

TITLE OF THE INVENTION

ENHANCED ASSET MANAGEMENT SYSTEM FOR FOOD CENTRE AND METHOD OF USING THE SAME

5 TECHNICAL FIELD

The present invention relates to an enhanced Asset Management System for a Food Centre comprising an incentivized Tray Management System integrated with a Point of Sale (POS) System. The present invention also relates to a method of operating the system and use of the Asset Management System as a Promotional and Marketing tool.

10 BACKGROUND ART

Presently, operators of Singapore food courts and hawker centres (hereinafter "Food centres") face a real problem of a shortage in supply of cleaners to clear tables and used food utensils. Factors contributing to the problem include a tight labor market and unattractive work conditions. After a meal, Patrons of the Food centres would simply leave used food utensils and their remains on the Food Centre tables. This practice characterizes the convenience and culture of Food Centres all around Singapore. Initially, individual Stall Owners were responsible for clearing the trays & utensils of Patrons from their respective stalls. When individual Stall Owners could not handle the additional workload that arose from the cleaning of tables, contract Cleaners were employed by the Food Centre Operator to undertake these tasks. Now, in addition to the role of organizing and managing the Food Stalls, Food Centre Operators are also in charge of overseeing the clearing and cleaning of eating utensils. Usually several Cleaners are employed by the Food Court Operator to clear the used food utensils, throw away the food remains and ensure that the tables in the outlet are clean and hygienic. In a bid to improve their productivity, Food Centre Operators started to contract Cleaners for the collection of empty food trays and waste food.

Now, the reality is that with the pressures of a lunch time crowd, the contract Cleaners are unable to clear the tables fast enough. As a result, the utensils and left over food attracts rodents and birds, especially pigeons. Pigeons have become a commonly problem faced by all Food Centres. Not only does this compromise the hygiene of the F & B outlet, but these birds are also a potential source of infection. However, increasing labour costs and labour shortages more particularly of the unskilled type, makes it difficult for Food Centres to hire more contract cleaners. The trend of increasingly labour and problem of high operating costs forces Food Centre Operators to turn to innovation and productivity solutions to manage their food centres. In the foreseeable future, the operating costs of Singapore F & B outlets are expected to be pressured by the higher wages created by existing labor and economic

conditions. Thus, the present lack in supply of contract Cleaners and the future need to increase the salaries of these contract Cleaners in order to hire Cleaners poses an urgent problem for Food Centre Operators.

5 The present solution of outsourcing the cleaning job to a third party is an attempt to contain operating costs in the face of a lack of supply of cleaners. In fact, many Food Centres now turn to cleaning companies to supply them with contract cleaners for clearing and cleaning tables and eating utensils and then washing and cleaning the food utensils for re-use among all the stalls. However, at public hawker centres, the National Environment Agency (NEA) still needs to closely supervise the cleaning services provided by these cleaning companies
10 to ensure that food remnants are removed expeditiously so that birds are denied of food sources and that a good standard of general cleaning and table cleaning services are maintained within the F & B centre. The bird nuisance is a particular issue of concern for public hawker centres that are mostly outdoor. Meanwhile, at privately owned coffee shops in addition to similar problems faced by at the hawker centres, private vendors need to
15 continuously manage overheads while maintaining competitive and economical pricing. Therefore, the core labour issue still plagues these cleaning companies and remains a pressing issue to be solved by all F & B outlets around Singapore.

As the main regulatory body of all F & B outlets in Singapore, the NEA foresaw such trends and challenges, and introduced a Tray-return Initiative in 2012 to encourage users to return
20 the used food tray as an act of social graciousness. The educational campaign was met with a mixed reaction and the results of the campaign remain ambiguous. Patrons of Singapore's F & B/Food Court and Hawker stalls remain entrenched in their habits of leaving food utensils and food remains on the table after their meals. Social habits require time to change and NEA has remained committed with the campaign. The campaign stepped up with the
25 introduction of a food coupon initiative to entice Patrons later in 2012. Not only has the use of incentive resulted in a lukewarm response and support from the public, but the incentive system has also been subjected to abuse by certain users. Patrons have also been resistant to the change with claims that returning their own food tray will deprive the cleaner of his or her job. As a result, the government campaign remains sluggish as the inertia to change old
30 habits coupled with the reluctance to carry out such manual tasks have not translated into tangible results as of 2016. Thus, an ideal productivity tool would be one that not only works within the habits and culture of the Singaporeans as Patrons, but also allow Food Centre Operators to maintain optimum hygiene standards with a minimum number of cleaners, and at the same time serve to enhance the productivity of cleaners.

Besides Government and civic initiatives, other viable approaches would be to introduce productivity tools to address the problems discussed above in line with the Government's push towards Innovation and Productivity. Unsurprisingly, inventions for semi-automated cleaning systems for F & B outlets have been proposed that are in fact both an innovation and a productivity tool. One such approach was proposed in 2013 to encourage tray returns. The invention known as the RFID Tray Return System (Singapore Patent Application No. 2013038955) that makes use of the existing RFID technology to encourage tray return, through an incentive in either the form of money or vouchers which is dispensed automatically by the system upon successful return of the tray.

However, this Tray Return System faces many limits. Though being a productivity tool, it retains many elements of human monitoring and conventional policing for the overall administration of the technology, and thus again is dependent on the level of civic mindedness of the F & B Patrons. The Tray Return System works on a disincentive such that the public is compelled to return the tray, which offers them a token sum or vouchers upon successful return. In other words, this productivity tool does not work within the habits and culture of Singaporean Patrons. A further disadvantage that Patrons may be deterred from usage because the use of the time it takes to dispose the waste food and utensils into its respective containers and when faced with the realities of a lunch or dinner crowd, inexperienced users may take a long time or even form a bottle neck. Working executives would rather forego the meagre incentive when faced with such a situation, thus defeating the purpose of the Tray Return System.

From the Food Centre Operators' point of view, there are also many drawbacks that deter them from the practical implementation of the RFID Tray Return System. An important technical feature as well as drawback of the RFID Tray Return System is its high dependence on Internet Connectivity because of the use of a Wifi-Router. In the event of a disconnection, the system is disabled and unable to function independently. Another disadvantage is the policing needed when abuse is detected through the triggering off of an alarm. This system would potentially incur for vendors' additional overheads. Especially so for some private coffee shops, since the opportunity costs of setting up and maintaining the RFID Tray Return System would be more than the overheads incurred in hiring several cleaners. A specified technical feature of the RFID Tray Return System is that the tray has to be sent back to the admin office to be registered with value ready to be issued to the stall again after washing. This creates additional administrative responsibilities for the office of the F & B Operators which has to be separately handled besides maintaining the hygiene standards and supervising the work of the cleaners. These drawbacks deter Food Centre Operators from enjoying the advantages from this RFID Tray Return System, which may

offer an explanation for why Operators have not caught on to this highly needed solution. An F & B management system is needed that not only accounts for these drawbacks but is also mindful of other key players and stakeholders.

