

Improving Cycle Counting with Buffer Time Management

by

BROODRYK JP
29044856

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Executive Summary

This report provides a view of how inventory accuracy can be improved when Buffer Time Management principals is applied to Cycle Counting procedures. With no base module from which customer specific solutions can be designed from leads to brand new Cycle Counting modules being developed for each and every customer, this results in waste of time, money and other resources. The need to develop a module that would act as base module for future developments was identified and addressed. Different Cycle Counting methodologies were researched along with the key principles of Buffer Time Management. The research indicated that selecting the ABC categorization method of Cycle Counting will be the best choice when combined with the color coding and buffer principles of Buffer Time Management. Business and process blueprints where developed for several proposed solutions on which customer need verification was done to select the most promising proposed module. A prototype module was developed in Microsoft Excel with actual inventory records. Results from the implementation of the prototype module indicated that the module is able to schedule cycle counting stock takes and at the same time provide accurate and up to date schedule states and inventory levels. In conclusion, the implementation of this developed module will increase inventory accuracy, provide transparency to supervisors and management for business planning and will increase customer service and satisfaction.

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1 Introduction

1.1 Background

iPlan is an independent firm of professionals who design, manage, implement and support business processes that carefully balance world class best practices, appropriate and affordable technology and practically work within the constraints of local skills and resources.

Inventory accuracy is critical for effective planning and customer service. Inventory accuracy is not just concerned with the financial impact of stock losses, but with the business systems reflecting reality in terms of different inventory records. Presently there are two accepted practices for determining inventory accuracy, periodical physical inventory stock taking and cycle counting (Graff, RT, 1987). The first practice is more common and requires a company to physically perform a full stock take on some sort of a periodical basis. The second practice is steadily becoming a more favoured practice and requires a company to simply perform a statistically significant cross-section stock count of its inventory more frequently (Muller, 2011 p. 185). Both these practices are dependent on information from a company's ERP system (Enterprise Resource Planning).

An Enterprise Resource Planning system is a software information management system that integrates the processes and information from the various departments of a company (internal and external) into a centralised portal where the information gathered can flow between departments. ERP systems can be used to manage product or service planning, scheduling, purchasing, customer support, order tracking, interaction with suppliers as well as inventory levels (TechTarget). BusinessDictionary.com defines ERP as "a software system for identifying and planning the resource needs of an enterprise."

According to BusinessDictionary.com, stock taking is can be defined as the "physical verification of the quantities and condition of items held in an inventory, as a basis for accurate inventory audit and valuation . It is common practice that stock taking is done at least on an annual basis and usually at the end of the financial year of the company.

Cycle Counting is defined as "Periodic inventory system audit-practice in which different portions of an inventory are counted or physically checked on a continuous schedule. Each portion is counted at a definite, preset frequency to ensure counting of each item at least once in an accounting period (usually a year). Fast-moving or more expensive items are counted more often than slower moving or less expensive ones, and certain items are counted every day." (BusinessDictionary.com)

Stock taking and cycle counting each have their constraints in terms of effectiveness, giving rise to the idea to apply a specific Theory of Constraints (TOC) principle to the inventory accuracy problem, namely buffer time management.

Theory of Constraints (TOC) is defined by BusinessDictionary.com as “ a scheduling and inventory control philosophy, it proposes that a firm is a 'chain' of interdependent links (departments, functions, resources) some of which may have potential for greater performance but cannot realize it because of a weak link that is an external or internal bottleneck (constraint) and every firm has at least one.”. TOC introduces the concept of “buffer time” for make to stock manufacturing environments. The objective of TOC is to trigger replenishment for a constraint resource when the buffer assigned to that resource reaches a certain minimum value/amount. The purpose of a buffer is to protect the schedule of operations and activities. It is this principle that will be used in the scheduling of cycle counting but will however be used from slightly a different perspective. As with cycle counting, certain time periods are assigned to different items based on certain criteria. “Buffer time” can be seen as the time from the last count date to the next count due date.

1.2 Problem Statement

With no base line cycle counting monitoring model that can act as a starting point for iPlan consultants, significant effort is spent developing a customer specific model, and usually means that the solution cannot be re-used for future models. Too much time is spent and unnecessary mistakes are made when developing a new customer-specific dashboard model to aid the scheduling and monitoring of scheduled cycle stock counts for each implementation. Therefore it would be of great value to incorporate the key principles of buffer time management (one of TOC's principles) with the principles of cycle counting into a standard module for a well known ERP system (SYSPRO).

1.3 Project Aim

The aim of this project is to develop a computer based module that will aid in the scheduling of cycle stock counting and the monitoring thereof. This module should act as a base for the development of future modules for customer specific requirements.

1.4 Project Approach and Time Line

1.4.1 Activities and deliverables

1.4.1.1 Phase 1: Literature study and user requirements specifications

- Understand the value of a successful ERP system, more specifically understand SYSPRO and its approach to inventory accuracy;
- Understand the principles of TOC with emphasis on Buffer Time Management;
- Understand the Cycle Counting principles in all of its various forms and

Based on the information acquired a best practise solution and operational procedure can be defined.

The deliverable of this phase is a user requirement statement that outlines the functioning of the proposed solution based on best practise foundations.

1.4.1.2 Phase 2: Business and process blueprint

A blueprint will be defined for the solution. This blueprint will describe the sequence of events within the solution, highlighting:

- Required pre-conditions
- Data and user inputs
- Calculation logic
- Data and graphical outputs

The deliverable of this phase is a blueprint document approved of by the project sponsor.

1.4.1.3 Phase 3: Technical Specification

The technical specification transforms the blueprint into a systems or technical document. It includes:

- Entity relationship diagram
- Data structures
- Screen layouts and keyboard logic
- Technical interfacing

The deliverable of this phase is a technical specification approved of by the project sponsor.

1.4.1.4 Phase 4: Prototyping

Prototyping will be done in Excel, building a working solution based on the previous phases.

The prototype will be presented to the project sponsor for sign off.

Upon completion of the prototype, the solution and supporting documents will be handed over to the iPlan development team for inclusion in their suite of products.

