 upon delivery of the products and collection of the returned products. There is reduced or minimal time-lag compared to the existing system between the issue of the supplier's invoice and the merchant's purchase order. The timeframe between issue of the electronic invoice and issue of the electronic purchase order for a transaction is abridged to not more than 15 minutes (including the time taken by the merchant storekeeper 112 for inspection of the quantity and cost of products delivered) as compared to several days in some current cases. The automated digital processing of the electronic invoices and electronic purchase orders eliminates or reduces errors at both the supplier 104 and the merchant 106 sides. The electronic system 100 advantageously ensures prompt verification / confirmation by the merchant of the delivery with the in-built proper documentation of deliveries and receipts, and therefore reduces disputes and facilitates timely settlement of invoices. Administrative and operational efficiency is enhanced and paper consumption is significantly reduced.

In the foregoing detailed description, embodiments of the present disclosure in relation to electronic systems and computerized methods for processing business-to-business transactions are described with reference to the provided figures. The description of the various embodiments herein is not intended to call out or be limited only to specific or particular representations of the present disclosure, but merely to illustrate non-limiting examples of the present disclosure. The present disclosure serves to address at least one of the mentioned problems and issues associated with the prior art. Although only some embodiments of the present disclosure are disclosed herein, it will be apparent to a person having ordinary skill in the art in view of this disclosure that a variety of changes and/or modifications can be made to the disclosed embodiments without departing from the scope of the present disclosure. Therefore, the scope of the disclosure as well as the scope of the following claims is not limited to embodiments described herein.

Claims

1. A server of a supplier for processing business-to-business transactions between the supplier and a number of merchants, each merchant having a number of outlets, the supplier server comprising:

a data communication module configured for:

receiving a number of electronic invoices from an electronic device of the supplier, each electronic invoice associated with a transaction at each merchant outlet, each electronic invoice comprising quantity details of products transacted in the respective transaction, cost details of the transacted products, and identification details of the respective merchant and merchant outlet; and

receiving a number of electronic purchase orders from a number of servers of the merchants, the purchase orders generated by the merchant servers for the products transacted in the respective transactions based on the respective electronic invoices; and

a verification module configured for:

verifying the electronic invoices and electronic purchase orders against each other to complete said processing of the transactions,

wherein the electronic invoices are generated by the supplier electronic device; and

wherein each electronic invoice is communicated from the supplier electronic device to a merchant electronic device at the respective merchant outlet for subsequent communication to the respective merchant server.

2. The supplier server according to claim 1, wherein the electronic invoices are received collectively after the transactions are performed.

3. The supplier server according to claim 2, wherein the electronic invoices are received collectively after a consolidation of the product quantity details of the transactions and a stocktake performed using the supplier electronic device.

4. The supplier server according to claim 1, wherein the electronic invoices are received individually after each transaction is performed.

5. The supplier server according to any one of claims 1 to 4, further comprising a data processing module configured for modifying the electronic invoices and/or electronic purchase orders to be tamperproof.

6. The supplier server according to any one of claims 1 to 5, the data processing module further configured for storing the electronic invoices and/or electronic purchase orders on a transaction database of the supplier.

7. The supplier server according to any one of claims 1 to 6, further comprising a merchant identification module configured for generating and communicating to the supplier electronic device, details of a route leading to the merchant outlets.

8. The supplier server according to any one of claims 1 to 7, wherein the electronic invoices and/or electronic purchase orders are digitally signed.

9. An electronic device of a supplier for processing business-to-business transactions between the supplier and a number of merchants, each merchant having a number of outlets, the supplier electronic device comprising:

a data input module configured for:

receiving, from a user of the supplier electronic device, quantity details of products transacted in a transaction at each merchant outlet;

an invoicing module configured for:

generating, for each transaction, an electronic invoice comprising the product quantity details, cost details of the transacted products, and identification details of the respective merchant and merchant outlet;

a data communication module configured for:

communicating, for each transaction, the respective electronic invoice to a merchant electronic device at the respective merchant outlet; and

communicating the electronic invoices to a server of the supplier for subsequent verification against a number of electronic purchase orders of the merchants,

5 wherein the electronic invoices are communicated from the respective merchant electronic devices to a number of servers of the merchants for generating the electronic purchase orders;

wherein the electronic purchase orders are communicated from the merchant servers to the supplier server, the electronic purchase orders generated for the products transacted in the respective transactions; and

10 wherein the electronic invoices and electronic purchase orders are verified, by the supplier server, against each other to complete said processing of the transactions.

10. The supplier electronic device according to claim 9, wherein the electronic
15 invoices are communicated to the respective merchant electronic devices via a wireless communication protocol.

11. The supplier electronic device according to claim 9 or 10, wherein each
20 electronic invoice is communicated to the respective merchant electronic device as a Quick Response (QR) code.

12. The supplier electronic device according to any one of claims 9 to 11, the data
communication module further configured for receiving, from the supplier server,
25 details of a route leading to the merchant outlets.

13. The supplier electronic device according to any one of claims 9 to 12, further
comprising a stocktake module configured for receiving, from another user of the
supplier electronic device, a confirmation input after consolidating the product quantity
30 details of the transactions and performing a stocktake.

14. The supplier electronic device according to claim 13, wherein said
communicating of the electronic invoices to the supplier server is performed in
response to receiving the confirmation input.

15. The supplier electronic device according to any one of claims 9 to 14, the data communication module further configured for communicating, for one or more transactions, the respective electronic invoice to a printer device of the supplier for generating a printout of the respective electronic invoice.

16. The supplier electronic device according to claim 15, wherein the supplier electronic device and supplier printer device are communicatively linked via a wireless communication protocol.

17. The supplier electronic device according to any one of claims 9 to 16, further comprising a data processing module configured for modifying the electronic invoices to be tamperproof.

18. The supplier electronic device according to any one of claims 9 to 17, further comprising a transaction database for storing the electronic invoices.

19. The supplier electronic device according to any one of claims 9 to 18, further comprising a validation module configured for digitally signing the electronic invoices before said communicating of the electronic invoices to the supplier server.

20. A computerized method for processing business-to-business transactions between a supplier and a number of merchants, each merchant having a number of merchant outlets, the method comprising:

receiving, by an electronic device of the supplier, quantity details of products transacted in a transaction at each merchant outlet, the product quantity details provided by a user of the supplier electronic device;

generating, by the supplier electronic device, an electronic invoice for each transaction, each electronic invoice comprising the product quantity details, cost details of the transacted products, and identification details of the respective merchant and merchant outlet;

communicating, for each transaction, the respective electronic invoice from the supplier electronic device to a merchant electronic device at the respective merchant outlet;

5 communicating the electronic invoices from the respective merchant electronic devices to a number of servers of the merchants;

generating, by the merchant servers, electronic purchase orders for the products transacted in the respective transactions based on the respective electronic invoices;

10 communicating the electronic purchase orders from the merchant servers to a server of the supplier;

communicating the electronic invoices from the supplier electronic device to the supplier server; and

15 verifying, by the supplier server, the electronic invoices and electronic purchase orders against each other to complete said processing of the transactions.