While the RFID Tray System does not account for the Individual Stall Owners, it seems like it would be the Individual Stall Owners who would face the most problems should the system be implemented. The use of the RFID Trays exposes the Individual Stall Owners to various risks. For one, they are held accountable for the number of trays issued to them by the Food Court Operator. A drawback of the system would be pilferage of the trays amongst Individual Stall Owners in order to account for these trays in the event the trays do not tally at the end of the day. Since the trays are not individualized there are no practical ways to prevent such petty theft. This creates additional stress and consideration on the side of the Individual Stall Owners that do not directly benefit from the system but are a stakeholder in the system. Thus, Food Centre Operators are deterred from the implementation of the RFID Tray Return System.

Lastly, the greatest drawback is that the Tray Return system and Point of Sale (POS) system are not integrated, which would result in lower productivity and more manual procedures resulting in a duplication of work for stall Operators. An ideal invention would combine the Tray Return System and the POS System as a tool for productivity.

US Patent No. 7,839,289 discloses an object monitoring, locating, and tracking system and method employing RFID devices, which is an RFID system and method utilizes the power level of messages received from an RFID device for monitoring and/or locating and/or tracking the RFID device, e.g., and typically an object associated with the RFID device. The power level of received messages may be indicated by power level information contained in the message, or by the strength of the received signal carrying the message, or by both. The RFID system and method may be employed to monitor a condition of an object, e.g., a closable container, as to whether it is and/or has been closed or not, including being tampered with. Messages received from the RFID device, as well as an indication of a condition, may be relayed to a remote location.

US Patent No. 8,952,791 discloses a Method and system for tracking RFID tags for use in advertising and marketing. The patent is a method and system for tracking an RFID tag within a defined 3D space and can be used to identify objects within a live performance and create hotspots with respect to the objects, which allows viewers the ability to select objects that are associated with one of the hotspots, and transmits their interest in the selected object to one or more users. Preferably, the system operates such that hotspots can be created for previously created video, newly created video media, as well as live broadcasts.

SIMILAR RFID PROPOSALS USED FOR TRACKING OR CHECKING

RFID has been successful in many fields of applications as seen from the various contexts that it has been employed. One of the applications for RFID is in tracking of assets be it trays or other types of assets. There is a known “RFID System for Checking Medical Items” that
5 employs the same RFID technology for checking medical items as part of the preparation process for a surgical operation via the configuration of identification codes in order to determine the completeness of the medical items based on the received identification codes. However, the application is very specific and limited to use in the medical sector only.

Another known application for RFID is “RFID Antenna System for a storage shelf” which is
10 also used in the medical sector. This invention relates to a RFID antenna system for use in a medical supplies storage shelf forming part of the medicine trolley equipped with the RFID reader for monitoring the dispensing of medicine and medical supplies in a health care institution.

In the context of libraries, there is known a “SMART Secure RFID Item Return Collector”
15 where the application of passive RFID technology is further exploited in tracking of library books, file documents, audio and video CDs integrated into an effective library system such that the loan of items complements the RFID library management systems and file management systems. Once again, the application of this usage is internal and administrative.

Use of RFID and POS Systems are also known. An invention for “SMART RFID Checkout
20 Kiosk” combines two known technologies where the POS software and system is linked up to the RFID technology. This application utilizes multiple payment methods and is a means to improve the productivity of understaffed and busy sales outlets. It would be ideal for an invention to exist in the F & B sector, to benefit from the productivity advantages conferred
25 by the use of the RFID technology and the POS System.

POS SYSTEMS FOR TRACKING AND CHECKING

POS Systems are computerized systems that consist of registers, computers and peripheral equipment. As its name suggests, at each point of sale, the computer system keeps track of the sales, output and input. The information generated by the POS system is especially
30 useful and convenient for accounting and book keeping purposes. POS systems are widely used in the F & B industry as they facilitate tracking of revenue and checking of income collections. Thus POS Systems are also tracking assets, albeit financial assets including cash and receivables. Today, many registers are computers or iPads. These registers are connected to a server, also known as a “store controller” or “central control unit”. Various

registers at multiple stores can all be connected to this main sever, where managers can easily monitor sales and find out other needed store data. Thus, this known technology is widely used to keep track of sales, labor and payroll but has not been used for tracking of trays. Ideally, the benefits of this technology can be extended to the tracking and management of Trays through a computerized system.

What is lacking is an asset management system (Trays) in which tray management is automated and incentivized by charging the tray user (Patron) a financial deposit on use and returning the said financial deposit upon return or deposit into a Tray Return Centre.

What is also lacking is the absence of a POS integrated with a Tray Management system, whereby financial deposit for trays are automatically entered into the POS System and linked to an issue of a Tray and when the Tray is deposited or return to the Food Centre, a sum equal to the financial deposit is paid to the patron and the entire series of transactions linked between the POS system and the Tray Management System seamlessly, resulting in no loss in the value of initial sum of monetary deposit used to set up this Tray Management System.

What would be more desirable is an integrated POS system and Tray Management System wherein data from RFID Tray Management System and sales/purchase data from the POS System are stored and use for promotional purposes and customer relationship management of the Food Centre.

SUMMARY OF THE INVENTION

In accordance with the present invention, it is an object of the present invention to provide an asset management system for food centre or the like comprising:

a tray management system incorporated with an interface module, and including at least one tray deposit centre having a RFID reader;

a plurality of trays, each tray embedded with a RFID tag, in communication with a tray management system,

a point of sale (POS) system electronically linked to an interface module to a tray management system, said POS system having a plurality of POS machine in each of food stalls within a food court, wherein a plurality of trays are embedded with RFID for tracking, and the RFID reader detects the trays and the RFID reader at the stall functions to read the RFID on the tray, activating it for use and another RFID reader at a Tray Return centre deactivates the RFID tray upon it being dropped into the Tray Return centre and upon refund of monetary deposit; and

a Promotion System wherein the data generated from the tray management system and the POS system, through the interface module, are stored and processed for promotional and marketing purposes and for customer relationship management.

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Another main object of the present invention is to provide a method of tray returning using the asset management system, comprising the steps of (i) placing a RFID tray in a port of the tray return or deposit centre; (ii) picking up data of the RFID tray and transmitting the data to the Tray Management System; (iii) confirming the data of the tray to that of an activated tray; (iv) transmitting a signal to the payment device to release a monetary sum (deposit) that was earlier deposited by the patron upon purchase of food or drink and which was paid to the stall.

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An object of the present invention is to solve the core labour issue faced by F & B outlets with regards to tray return by Patrons and tray clearance by Cleaners. This is done through a two-prong approach, of making existing cleaners more efficient while reducing the food centre's reliance on an increasingly tight labour market.