2 Inventory Management and Cycle Counting

2.1 Inventory inaccuracy and ERP systems

Both the state of the economy and the rising level of competition within industry have made the need for accurate inventory records more important than ever before. Inventory accuracy is crucial for customer satisfaction. If a company is unable to satisfy the demand of a customer, the customer will probably take that demand elsewhere and the company will lose the sale or even the customer. Therefore, accurate inventory records will provide a company with a reassurance that it will be able to satisfy the demand of a customer.

It is a common fact that inventory records in reality differ from that what is recorded in the company's system. The causes of these variances differ from company to company with the more common causes being stock loss, transaction error, inaccessible inventory and incorrect product identification (Gershwin, 2005). Stock loss includes all products that are rendered unavailable for sale due to various reasons including:

- Faulty, damaged or broken stock;
- Customer returns;
- Theft (Shoplifting, Bribery or consumption of inventory)
- Inventory that has passed its shelf date or which has been spoiled or
- Slow moving inventory which have been written off.

Transaction errors mostly occur when new product is received or when products are sold to customers. The two most common causes of transaction errors at the receiving end of a company is either the discrepancies between the shipment record and the actual shipment received and the discrepancy between shipment received and the shipment booked into the company's inventory system. If either of these discrepancies passes the receiving clerk, the actual inventory will not equal the inventory of the system. Transaction errors also occur at the selling end of a company. Here, discrepancies occur when the checkout registers do not accurately keep track or register which items and how much is sold to a customer. This may be due to a lack of concentration, skill or training. This error may lead to incorrect checkout of certain products and will lead to inaccurate inventory records.

Inaccessible inventory refers to products which shows on-hand on the inventory system but cannot be found on the shop floor, store room or warehouse. These products are usually misplaced by either a customer or worker when taken from one location and placed on another without the knowledge of the floor or store manager. These products are therefore currently rendered inaccessible but may become accessible once again when found and is

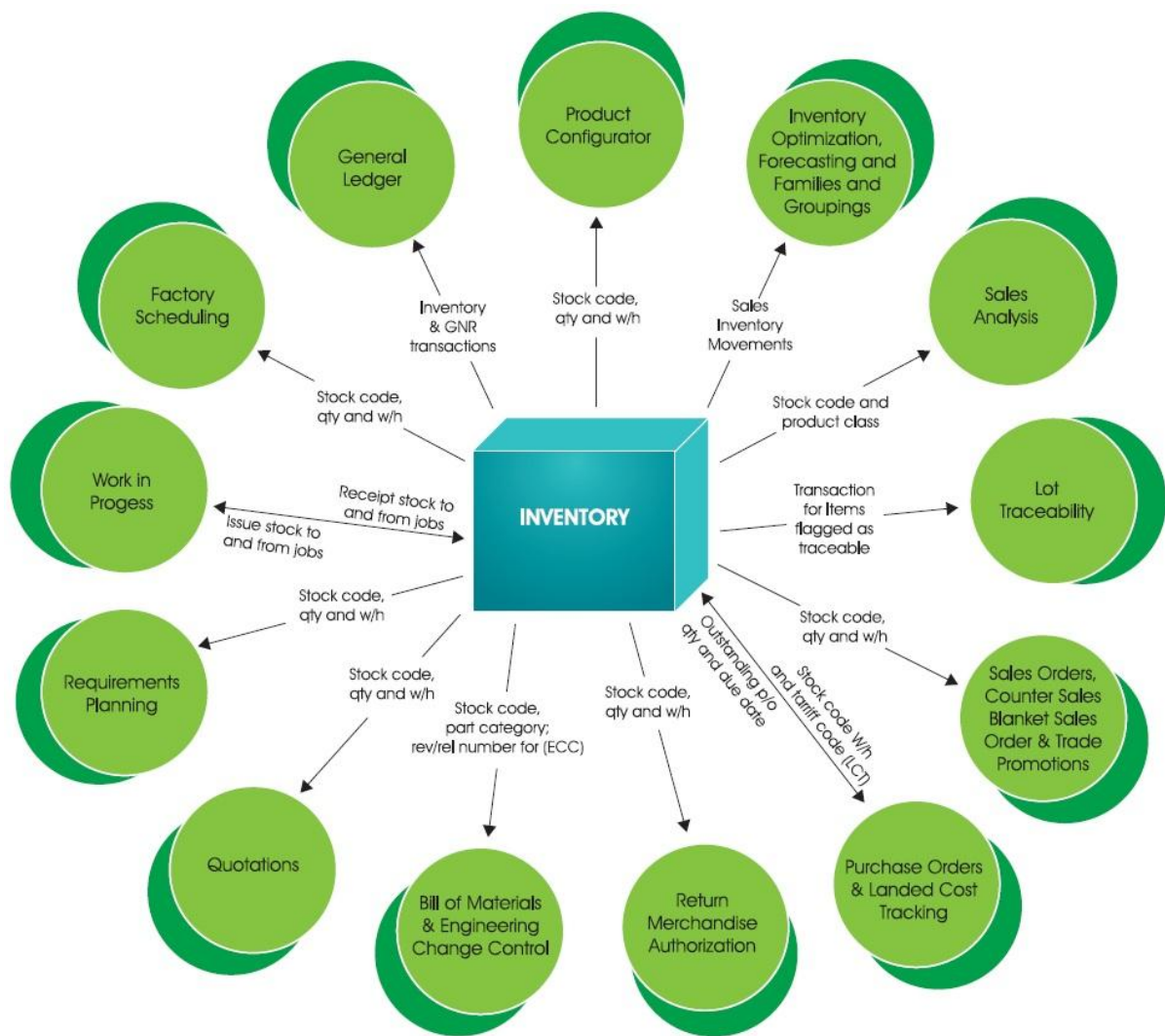
still in able to be sold to a customer. However, when these products are not found after a certain time period, or if they are found but not in a state that it can be sold to a customer, these products are then written off and are classified as stock loss.