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Another object of the invention is to reduce the work load of Cleaners while helping to make them more efficient by being faster and more productive in cleaning. Operators of F & B outlets cannot do without cleaners completely. However, now with the present invention they are able to hire the minimum number of cleaners, who are able to work at maximum productivity and efficiency because Patrons are encouraged to return their trays, and Stall Owners are able to issue trays with ease. Cleaners are able to focus on the actual cleaning of plates at the dishwashing area, without having to walk around the entire area of the hawker centre to collect plates multiple times and finally gathering them all at the common washing area – keeping the number of cleaners to the minimum, which is ideal. The unattractive work conditions for cleaners because of the low pay can also be improved with this invention. In the event that Patrons choose to forego their monetary deposit, Cleaners are motivated to clear the trays expeditiously because of the potential of obtaining the monetary deposit. This would not only make up for the Cleaners' low pay but also reduces the burden on the Operators while not disadvantaging Cleaners. Patrons can also choose to forego their monetary deposit as an act of social graciousness – in the form of a tip for the cleaner who clears away their tray after their meal. This makes the actual operations of the Food Centre much smoother and integrated. All stakeholders in the Food Centre are able to focus on doing what do they best. Food Centre Operators are able to focus on the management of the day-to-day running of their stalls without being plagued by various petty concerns such as tray count or birds as a nuisance. Individual Stall Owners are able to pour

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themselves into the preparation and service of food, without being bugged by additional responsibilities for tray allocation and collection or exposed to unnecessary risks. The Tray Management Process is straightforward for the Stall Owner as well, as it does not involve additional tasks or responsibilities.

5 A further object of the present invention is to provide a Tray Management System integrated with a POS system. The benefits of employing an RFID system to track tray issue and return can be extended to the F & B industry to increase productivity. Having a tray management system, which encourages Food Centre Patrons to return RFID embedded trays by charging a monetary deposit for use of a RFID embedded tray and then returning the said deposit to
10 them upon return of a RFID embedded tray at specific locations, may help Food centres manage the Tray Return problem. Such a solution would also improve productivity for Food Centre Operators. The integration of the Tray Management System with a POS system such that the inclusion of a monetary deposit for the use of the tray and refund of the monetary deposit upon return of the tray and after consumption of a meal or drink would increase
15 productivity and be a seamless way to encourage tray returns. This productivity solution would benefit all relevant stakeholders involved including Individual Stall Owners, the Cleaners as well as the Food Centre Operator.

A further object of this invention is an F & B management system that integrates the disparate systems of the food centre into a seamless management system. There are
20 various practical considerations and aspects that Operators face in the day to day operations of an F & B outlet. While the form of the invention appears the same as its prior art, the substance that makes up this invention is vastly different. It is no longer simply a tray return system, but an F & B management system with a Promotion System since it elegantly manages all stakeholders in the system to maintain the hygiene standards of the F & B
25 outlet. By integrating the Tray Return System with a POS, the management of F & B outlet and the Stall Owners are relieved of the manual tasks of tracking the trays and the cumbersome task of collecting a deposit for the issue of a tray and then reimbursing the Patron for the deposit. The accounting of the tray returns occurs within the POS system through an interface module that connects the tray system and the POS system. The Tray
30 System accounts for the number of trays in physical units. On the other hand, the POS system accounts for the number of trays in monetary terms. The manual process is now replaced with this automated system using the existing technology of a POS within the F & B sector. The use of a Promotion System would enhance the Tray Return feature of the Tray Management System through incentivization of usage of RFID Trays and using the issue
35 and return of the RFID Trays to promote patronage of the Food Centre or promote

patronage of a certain brand sold at the Food Centre or even patronage of a group of stalls or individual stalls at the Food Centre.

A further object of the present invention would be a straightforward and closed process for the Patron. The Invention creates a closed system such that the monetary deposit for use of the tray is returned to the patron upon successful return. It may also happen that a Patron may be issued with a tray from one stall but may continue to purchase other meal items from other Stall Owners. The collection of the monetary deposits for RFID tray issued is thus not linked to any stall as at the end of the business day, and yet the stall who has collected the monetary deposit for the tray would have the said deposit deducted from the sales collection for the day, all being carried out by the POS system and without human intervention, which would increase productivity. The invention works within the culture and habits of Singaporeans because it does not depend on lofty ideals such as social graciousness but instead promotes return of trays based on a good understanding of our inherent motivation towards money. The process is straightforward for the user – with every return, the Patron receives a refund of the monetary deposit paid earlier at the time of purchase from the stall.

A further object of the invention is a straightforward and closed process for Food Centre Operators and Individual Stall Owners. The Invention is created to take into account all the stakeholders through the creation of a closed system. Without any loopholes or potential for abuse through multiple returns or the potential to capitalize on the monetary incentives of each tray return the invention reduces the risk for the Food Centre Operator and Individual Stall Owners. Since the cost of the tray is factored into the cost of the meal, a refund of monetary deposit to the patron through a payment device upon successfully return of the tray ensures there is no monetary loss for the Patron or for the Stall Owner. The addition procedure of a Centre Manager managing the monetary deposit and refund module of the Tray Management System integrated with a POS System not only ensures the system is properly managed and integrated with the POS system but also accounts for the tray in such a way also closes the system and reduces potential loopholes and abuse for malicious users.

Another object of the present invention is an efficient account for all the trays issued by the Food Centre Operator to the Individual Stalls through an automated POS system. In the Tray Management System, the accounting of the trays is no longer done manually. The actual workings of the Tray System would be such that at the start of the day, a Staff from the Vendor would manually allocate a fixed number of trays to each Stall Owner by going round the complex handing out these physical trays. The trays allocated would have been tagged and accounted for in the Tray Management System. At the end of the day, the Operator's

Staff has to go around to each store to ensure that the trays are accounted for. Each Stall Owner does not have to manually account for the trays that he issues to the public. A manual process is extremely tedious and prone to mistakes. Instead when the Patron pays for the food, a monetary deposit for tray use is also included in the payment by the Patron. A

5 RFID tray is then released by the Tray Management System, having been read by a RFID Reader in the Stall. The integration of the Tray Management System with the POS system would relieve the Stall Owners and Food Centre Operator of manual responsibilities that can now be automated. With the POS system, trays are accounted for automatically via the POS system and do not require physical accounting for. The physical accounting is now being
10 taken care of by the POS system through an interface module. With the POS system interfacing with the Tray Management System, monetary deposits are accounted for automatically via the POS system. The Food Centre Manager would only have to “top up” the initial sum placed in each of the Payment Devices dispensing the monetary deposits at the start of each day, before commencement of the business of the Food Centre. The
15 physical accounting of monetary deposit is now being taken care of automatically by the POS system through an interface module.

A further object of the present invention is to allow users to return their trays with ease and convenience through minimal involvement of the Patrons and Stall Owners as well as the Food Centre management, this reduces the time involved for all the stakeholders required in
20 the operation of a Food Centre.

A further object of the invention is an automated F & B management system which comprises of an asset management system for trays and a POS system.

A further object of the present invention is a tray management system using the non-abrasive and non-invasive means of registering a new tray through a RFID Ultra High
25 Frequency (UHF) Passive Tag also known as a Unique Tray Primary Key. Through the RFID system, the RFID tray is set to be “active” when the stall owner issues the tray. An “active” tray (or “activated RFID Tray”) refunds the monetary deposit to the patron through the payment device upon the patron returning the RFID Tray into the Tray Return Centre. After the monetary deposit is dispensed, the RFID Tray is “deactivated” and it can no longer send
30 any signal to the Payment device to issue further payments – where an “out of service” message will be displayed by the system. Simultaneously, the Tray Management and POS system records all transactions of the trays automatically. Thus, an object of the present invention is a means for keeping track of trays through the use of Tray Management System and POS system using a tablet to view reports of the tray management system.

A further object of the present invention is the generation of data and information through the RFID Tray System and POS System and storage and integration of the data in the Promotion System for marketing and promotional purposes and for Customer Relationship Management. Information such as details of trays and monetary deposits collected and returned are generated automatically by the Tray Management System/POS system. Through the software solution and modules in the present invention, specific and general data is generated into a report that accounts for every tray, specific tray location, time and date. At each scan, the Tray Monitoring Module provides specific information for the food centre operator or stall owner.

A further object of the invention in the generation and storage of data is in building of a membership database. In order to retain custom, purchasers can be encouraged to patronise the Food Centre more frequently by introduction of a membership scheme. As such, the POS system can include customer ID (membership ID) so that purchasers can be identified as members when patronising the Food Centre on a regular basis. With the integration of membership data in the Promotion System (via the POS system), and tray return data (via the tray management system), the invention would provide operators and stall owners with valuable information on member-specific data and analytics. In turn, the Food Centre can introduce various promotional and marketing programs to continue to attract members to patronise the Food Centre and to introduce more customers to the Food Centre.

A further object of the invention is to utilize existing productive features of the technology and data captured to create a variety of innovative solutions for operators and vendors. The Game Circuit feature is one particular innovative means that can be employed, where patrons of one or more selected trays which are returned can be entitled to a cash or product incentive through the use of a game campaign.

Another object of the invention is to utilize existing productive features of the technology and data captured is a Promotion System with the capability to carry out Brand Promotion or Event Promotion where selected patrons of the tray return can be entitled to a cash or product incentive when one or more selected trays used for the purchase of a Brand or purchase during the event. of a game campaign. Various promotion programs would be set up based on promotional parameters such as date range, stalls involved, food or drink items involved and so on.

Another object is using a membership system wherein patrons can join as members of the food centre and receive promotional, discounts on food and beverages and marketing benefits through use of a membership scheme, wherein the data collected in the POS

system are captured and kept in the Promotion System to track purchases by members for purpose of determining the type and kind of marketing and promotional benefits given to these members.

5 BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the invention, its advantages, and the objects attained by its use, reference should now be made to the accompanying drawings. The accompanying drawings illustrate one or more embodiments of the invention and together with the description herein, serve to explain the workings and principles of the invention.

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FIG. 1 is a layout of a typical Food Centre using the Tray Management System and POS System in accordance with the present invention.

FIG. 2 is a flow chart of the Tray Registration Process in accordance with the present invention.

15 FIG. 3 is a flow chart on sequence of handling of the tray by Tray Management Module.

FIG. 4 is a schematic of a Food Centre using the present invention, with a plurality of food and drink stalls in accordance with the present invention.

FIG. 5 is a schematic of a Food Centre using the present invention, with a plurality of food and drink stalls at the commencement of a purchase by a Patron in accordance with the present invention.

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FIG. 6 is a schematic of a Food Centre using the present invention, with the Patron being issued with a tray and enjoying the meal at a table in the Food Centre in accordance with the present invention.

FIG. 7 is a schematic of a Food Centre using the present invention, with the Patron returning the tray to a Tray Deposit Centre in the Food Centre in accordance with the present invention.

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FIG. 8 is a schematic of a Food Centre using the present invention, with the Patron receiving the Deposit from the Tray Deposit Centre and the Tray processed inside Tray Deposit Centre.

FIG. 9 is a schematic of a Food Centre using the present invention, when a Patron returning a Tray being Nth Number, triggers a light and siren, the Nth Number Tray based on prescribed tray count, when the Nth Tray is deposited at the Tray Deposit Centre.

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FIG. 10 is a flow chart of the sequence of the game circuit feature of the tray management module.

FIG. 11 is a flow chart of the data and information processed by a Promotion Module in the combined POS and Tray Management systems.

5 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is now explained by reference to the Figures. The drawings are illustrative and are not to be taken as the only way the present invention works.

FIG. 1 is a layout of a typical Food Centre using the Enhanced Tray Management System and POS System in accordance with the present invention. Fig 4 schematic of a Food Centre using the present invention, with a plurality of food and drink stalls in accordance with the present invention.

The key components of the Tray Management System integrated with POS are as follows:-

a. Food Centre

A Food Centre would consist of a plurality of Food and drinks stalls (12). These stalls (12) would be managed by individual Stall Owners/Operators. The Food Centre Operator has an Enhanced Asset Management System comprising a Tray Management System (50), a Promotion System (55), an Interface Module (60) and a Point of Sale (POS) System (70).

In accordance with the present invention, the POS System (70) is electronically linked to a POS machine (14) in each stall, and all are linked electronically to a computer server (80).

b. Food Stall

Each food or drink stall (12) is equipped with a POS machine (14) linked to a POS System (70) and RFID Reader (16) linked to a Tray Management System (50). The POS System would also allow membership details of patrons who are members of the Food Centre to be captured as part of the purchase data, which would be also stored in the Promotion System (55).

c. RFID embedded Trays.

These are the trays (10) used to carry food and drink items which are purchased from the stalls (12) within the Food Centre. Each Tray (10) contains a RFID unit containing certain data items. With an RFID unit, each tray is uniquely tagged. The RFID in each tray would be activated automatically when the Stall Owner/Operator receives payment from a Patron paying or charging the purchase at

the stall (12). The Stall Owner would enter the receipt of the sum as a financial deposit into the POS System (70). The data would be transmitted to the Tray Management System (50) as well as to the Promotion System (55) via the Interface Module (60) and a RFID tag in a Tray would be activated and issued to the Patron.

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If a promotional event is to be held such as encouragement of Tray Return by awarding patrons returning Nth Tray (N being any number or numbers), a specific promotional program in the Promotion System (55) would be activated. Once the Promotional Program is activated based on the specified parameters (for a specific range of dates, for all or some stalls, for some food or drink items or for all purchases and so on), the Promotional System (55) would count the number of Trays issued at all Stalls. The Number 1, 2, 3 and so on would be assigned and linked to the Tray ID. In this manner, when a specific number is designated as N, and that Nth tray is deposited in the tray Return Centre, the return would be detected. The detection would be announced to the Food Centre through various auditory and visual gadgets to introduce a carnival ambience to the patron who had deposited the Nth tray.

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d. RFID Readers

These are RFID sensors (24) which activate a tray upon receipt of signal from the Tray Management System (50).

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e. RFID sensors

These are RFID sensors (24) which read the return of RFID embedded tray (10) into a Tray Deposit Centre (20).

f. Payment devices

These are payment devices (26) which would release a sum of money i.e. a \$1 coin or \$2 note or the like by the Tray Management System (50) upon fulfillment of certain conditions.

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g. Tray Deposit Centre

The Tray Deposit Centre (20) is located within the Food Centre and allows Patrons to return their trays upon consumption of their meals. One or more Payment Devices (26) would be installed at the Tray Deposit Centre (20) to enable Patrons to return their RFID trays (10) into tray receiving ports (22) in the Tray Deposit Centre (20). The Tray Deposit would also have sirens and lights installed which would go off when specific Tray ID is returned, as part of the process of encouraging tray return or as part of a Promotional Event or Brand Purchase event.