Incorrect product identification mostly occurs when the wrong barcode sticker is placed on a product by either the manufacturer or stores. These barcodes are scanned at checkout and if the error is not picked before final checkout the wrong inventory record will be updated and will lead to inaccurate inventory records. (Gershwin, 2005). Inventory records are usually computer based by some form of information management software. These records can either be Microsoft Excel based for smaller independent retailers but for a company that have thousands of SKU's in its warehouse a more sophisticated information management software program is needed. Also if the total number of SKU's is low, monitoring of these SKU's can be done manually and visually but when the total number of SKU's reaches thousands it is better to rely on some sort of computer software There are several companies offering information management programs but for this project the focus will be on the SYSPRO ERP system.

The SYSPRO ERP system on which this project is based has the following approach to the handling of inventory record information: "SYSPRO Inventory Software enables effective customer servicing and improved profits by providing superior inventory control that optimizes stocking levels. It forms the core of the accounting, distribution and manufacturing facilities and is designed to integrate with all the major functions of the systems and to provide flexible reporting on inventory holdings. All movements against inventory items are recorded and can be reported on. Features include multiple warehouses and bin numbers, multiple costing methods, a full Kardex facility, a stock take system and extensive reporting." (SYSPRO).

As can be seen on Figure 1, SYSPRO clearly realises the importance of accurate inventory records. The figure also indicates the integration and the flow of this inventory record information between the various departments who needs this information in order to function both effectively and efficiently.

Figure 1 - SYSPRO's view on the importance of Inventory (SYSPRO)



A company running without an ERP system will most likely be running several different kinds of software. This may lead to numerous problems such as the lack of customization of the software, the challenge of integration and flow of information between the different programs, the lack of visibility or traceability of customer orders and product flow as well as mislead management decisions. This difficulty of information flow between the different software programs and departments will most likely cause inaccurate inventory records and if not corrected, management may base their business decisions on this information and the likelihood of project failures skyrockets.

An ERP system provides transparency in a company. It controls and standardizes the format of information and by doing this allows the information to easily flow between departments. This transparent flow of information allows easy tracking of customer orders,

right from the order straight through to checkout. Company purchases and expenditures are recorded and registered in a centralized database which allows the company a close control over these activities. (Eresource). The continuous flow of standardized information through the entire ERP system eliminates the possibility of re-typing errors and it is this that has improved the accuracy inventory records.

It is clear from Figure 1 that inaccurate inventory records will have a vast impact on business processes. If any type of error should occur when updating inventory records, every department in the company that makes use of this information will experience some sort of project or schedule failure. These failures will most likely result in profit losses and in extreme situations may be the cause for bankruptcy.

2.2 Stock Taking versus Cycle Counting

In order to further increase the accuracy of inventory records a common business practice called stock taking is performed by most companies. Presently there are two accepted practices for determining inventory accuracy, periodical physical inventory stock taking and cycle counting (Graff, RT, 1987).

2.2.1 Stock Taking

According to BusinessDictionary.com, stock taking can be defined as the “physical verification of the quantities and condition of items held in an inventory, as a basis for accurate inventory audit and valuation . It is common practice that stock taking is done on an annual basis and usually at the end of the financial year of the company.

The objective of an annual physical stock take is to satisfy an accounting need, to compare actual inventory figures to the figures in the accounting books. (Muller, 2011 p. 186). Inaccurate inventory records will result in incorrect figures on accounting records. This may lead to false profit claims, application for loan failures as well as incorrect dividend payouts to stakeholders, not even to mention that it is against all accounting policies. (SAICA, 2011 pp. A26-27, A603).

Stock taking possesses some important benefits but do have some significant drawbacks:

Table 1 - Stock Taking Pro's & Con's

Pro's	Con's
An external company can be contracted to perform the annual stock count	Done on an annual bases
	Time between stock counts are to long
	Requires a total shutdown of operations
	Stock count data capturing and analysis may be take long
	Discrepancies may be difficult to identify and trace back to source
	Discrepancy errors may grow exponentially with time and with no knowledge thereof before year end
	Human error

Combined Resources: (Graff, RT, 1987) (Muller, 2011)

Annual stock taking does not allow discrepancy identification throughout the company's financial year and may lead to an escalated problem that could have been avoided if it was identified and resolved earlier.

2.2.2 Cycle Counting

Cycle Counting is defined as "Periodic inventory system audit-practice in which different portions of an inventory are counted or physically checked on a continuous schedule. Each portion is counted at a definite, preset frequency to ensure counting of each item at least once in an accounting period (usually a year). Fast-moving or more expensive items are counted more often than slower moving or less expensive ones, and certain items are counted every day." (BusinessDictionary.com)

The objective of cycle counting is to discover discrepancies soon after they occurred and to correct the causes of these errors, it is to identify and correct system failures that result in inaccurate inventory records. (Muller, 2011 p. 186).

Cycle counting is steadily becoming the more favoured practice when it comes to stock counting, some even regard it as a best practice. The reason for this shift from traditional stock taking to cycle counting is because of its continuous counting factor. This factor enables management to sooner discover any discrepancies and by doing this enables management to respond quicker to the discrepancy and resolve it. Since cycle counting is

done piece by piece it is significantly easier to backtrack through both the paperwork and the actual stock of a specific product if a discrepancy exists. With this relatively easy way of backtracking through inventory records errors, more errors can be identified and fixed on a more frequent basis than that of stock taking and as a result of this the entire operation will smooth out more quickly. (Muller, 2011 p. 185).

Cycle counting possesses some significant benefits but do have some drawbacks which should be considered:

Table 2 - Cycle Counting Pro's & Con's

Pro's	Con's
Counting frequency is short enough to pick up on discrepancies in stock levels earlier	More complex
Easier to backtrack through paper trails to find the causes of discrepancies	Poses a considerable learning curve for employees.
Offers continuous improvement	Implementation may be costly
Counting takes place throughout the financial year and therefore requires no shut down of operation	Human error
Increases accuracy of inventory records throughout the financial year	

Combined Resources: (Seda, 2008) (Graff, RT, 1987) (Muller, 2011)

The cycle count methodology used by management to determine the schedule and frequency of inventory counting (buffer size) merely indicates the starting point of the model being developed in this project. It does not address the business problem.