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h. Tray Receiving ports

Tray Receiving ports (22) are openings in the Tray Deposit Centre (20) through which the RFID Trays (10) are returned by the Patrons. RFID sensors (24) are

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installed at these Tray Receiving Ports (22) which would read the RFID of a tray as it is inserted into the port.

i. Tray Management System (50)

The issue, movement and tracking of RFID Trays are controlled by the Tray Management System.

j. POS System

The POS system is known and would not be described.

k. Interface System (60)

An interface system (60) allows the data in the Tray Management System to be linked and used by the POS system (70). Likewise, data from the POS System would be linked and used by the Tray Management System.

j. Promotion System (55).

Tray Promotion System (55) would contain a plurality of promotional programs written to fit the occasion or promotional activity. A specific promotional program would be activated when a specific Promotion is to be held. For example, a promotion can be launched for “Customer returning the RFID Tray to the Tray Deposit Centre with Lucky Number selected from the Promotion System” or “Nth customer returning Nth number tray issued for a period and who returned the Nth Number Tray into the Tray Deposit Centre” or “customer with Nth Tray who purchase a particular brand of beverage” who returned the Nth Tray or “customer issued with Nth Tray for an event and who returned the Nth tray”. The parameters of the Promotion event are decided before commencement of the event and details entered into the Promotion program and stored in the Promotion System (55).

The Promotion System (55) would also have a database wherein the tray data from Tray Management System and sale/purchase/membership data from the POS System are stored.

The Promotion System would be flexible enough to allow Food Centre-wide promotion as well as individual promotions carried out by specific food and beverage stalls or a group of stalls. The promotion could also be ad-hoc e.g. for a day or even for a few hours.

The Enhanced Asset Management System allows operators and stall owners to effectively manage one of their most overlooked assets – trays, previously manually accounted for by operators. Now that these trays are electronically managed by the tray management system, the tray data is also utilized by the data mining application within the tray management

system to provide good analytics for tenants as well as the Food Centre Manager who will be able to utilize these data to plan future business promotions or marketing campaigns.

The Tray Count Module (51) provides users with real time information on the location of a tray etc., via the Computer Server (80). The data provided by the tray count module (52) is also processed by the data mining application (56) to provide analysis and statistics of the data registered within the module (52).

As a tool, the Tray Management system can generate data, from the point where the tenant hands over the tray to the customer, up to the point when the customer returns the tray to the tray return point. Based on the varying timings data such as

- Volume of Customers in specific time belts
- Average flow of Customers in specific time belts
- Duration spent by each Customer at the Food Centre
- Average staying time per Customer in specific time belts
- Individual Stores highest 'check in' count and/or lowest 'check in' count.

The above data can be derived in an aggregated format at a macro level (volume/duration of the entire food centre) or at a micro level (volume/duration of a specific store). As tray tracking beginning immediately at output from the Stall to input at the tray deposit centre, is done by the system on a daily basis, data reports over a 24-hour period, 7-day period or 31-day period can be generated. Both the Food Centre Operator and the Individual Stall Owners are able to track overall/individual patron traffic flow via tray output and input counts on a week to week comparison or a month to month comparison. Individual Stall Owners also have access to the data of other Stall Owners in order to gauge their business performance vis-à-vis other Stall Owners. Most importantly, individual Stall Owners are able to have specific analytics behavior data based on their own customer base. This is especially useful in the context of a Food Centre, where different food concepts might have different types of Customer behavior.

FIG. 2 is a flow chart of the Tray Registration Process of the Tray Management System in accordance with a preferred embodiment of the present invention.

The Tray Registration Process commences with the embedding of a RFID tag on the Food Tray to form the RFID Tray (10). The Tray Management System (50) comprises the components as follows:

- A passive UHF RFID in each Tray which is assigned an unique ID;
- A Desktop reader (16) for tag association;

- Mobile Tray reader (16);
- Tray Reader (16) in each stall;
- RFID Sensor (24) in Tray Return Port; and
- various components such as the antenna (30), reader (16), processing unit (40) and electronically in communication with a server (50) for the tag association of trays.

All components are linked electronically to each other. Asset Data from the Tray Management System (50) would interface with the POS System (70) through an Interface Module (60). The POS system (70) would process financial data including financial values assigned to the issue and activation of a RFID Tray (10) and return of a RFID Tray (10) into one of the Tray Return Ports (22). If purchasers are identified as members of the Food Centre, the POS system would also capture their membership ID.

The antenna (30) is meant to facilitate the tag association transactions and is embedded with the desktop reader (16). The Tray Management System (50) is connected to the server (80) and interface with the POS System (70) via an Interface Module (60).

FIG. 3 is a flow chart of the sequence in processing of a RFID Tray when a customer makes a Purchase in accordance with the present invention.

The working of a Tray Management System (50) which is integrated with a POS System (70) is now described with reference to Fig 3 and Figs. 4 to 8.

A system overview is now given by reference to Fig. 4 in accordance with the present invention. The Food Centre has a Tray Management System (50), a Promotion System (55), a POS System (70), and an Interface module (60) to track the payment of a monetary deposit paid or charged to a Patron upon ordering food or drinks at any of the stalls in the Food Centre, and returning the said monetary deposit to the Patron upon the Patron upon depositing the RFID Tray (10) into a Tray Return Centre (20). The integration of a Tray Management System (50) and POS System (70) allows the Food Centre Operator to reconcile monetary deposits credited to each F & B outlet with the monetary deposit returned to all Patrons and RFID Trays (10) issued and returned to the Tray Return Centre (20). The Promotional System is activated for events and activities such as "Lucky Customer" event covering a period of days, or Promotional event for an evening or Brand promotional event for a period of days purchase of a particular brand.

The various elements of the Invention are described herein.

a. Food Centre

A Food Centre would consist of a plurality of F & B outlets or stalls (12), each F & B outlet having a Point of Sale (POS) machine (14), all linked electronically to a computer server (80).

5 b. Stall

Each food or drink stall (12) is equipped with a POS machine (14) which is linked to a POS System (70) in use in the F & B Centre. Each food or drink stall is also equipped with a RFID reader (16) and a plurality of RFID trays (10).

c. RFID embedded Trays

10 These are the RFID trays (10) used to carry food and drink items which are purchased from the stalls (12) within the Food Centre. Each Tray contains a RFID unit containing certain data items.

d. RFID Readers

15 e. These are RFID readers (16) which read and activates a RFID embedded tray (10) upon issue.

f. RFID sensors

These are RFID sensors (24) which read the return of RFID embedded tray (10) into a Tray Deposit Centre (20).

g. Payment device

20 These are payment devices (26) which would release the monetary deposit i.e. a \$1 coin or \$2 note or the like by the Tray Management System upon fulfillment of certain conditions. The Payment Devices are electronically linked to the POS System (70) and the server (80).