(Muller, 2011) identified several cycle counting methodologies:

- Control Group
- Location Audit
- Random Selection
- Diminishing Population
- Product Categories
- ABC Categorization

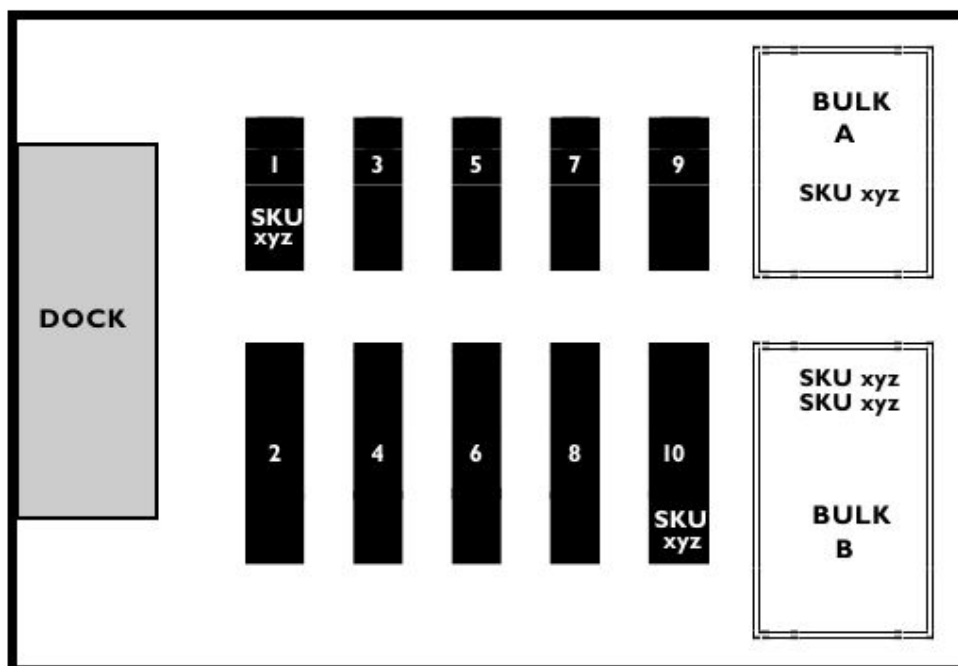
2.2.2.1 Control Group

As with any other new system being implemented, it is best to start on a smaller scale and work up to full scale if successful. The control group cycle counting method does exactly this. By using a smaller control group of SKU's it will be significantly easier to identify system problems and will ease the adjustment thereof. This method will allow management to fully understand the who, what, when, where and why their inventory system behaves the way it does and may provide crucial insight which may help future cycle count scheduling.

2.2.2.2 Location Audit

The location audit cycle counting method literally divides the entire warehouse or storeroom up in some logical method as determined by management. This division can be done into departments, rooms, racks, bins, aisles, bins, etc. See Figure 2 as an example. All stock items are treated equally and therefore each division to be counted also have equal importance. On each counting day a specific division is chosen and every item in that division is counted and recorded.

Figure 2 - Example of a Location Audit divided areas (Muller, 2011 p. 191)



2.2.2.3 Random Selection

The random selection cycle counting method is perhaps the easiest of all the other cycle counting methods. The items to be counted on a specific day is literally chosen by chance but it does however have to represent the entire warehouse or storeroom, from expensive to inexpensive items, fast and slow movers and so on. Otherwise all stock items are treated

equally and therefore the importance or value of a product plays no role in the selection thereof.

2.2.2.4 Diminishing Population

The concept of the diminishing population cycle counting method is to ensure that every SKU is counted at least once in a cycle. All stock items are treated equally. No SKU is counted again in a cycle before all the other SKU's is not counted. The more SKU's to be counted the longer the cycle, the more SKU's counted per day, the more cycles per year.

2.2.2.5 Product Categories

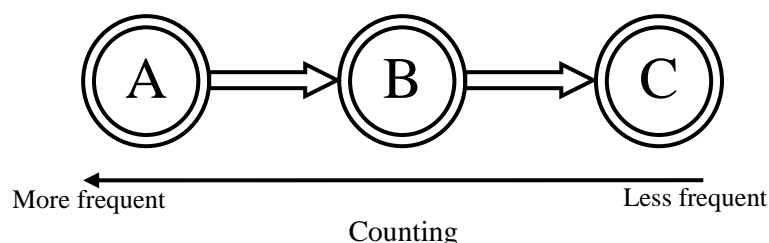
In the product categories cycle counting method all stock items are not treated equally. Management decides which SKU's should be group together based on some category defined by them such as type of usage, frequency of usage, supplier and so on. The number of categories to count per day depends on the number of SKU's within those categories. The more items per category mean the fewer categories by day. The more categories mean longer cycle times.

2.2.2.6 ABC Analysis

The ABC Analysis cycle counting method is definitely the most sophisticated cycle counting method as well as the most preferred by accountants.

This method of cycle counting requires the classification of stock into three main categories, A, B or C. An extra category (D) can be create to accommodate any special items requiring special counting schedules or which may carry managerial preferences. These classifications will determine the frequency of counting, those items in A will be counted more frequently than B, and items in B will be counted more frequently than the items in C. (Muller, 2011 p. 196). This is graphically represented in Figure 3 below:

Figure 3 - ABC cycle counting frequency



The classification of SKU's is based on their value. This value can be defined by several aspects of the SKU including unit cost, unit lead time or stock item value. For the purpose of this study the focus will be on the stock value of each SKU, this value can be calculated as follows:

$$\begin{aligned} & \text{Ideal stock level of SKU Z} \times \text{Actual cost of SKU Z on accounting records} \\ & = \text{stock value of SKU Z} \end{aligned}$$