25 The Food Centre Manager is the one who tops up the Payment device each day and review daily reconciliation reports on monetary deposit received and recorded at each POS machine of each stall and refunds made by the Payment Device. For example, if a Stall had issued 10 RFID Tray (10) for the day, a monetary sum equivalent to the monetary deposit for 10 RFID Trays would have been recorded against this particular Stall. The POS System (70) would then release monetary value equivalent to 10 trays back to a suspense account
30 managed by the Food centre Manager. The Food Centre manager also collects the monetary deposits which the stall holders had charged to replace or restore the equivalent value of refunds issued by the payment devices (at the tray deposit centre). The integration with POS system (70) allows the Food centre manager to have a clear report on tray
35 movements/ deposits from each stall. In this manner, the stall holders who had collected the monetary deposit from the patron would be able to account for the monetary deposits to the Food Centre Manager. Likewise, the patron who had dropped the RFID tray (10) into the

Tray Deposit Centre (20) would have obtained refund of his monetary deposit from the Payment Device (26). Most important of all, the Food Centre Manager would be able to restore the value of monetary deposit issued by the Payment devices which have been refunded to patrons upon return of the RFID Trays (10) into the Tray Deposit Centre (20). In this manner, the Food Centre Manager would be able to ensure the monetary value in the Tray Management System (50)/POS System (70) is maintained, without any loss or gain. In the event there is a loss or gain, the daily reconciliation reports produced by the POS and Tray Management System to assist the Food Centre Manager in reconciliation and tracking of any variance.

- 10 The Food centre Manager would also set up the parameters in the Promotion System for a Promotional event, and enter such details as start date/time of the promotional event, stop date/time of the promotional event, coverage of food and beverage stalls and the like into the Promotion System to run the promotional event.

According to Fig. 4, each stall (12) would have a POS machine (14) and a RFID Tray (16).

- 15 The POS machine (14) is electronically linked to POS System (70) and the Tray Management System (50) and financial and other data passed to each system via an Interface Module (60). The POS System (70) and Tray Management System (50) is part of an Asset Management System of the Food Centre.

At the start of daily operations, a plurality of RFID trays (10) are handed to each stall

- 20 Operator. The Food Centre manager would also “top up” the monetary deposit at each Payment Device to its initial start value.

Fig. 5 describes the process when a Patron makes a purchase at a stall in accordance with the present invention. The Patron would first pay to a stall owner the costs for the food and monetary deposit for each RFID tray (10). Each RFID Tray (10) is tagged with a passive

- 25 Ultra High Frequency (UHF) RFID that weighs 1g and having the dimensions of 56mm by 12mm by 1.8mm. With a stable read range of up to 2 m, it is with an embedded antenna (30) to perform various functions such as programming of tags and association of tags. With the UHF RFID tag, each tray is issued with a unique RFID that is triggered or activated to be “in use”. The activation comes from the Tray Management System (50), which receives data from the POS system (70), informing that a monetary deposit has been paid at a POS machine (14) at a particular stall. If the patron is a member of the Food Centre, membership details would also be captured.

Fig. 6 is an illustration showing the Patron leaving the stall with the food or drink, having paid for the food or drink as well as a sum of money as monetary deposit for the tray.

The Tray Management System (50) is now keeping a record of the particular RFID tray (10) which is now in use. The data kept by the Tray Management system (50) may include data on time and date of activation, identity of the stall from which the tray was activated.

Figs. 7 and 8 describe the process when the Patron has completed his meal or drink, in accordance with the present invention. After the Patron has completed taking the meal, the Patron would walk to a Tray Deposit Centre (20) with the RFID tray (10). The RFID tray (10) is placed in a Tray receiving Port (22) in the Tray Deposit Centre (20). Once the RFID tray (10) passes a RFID Sensor (24) in the Tray Receiving Port (22), data on the RFID tray (10) is picked up and transmitted to the Tray Management System (50). The Tray Management System (50) checks the details of the RFID Tray (10) with the record of the RFID Tray as maintained in the Tray Management System (50), confirming that the RFID Tray (10) had been issued and activated and instructs refund of a monetary deposit. Upon checking these details are in order, the Tray Management System (50) transmits a signal to the Payment Device (26) installed near the Tray Return Port (22). The Payment Device (26) would then release the value of monetary deposit earlier paid by the Patron, who had earlier paid the same value as a monetary deposit to the stall whom the Patron made a purchase of food or drink.

When the monetary deposit is returned, the Tray Management System (50) would update the details of the monetary deposit to match the credit value of the monetary deposit entered into the POS system (70). In this manner, the Food Centre Operator would only see the net sum paid for the food by the Patron to the stall owner which does not include the monetary deposit. (This is important as the Food Centre Operator and the stall owner may have lease arrangements based on turnover of the stall or where payments are centralized by the Food Centre and the stall Operators are paid periodically for the turnover derived from each store.)

The Food Centre manager also collects the monetary deposits which the stall holders had charged to replace the equivalent value in the Payment devices 26 at the Tray Deposit Centre (20). The integration of the Tray Management System (50) with POS system (70) through an Interface Module (60) allows the Food centre manager to have a clearer report on tray movements/ deposits from each stall and separate financial details on monetary deposits and revenue collected at each stall. Hence, there is no actual monetary loss for all involved (Food centre manager, Stall holders, Patrons/customers) and at the same time, a clear picture is obtained by all parties (Stall owners and Food Centre Manager) on all financial transactions recorded by the POS System (70) and the Tray Management System (50).

Once a monetary deposit is returned, the POS system would also send a message to the Tray Management System (80) to deactivate the RFID Tray (10). By de-activating the RFID Tray (10), the RFID tray (10) would not contain any data on monetary deposit credited into the Tray Management System. The RFID tray (10) would continue to contain other asset details such as ID of the Tray. If there is no “financial value” in the RFID tray (10), taking such a RFID Tray (10) and depositing it into the Tray Return Port (22) of a Tray Return Centre (20) would not trigger any release of any sum of money from the Payment Device. This is because the RFID sensor (24) at the Tray Return Port (22) would “read” the data in the RFID Tray (10) but on finding there is no “monetary deposit” in the Tray Management System (50) and POS System (70), would not transmit any instructions to the Payment Device (26) to release any refund. Instead the RFID sensor (24) would activate a sound recording to inform that there is no credit and therefore no payment will be made by the Payment device.

After the RFID trays (10) are returned to the Tray Deposit Centre (20), the RFID trays (10) with leftover food and food utensils are placed on the conveyor belt, as shown in Fig. 8. The conveyor belt would transport the dirty plates to the cleaning centre where the cleaners can then pick up the plates and tray and pass them to the sections for washing and rinsing of trays and eating utensils. The RFID trays (10) are then separately kept pending release to the stalls again.

Promotions System

The inventor notes that additional features can be built into the invention to encourage tray return and at the same time offer new marketing opportunities for management of the centre and stall holders and new experiences for patrons of the Food Centre by incorporation of a Promotions System (55) as part the enhanced Asset Management System for Food Centre.

The Promotions System (55) would have several promotional programs in which parameters can be set e.g. beginning and ending dates, beginning and end times for each date, number of stalls covered by the specific promotion, and so on. One promotion program would be to introduce a game to incentivize patrons to return the RFID trays and deposit these RFID Trays into the Tray Deposit Centre. The game could be some form of prize for the Nth tray returned in a period. For this game, the Promotion System would count the number of RFID trays issued and to make use of the counting to select customers with a specific number assigned to the tray issued to the customer. Since the RFID Trays have a unique ID, the Promotions System can be activated to assign a number for each RFID Tray issued. The assigned number would be issued on a numerical sequence basis The activation basis could be selection of Nth patron, the promotion held over a period of days or selection of Nth

consumer of a specific brand purchased in a period of days or Nth patron making a purchase at any stall in a particular event held on a time period.