Equation 1

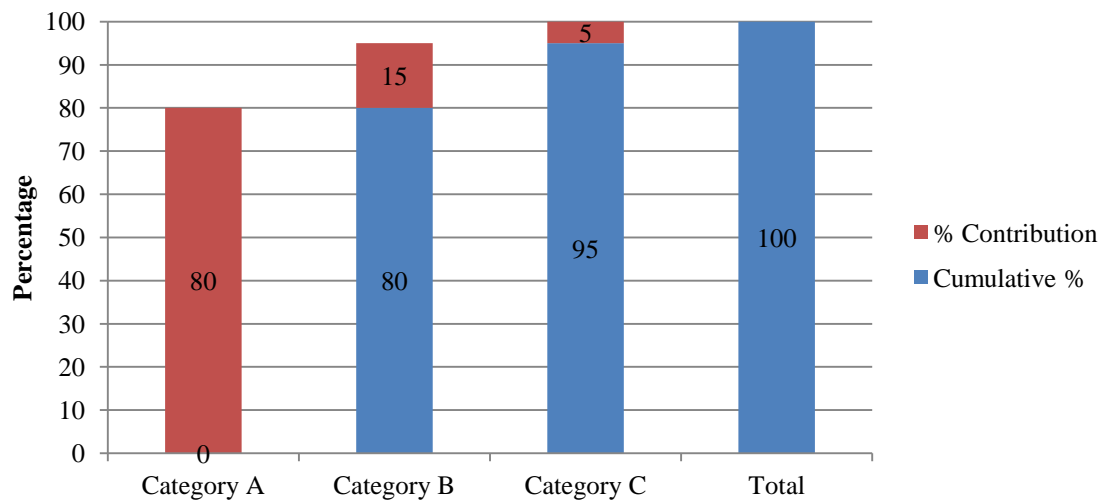
In order to categorize the SKU's, they need to be transformed and positioned on a scale of 0-1. To do this requires both the minimum and maximum SKU values of all the stock items in inventory. The SKU value transformation is done via the following equation:

$$\frac{\text{SKU value} - \text{min value}}{\text{max value} - \text{min value}}$$

Equation 2 (A simple classifier for multiple criteria ABC analysis, 2007)

The result from Equation 2 will be a value between 0 and 1 and it is this value that will be used to classify the SKU's. Category A items generally makes up the group of products that represent up to 80% of the total cumulative value of all stock items in inventory. Category B items generally makes up the group of products that represent 81% to 95% of the total cumulative value of all stock units in inventory. That leaves Category C items, these items generally make up the group of products that represents 96% to 100% of the total cumulative value of all stock items in inventory. These levels of the categories can graphically be seen on Figure 4 below:

Figure 4 - ABC category contribution



Thus in conclusion to the classification, all SKU items with a transformed value between 0 and 0.8 is categorized in the A class, items between 0.80 and 0.95 is categorized in the B class and items between 0.95 and 1.00 is categorized in the C class.

The frequency of counting allocated to each category is determined by management. This frequency of count information is then added to each SKU respectively in accordance to its category. As to the who should count and when should be counted does not form part of the business related problem but forms part of an operational problem and is therefore not considered in this study.

2.2.3 Opportunistic Counting

There exists a third type of stock taking termed opportunistic counting. Although the least perform it still needs to be noted.

When a customer orders or buys an item from the seller and the seller realises that the required item is either unavailable when the inventory records clearly indicates that there should be sufficient stock or there is a visible excess of stock when there should be less, an opportunistic stock counting opportunity arises. A stock take is then performed on this item to resolve the discrepancy. Therefore this item need not be counted again within its next scheduled count.

2.2.4 Buffer Time Management

Buffer time with regards to cycle counting can be defined as the time (days, months, quarters, years, etc.) between when the last cycle count was performed and the due date for when the next cycle count should be performed. The purpose of a buffer is to protect the schedule of operations and activities. Schragenheim defines buffer management as a diagnostics tool which is a shop-floor control methodology. Schragenheim also identified several uses for buffer management:

- Buffer management serves as an alarm system that identifies urgent problems which may threaten to disrupt the schedule;
- Buffer management indicated weak areas in the schedule;
- Buffer management provides support for short to mid range decisions and
- Buffer management prioritizes both the necessary attention and improvements required.

Buffer times gets depleted as each day passes; the percentage of buffer time remaining after each day can be calculated as follows:

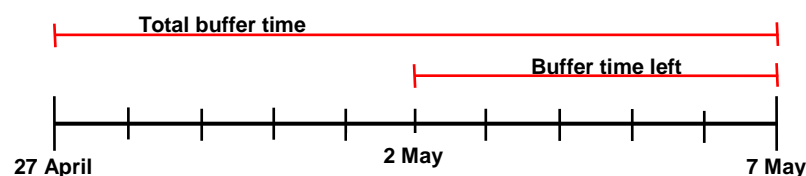
$$\text{Percentage buffer time left} = \frac{\text{Days left of buffer time}}{\text{Total buffer time}} \times 100\%$$

Equation 3

The following *example* will be used from here on to explain buffer time management:

Assuming that SKU Z has a cycle counting frequency of 10 days and was last counted on 27 April 2012 and is due for counting again on 7 May 2012. Assuming the current date as 2 May 2012 the following diagram can be drawn:

Figure 5 - Buffer time remaining (Du Toit, 2012)



This diagram indicates that a buffer time of 5 days remain for SKU Z out of a total buffer time of 10 days, therefore

$$\text{Percentage buffer time left for SKU Z} = \frac{\text{Days left of buffer time}}{\text{Total buffer time}} \times 100\%$$

$$= \frac{5}{10} \times 100\%$$

$$= 50\%$$

3 Design of the Cycle Counting Scheduling Module

3.1 Design Specification

The key requirements of the Cycle Counting Scheduling Module include the following:

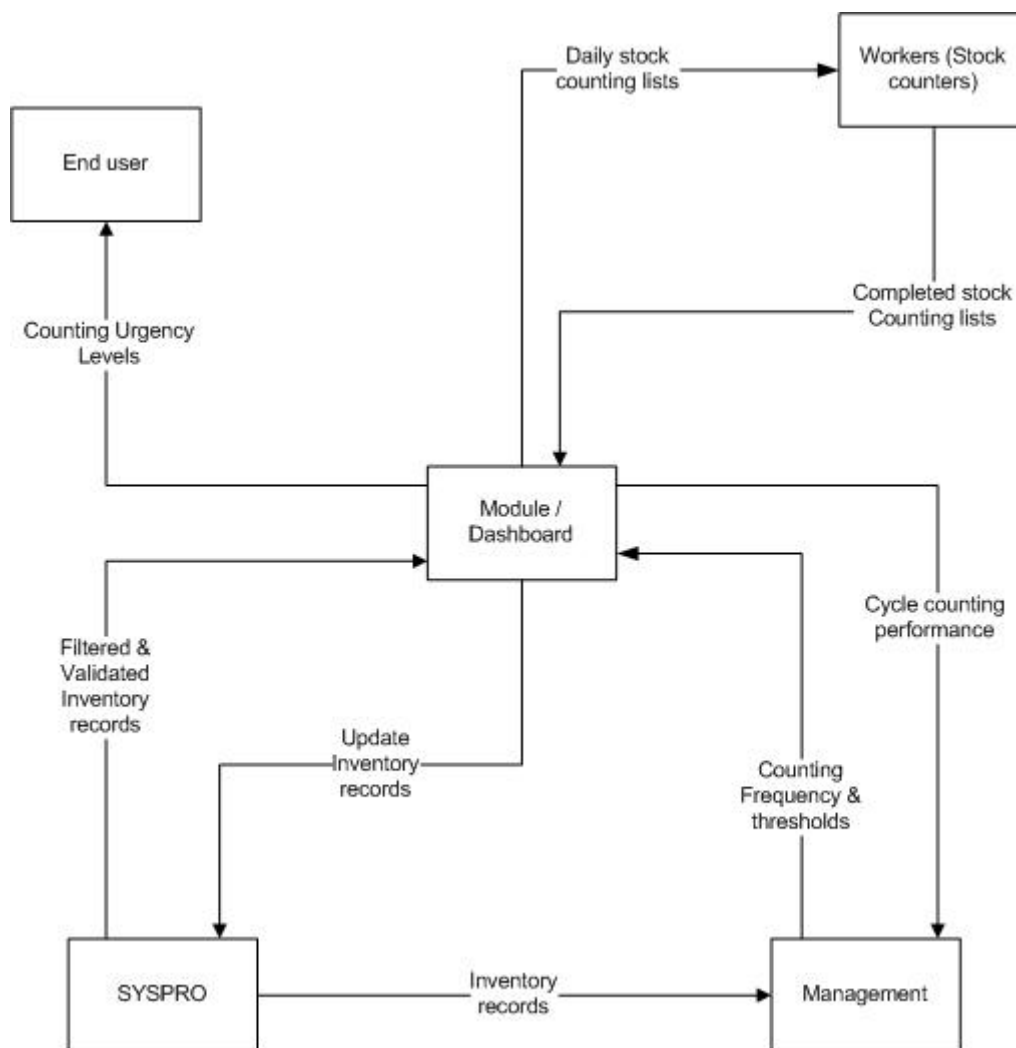
- Aid with the scheduling of cycle counts (source data, perform calculations, setup graphs, etc),
- Monitor the success of cycle counting schedules,
- Provide the end user with a single focusing tool (visually display state of schedule),
- Be linked to SYSPRO for “live” up to date inventory records (receive and provide updated inventory records) ,
- Allow the updating of inventory items,
- Allow compiling of either broad based (inter warehouse) or specific (warehouse specific, product type) stock capture sheets,
- Warn the user if stock items are past stock taking due date and
- Perform several calculations automatically to classify stock items into categories and to attach specific specifications to these stock items.

3.2 Concept Design

The module to be developed should mainly aid the end user in the scheduling of stock takes but should also monitor the success of these stock takes and how they are scheduled. The module should act as a single focusing tool to the end user, i.e. the module should have a main dashboard which will visually display the success and progress of stock takes.

Inventory record information will be provided by the company’s ERP system (SYSPRO in this case). Inaccurate records will result in incorrect scheduled buffer times and in turn will result in false buffer time remaining readings (e.g., Incorrect SKU cost may lead to a incorrect item classification and therefore incorrect counting frequencies and buffer times). This will lead to SKU’s either not being counted at all or being counted multiple times within the same cycle. This lack of counting will result in incorrect figures on accounting statements and excess counting will lead to unnecessary expenditures carried and will lead to less income on accounting records. Figure 6 indicates the flow of data between the various role-players in the proposed concept solution and it is clear from this that the consequences of inaccurate inventory records will most probably result in project failure.

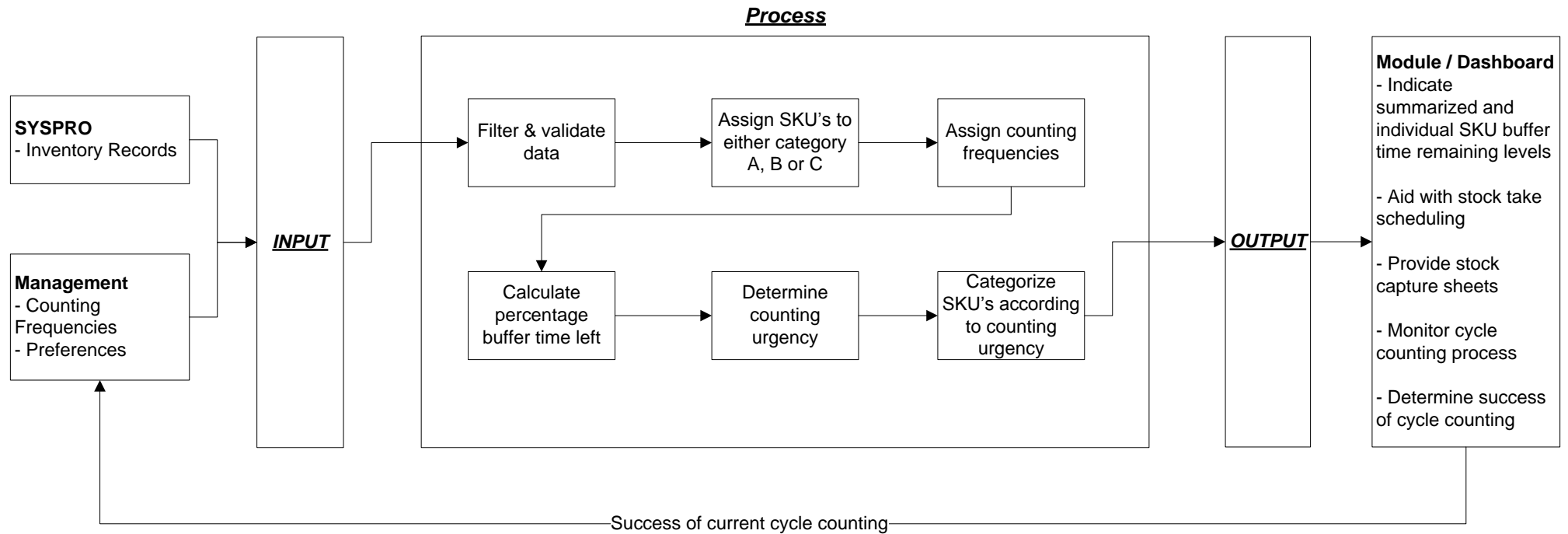
Figure 6 - Context Data Flow Diagram for proposed model