Fig. 9 describes the process when the Patron's tray hits the prescribed tray count at the tray deposit centre (20), in accordance with the present invention. The objective of the

5 Promotions System in the Enhanced Asset Management System is the use of an incentive for Patrons who willingly and cooperatively participate in the tray return process. Taking the premise of the present invention to its logical conclusion necessitates that the patron incentivization process be reinforced within and without. Patrons are incentivized by the monetary deposit to return their trays (10) at the tray deposit centre (20). A gamification
10 feature of the present invention stretches the perceived limits of the incentivization process, without extending the incentivization process into potential abuse. As such, the process of incentivization is a game to encourage patrons to return their trays, in which Nth Number tray returned to the Tray Deposit Centre (20) and deposited into the Tray Deposit Port (22) would result in the ringing of a siren or suitable music as well as flashing lights to draw the
15 public's attention to the efforts of that patron which returned Nth Tray.

It may be possible for one or more RFID readers to be installed in locations other than the Tray Return Centres for use in a particular promotion event so that even when the Trays are not returned to the Tray Return Centre, the Tray with the selected RFID number may be read and lights and music played to identify the patron and rewarded accordingly. In this
20 manner, the experience of the patrons in the Food Centre may be further enhanced. However, this is a subsidiary feature of the Promotion System making use of the RFID capability of the RFID Trays. Nonetheless, the RFID Tray has to be returned to the Tray Deposit Centre and placed into the Tray Deposit Port to enable the return of monetary deposit and also deactivating the RFID Tray, before it is recycled back into the RFID Tray
25 Management System to be re-issued.

For the purposes of illustration of the gamification/promotional feature, assume N is set at be 10,000. In other words, the Food Centre Operator aims for the game to be triggered when 10,000th tray is returned in a specified period. In the event after 9999 trays have been returned and deposited into the Tray Deposit Centre, the subsequent tray, being the 10 000th
30 tray that is returned triggers the light siren or music and lights. Since registered tray count data is generated on a real time basis, a light siren can be triggered upon a prescribed count based on user setting. This light siren may be installed at the Tray Deposit Centre or in a few locations within the Food Centre while the music may be played over the Public Address system. For purposes of illustration in Fig 9, the light siren (27) is depicted in the Tray
35 Deposit Centre. When this happens, patrons are made aware that a patron had just

deposited the Nth Tray and would be rewarded. The commercial objective is to create a marketing cum patron retention campaign, where a cash/product prize will be awarded to the Nth patron, where N is set based on other milestone targets by tray return counts. This “lucky draw” gamification feature of the Invention integrates the tray count data generated by the tray management system and the POS system to trigger certain actions based on the total ‘checked in’ tray numbers in pre-determined milestone numbers.

The Nth Tray could be based on all Trays issued by the Food and Beverage outlets in the Centre. In this scenario, each time a Tray is issued at an outlet, a number is assigned. All numbers are assigned sequentially and tracked in the Promotions System. When the Nth Tray is returned to a Tray Deposit Centre and placed into a Tray Deposit Port, the said return would activate the lights and/or siren or music and lights, the music being played over the Public Address system. When the Nth RFID tray is deposited into the Tray Deposit Port, the Tray Management System would also be updated to show the RFID Tray is returned or checked in. Upon checking in, the RFID Tray would be deactivated deeming it no longer in use or in circulation.

Another illustration of the use of the Promotional System is the promotion of a branded beverage for a specific period, be it a month or even for an evening. In this situation, only those stalls offering that branded beverage would participate in the promotion. The parameters entered into the Promotion Module would include the identity of the branded beverage (which is taken from the POS system) and the Tray issued for that branded beverage purchase. When patrons purchase the branded beverage, the Tray ID then issued would be linked to the branded beverage purchase. It can be seen that data on the branded beverage and Tray ID would be shared by POS system, Tray management System and Promotion System through the Interface System.

A step-by-step process of the game circuit is depicted in Figure 10. By way of example, the Promotion is for purchase of branded beverage for a specific period. The patrons who purchased the branded beverage is to be selected on a random basis. In such a situation, the prescribed tray count will be left to a Random Number generator program. In other words, Patrons who bought the branded beverage and returned the Tray (issued for the purchase of branded beverage) into the Tray Return Centre, will be selected by the Promotions System based on the Random Number generator. When the Tray with that particular Random Number is returned, the siren is triggered is similar to how a jackpot machine is triggered when a user wins the grand jackpot. Music may be played over the Public Address System and may be accompanied by flashing lights or even public announcements. The commercial objective is a new marketing tool (promotion of a purchase

of branded beverage) to create a new experience for patrons of the Food Centre. The marketing tool could also be patron retention campaign, where a cash/product prize will be awarded to the Nth patron, where N is set based on other milestone targets by tray return counts. This “lucky draw” gamification feature of the Invention integrates the tray count data generated by the tray management system and the POS system and would enhance the value of the Asset Management and POS system making it into a marketing and promotion tool as well.

The Promotions Module can be used for more than one promotion at one time. Therefore, it may be possible for the “Tray Return Incentive” feature to be an on-going promotional campaign and one or more promotional events such as “Branded Beverage” and “Event promotion” for a specific event to be activated at the same time in the Promotions System.

Further enhancements

The integration of the Tray Management System and the POS system yields many benefits for all stakeholders of the Food Centre. Another benefit that the systems provides is the integration of membership data to tray return data. Membership data registered at each POS machine (14) at individual stalls via a membership card or app can be integrated with the Tray Management System via the interface module. The uniquely tagged tray is linked up with a specific membership portfolio on the POS system which links the tray data to existing membership data in the POS system. This provides Food Centre Operators or Stall Owners with member-specific data and analytics, such as duration of each Food Centre visit etc. Such unique customer behavioral data is immensely valuable for the Operators and Tenants alike.

Conclusion

Preferred embodiments of this invention are described herein, including the best mode known to the inventors for carrying out the invention. Having described preferred embodiments of the invention with reference to the accompanying drawings, it is to be understood that the invention is not limited to the precise embodiment as described herein, and that various changes and modifications may be effected therein by one skilled in the art without departing from the scope or spirit of the invention as defined in the claims. Variations of those preferred embodiments may become apparent to those of ordinary skill in the art upon reading the foregoing description. For example, instead of RFID being used on the Trays, another type of readable data element (such as bar codes) can be used on the trays in conjunction with another type of reader for that type of readable data element (such as bar code scanner).

The inventors expect skilled artisans to employ such variations as appropriate, and the inventors intend for the invention to be practiced otherwise than as specifically described herein. Accordingly, this invention includes all modifications and equivalents of the subject matter recited in the claims appended hereto as permitted by applicable law. Moreover, any combination of the above-described elements in all possible variations thereof is encompassed by the invention unless otherwise indicated herein or otherwise clearly contradicted by context

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CLAIMS:

1. An asset management system for food centre or the like comprising
 - (a) a tray management system incorporated with an interface module, and including at least one tray returning station having a RFID reader;
 - 5 (b) a point of sale (POS) system electronically linked to a plurality of POS machine in each of food stalls within a food court, wherein the plurality of trays are embedded with RFID for tracking, and the RFID reader detects the trays and the RFID reader functions to read the RFID on the tray and activates the RFID tray; and
 - (c) a Promotion System wherein the data generated from the tray management system and the POS system, through the interface module, are stored and processed for promotional and marketing purposes and for customer relationship management.
- 10 2. The asset management system for food centre of Claim 1, wherein the POS machine in each stall is linked electronically to a computer server.
3. The asset management system for food centre of Claim 1, wherein each food or drink stall in the food court is equipped with a POS machine linked to a POS system and RFID Reader linked to the tray management system.
- 15 4. The asset management system for food centre of Claim 1, wherein the trays are issued by the stalls within the food court, and each tray contains an RFID tag.
5. The asset management system for food centre of Claim 1, wherein the RFID tray is activated automatically when the stall owner or operator receives payment of a monetary deposit from a patron.
- 20 6. The asset management system for food centre of Claim 1, wherein a RFID sensor activates the RFID tray upon receipt a signal from the tray management system.
7. The asset management system for food centre or the like of Claim 1, further comprising a payment device to deliver monetary deposit or the like upon the deactivation of the RFID tray.
- 25 8. The asset management system for food centre or the like of Claim 7, wherein the payment device releases a monetary sum equal to the monetary deposit paid by the patron to the stall owner.
9. The asset management system for food centre or the like of Claim 1, further comprising a tray deposit centre allowing patrons to return trays upon consumption of the meal.
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10. The asset management system as claimed in Claim 9, wherein a plurality of openings are provided at the tray deposit centre through which the trays are returned by the patrons.
11. The asset management system as claimed in Claim 10, wherein RFID sensors are installed at the tray receiving ports which read the RFID of the tray when a tray is inserted into the port.
12. The asset management system as claimed in Claim 1, wherein the tray management system contains data on time and date of activation of tray, identity of the stall from which the trays are being activated.
13. The asset management system as claimed in Claim 1, wherein the RFID provides data including tray number, scanning date, scanning time and returning of monetary deposit and said data could also be stored in the RFID tag embedded in the RFID Tray.
14. The asset management system as claimed in Claim 1, wherein the trays are delivered to stall owners and are acknowledged via UHF Passive card.
15. The asset management system as claimed in Claim 1, wherein a RFID sensor read the issue of a RFID embedded tray to a patron, and the RFID reader is mounted with an embedded antenna to facilitate tag associated transactions.
16. The asset management system of Claim 1, wherein each stall in the food centre is mounted with a POS device and a RFID tray reader, and the POS device is electronically linked to the POS system and the tray management system.
17. The asset management system of Claim 1, wherein the Promotion System receives data on RFID Tray from the Tray Management System upon issue of the RFID Tray, purchase and sale data from the POS System and membership data of purchasers from the POS System.
18. The asset management system of Claim 1, wherein the Promotion System can run a variety of marketing and promotional programs, using the data received from the Tray Management System and POS System.
19. The asset management system of Claim 1, wherein the marketing and promotional programs run by the Promotion System can include gamification programs for Tray Return wherein a specific Nth Tray issued by the POS System and returned to the RFID Tray Return Centre and deposited into the RFID Tray Deposit Port either for a specific day or a period of days could be given an incentive.

20. The asset management system of Claim 1, wherein the marketing and promotional programs run by the Promotion System can include brand promotion programs wherein only patrons of specific purchases of food or brands of a specific brand may be given an incentive when the ID of the RFID Tray tagged in the specific purchase would be rewarded.
- 5 21. The asset management system of Claim 1, wherein the marketing and promotional programs run by the Promotion System can include stall promotion programs wherein only patrons of a specific stall are selected for a promotional event and out which, the patrons of the specific stall would be selected randomly to be awarded.
- 10 22. The asset management system of Claim 1, wherein the marketing and promotional programs run by the Promotion System can include membership promotion programs wherein only purchases by members of the Food Centre are tracked on a periodic basis to be further given incentives for their past patronage and said membership details may be contained in a RFID tag and such details may also be read or updated using a RFID reader.
- 15 23. A method of tray returning using the asset management system set forth in Claim 1, comprising the steps of (i) placing a RFID tray in a port of the tray return station; (ii) picking up data of the RFID tray and transmitting the data to the tray management system; (iii) confirming the data of the tray to that of the activated tray; (iv) transmitting a signal to the payment device to release a monetary deposit equal to the sum deposited by the patron upon purchase of food or drink from the stall.
- 20 24. The method of tray returning as set forth in Claim 23, wherein upon refund of the monetary deposit to the patron, the tray management system updates the details of the monetary deposit to offset the credit value entered into the POS system.
- 25 25. The method of tray returning as set forth in Claim 23, wherein the POS system sends a message to the tray management system to deactivate the RFID tray once a financial deposit is returned to the patron.
26. The method of tray returning as set forth in Claim 23, further comprising the step of transporting the used tray with utensils by a conveyor belt to a cleaning centre, where a cleaner picks up the utensils and the tray is then passed to a section for washing and rinsing of trays and of the utensils.
- 30 27. The method of tray returning as set forth in Claim 23, further comprising the step of retaining the cleaned trays separately pending release to the stalls owner in the food centre.
28. The method of tray returning as set forth in Claim 23, wherein the POS system sends a message to the tray management system to deactivate the RFID tray.

29. The method of tray returning as set forth in Claim 23, wherein the tray management system is integrated with a POS system.

30. The method of tray returning as set forth in Claim 23, wherein each food or drink stall in the food court is equipped with a POS machine linked to a POS system and RFID Reader
5 linked to the tray management system.

31. The method of tray returning as set forth in Claim 23, wherein the RFID tray is activated automatically when the stall owner or operator receives a monetary deposit from a patron.

32. The method of tray returning as set forth in Claim 23, wherein a plurality of RFID
10 sensors located on the tray activate the tray upon receipt a signal from the tray management system.

33. The method of tray returning as set forth in Claim 23, wherein a payment device is employed to deliver a sum of money equal to the monetary deposit paid by the patron to the stall owner, upon the deactivation of the RFID tray.

15 34. The method of tray returning as set forth in Claim 33, wherein the payment device releases the monetary deposit in the form of S\$1 coins or S\$2 notes or the like by the tray return system.

35. The method of tray returning as set forth in Claim 23, wherein a plurality of openings are provided at the tray deposit centre through which the trays are returned by the patrons.

20 36. The method of tray returning as set forth in Claim 23, wherein a gamification feature is introduced to the said method of tray returning and where upon refund of the monetary deposit to the patron, the gamification feature is triggered in addition to the return of monetary deposit to offset the credit value entered into the POS system.

25 37. The method of tray returning as set forth in Claim 23, wherein a promotional feature is introduced to the said method of tray returning and where upon refund of the monetary deposit to the patron, the promotional feature is triggered in addition to the return of monetary deposit to offset the credit value entered into the POS system.