A proposed process flow for the Cycle Counting Scheduling Module is shown in Figure 7. This process requires the input from two main sources, management and SYSPRO. Management will provide cycle counting schedules, this will include counting frequencies, thresholds, flagged SKU's, etc. SYSPRO will provide the actual inventory records for every SKU in the company. However, the proposed process only requires certain data fields from SYSPRO in order to function, therefore the information from SYSPRO will be filtered to extract only the data fields required. Before this information is used further on in the process it will be validated by checking if every data field in the inventory record does contain information and if that information is in the appropriate field (e.g. date format is correct, SKU cost more than R0.00, etc). This filtering and validation will be done to ensure that the data required is available and correct. After the information validation step each SKU will be assigned to category A, B or C according to classification calculations. The next step in the

process will be to calculate the remaining scheduled time of each SKU. This calculation will in turn be used to determine the counting urgency for each SKU and will be summarized in a format of a bar graph. The complete process will produce as output a monitoring dashboard which will be used for the monitoring of cycle counting schedules. This output will be reported to management for future decision making and planning.

Figure 7 –Cycle Counting Process Flow Diagram



3.3 Detailed Design

3.3.1 Business and Process Blueprint

3.3.1.1 Required pre-conditions

Any model or module being developed requires inputs, these inputs are transformed by the process or program to produce certain required outputs.

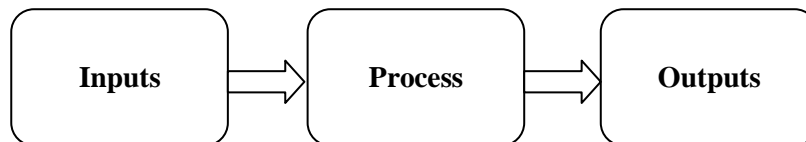


Figure 8 - Input-Process-Output

This system is however influenced by several external factors. The entire system is influenced by various other supporting systems of the company which maintains and/or enhances both the quality of the inputs and outputs and also supports the various process elements.

When developing a module or system the supporting systems as well as the various environmental factors need to be accounted for to ensure success of the overall system. The following figure indicates the inclusion of these external factors:

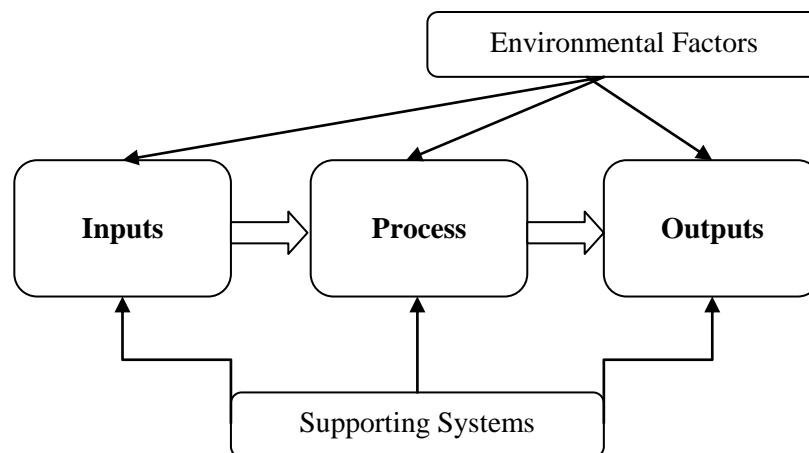


Figure 9 - Environmental factors and Supporting systems

In order for the system to achieve the required output and to ensure the module performs efficiently, certain pre-conditions are required for the input, the process and the output:

- Inputs:
 - Microsoft Excel (2003/2007)
 - Accurate SYSPRO inventory records

- Process:
 - Proper module calculations
 - Accurate grouping and interpretation of data

- Outputs:
 - Well-organized cycle counting schedules
 - Realistic stock take capture sheets
 - Accurate and updated inventory records
 - User friendly interfaces

If the inputs used are not complete or correct, an incorrect output will be produced. For example, if an inventory record contains an incorrect product quantity, its ABC class will be assigned incorrectly and will result in an incorrect counting frequency assigned to the product, this in turn will display an incorrect counting urgency may cause an unstable cycle counting schedule.

Not only should the data be correct, but the data should be present. If an inventory record contains an empty field (e.g. NULL or “VALUE”) which is required by the module for processing, an error will be produced and may influence the counting schedule and the success thereof.

3.3.1.2 Data and User Inputs

i. Data

The data required by this cycle count scheduling module will be provided by SYSPRO from which the required fields can manually be chosen through SYSPRO commands and thus forming part of the data filtering process. The data fields required by the module for the ABC Analysis method chosen include:

- | | |
|----------------|--------------------|
| • StockCode | • MinimumQty |
| • Warehouse | • MaximumQty |
| • UnitCost | • SafetyStockQty |
| • QtyAllocated | • DateLastStockCnt |
| • QtyOnHand | |

Several new fields will be added for calculations in order to determine counting schedule contents, these will include:

- StockValue
- StockValueTransformed
- ABCClass
- CntFreq
- S/C Note
- Days between count
- StockCountDueDate
- DaysLeft
- %BufferTimeLeft
- CntUrgency

(Note: The data field StockVaule is usually found in SYSPRO databases but was not a field used in the current databases and for that reason did not carry any values and therefore the need to create values)

ii. Managerial Input

Data is the raw facts about people, places, events and things that are of importance in an organization, however, each fact, by itself, is relatively meaningless. (Bentley, 2007 p. 21) In order to give “meaning” to this data the module also requires some inputs from management:

- Management preferences
 - special SKU attention,
 - flagged SKU's and
 - SKU theft risk
- Thresholds
 - Minimum, maximum and safety stock quantities
- Number of workers available for counting
- Total cycle length
 - Annually, Quarterly, etc
- Time window's
 - Available times within cycle in which counting can be done
 - Restriction times (Product launches, system upgrades, etc)

With the additional information mentioned above the data from SYSPRO can then be processed or reorganized into a more meaningful form for someone (Management or end user). (Bentley, 2007 p. 21).

iii. User Input

In order to gain knowledge or wisdom from the data requires the end user to provide certain inputs. The end user should specify according to what criteria the cycle counting schedule should be compiled (per warehouse, ABC classification, counting urgency, etc). Multiple criteria can also be selected for a more defined schedule e.g. warehouse or counting urgency specific. It will also be the responsibility of the user to capture the stock takes as they are completed.

3.3.1.3 Calculation logic

The first step in the process will be to filter the data fields and only extract those required from the SYSPRO databases. Filtering in the prototyping phase will be done in Microsoft Excel and requires that the data fields are manually selected in SYSPRO and exported into a Microsoft Excel sheet. The final module will be programmed to automatically filter, select and extract the required data fields from the SYSPRO databases.

The next step after filtering will be to validate the inventory records. This step is required to ensure that each data field not only contains data but also to ensure that the data corresponds to the format required for the specific data field. Without this validation step the module may encounter system errors that could otherwise have been avoided.

The next step in the process requires that several calculations is performed for each inventory record (SKU) to determine its:

- **Stock Value**

$$= \text{UnitCost} \times \text{QtyOnHand}$$

- **Stock Value Transformed**

$$= \frac{\text{StockValue} - \text{minStockVaule}}{\text{maxStockVaule} - \text{minStockValue}}$$

- **ABC Classification**

$$= \text{IF}(\text{StckValue} < 500, "D", \text{IF}(\text{StckValueTrans} < 0.8, "A", \text{IF}(\text{StckValueTrans} < 0.95, "B", "C")))$$

- Counting Frequency**

$$= IF(ABCClass = "A", "Frequency1", IF(ABCClass = "B", "Frequency2", IF(ABCClass = "C", "Frequency3", "Frequency4")))$$
- S/C Note**
No calculation – note area for managerial preferences
- Days between count**

$$= IF(ABCClass = "A", 7, IF(ABCClass = "B", 30, IF(ABCClass = "C", 91, "user defined value")))$$
- Stock Count Due Date**

$$= DateLastStockCount + DaysBetweenCount$$
- Days Left**

$$= StockCountDueDate - Current Date$$
- Percentage Buffer Time Left**

$$= \frac{DaysLeft}{DaysBetweenCount} \times 100\%$$
- Counting Urgency**

$$= IF(PercentageBufferTime < 0, "Critical", IF(PercentageBufferTime < 33.33, "High", IF(PercentageBufferTime < 66.66, "Medium", "Low")))$$

The result of these calculations will in turn determine the *CntUrgency* of the specific SKU. The calculations above will be done for each and every SKU in the database. Each SKU will then be categorized into one of four counting urgency categories depending on the result of the *%BufferTimeLeft* calculation:

Colour Code	Counting Urgency	Percentage Buffer Time Left
Green	Low	$\geq 66.66\%$
Yellow	Medium	$< 66.66\%$
Red	High	$< 33.33\%$
Black	Critical	$< 0\%$

Table 3 - Percentage Buffer Time Left Categorization

With each SKU now categorized in one of the above four categories, the next step in the process will count the number of SKU's in each category and summarize the result for dashboard output purposes.

3.3.1.4 Data and graphical outputs

Monitoring

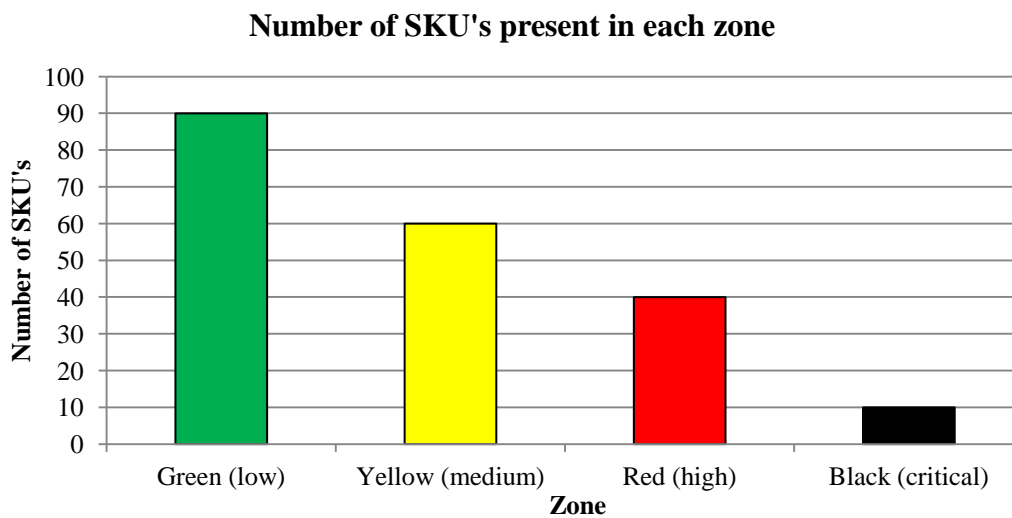
The number of SKU's a company can have in its warehouse or store room can range from anywhere from single digits to millions depending on both the size and type product and/or company. If management decides to use cycle counting to compare actual inventory records to that of the system, the total number of cycle counts to be performed will equal the total number of SKU's the company has. To ensure that each SKU is at least counted once per cycle some sort of monitoring or supervision is needed. Monitoring is "supervising activities in progress to ensure they are on course and on schedule in meeting the objectives and performance targets." (BusinessDictionary.com).

The assumption is made that company management has chosen to make use of ABC Analysis to assign SKU's into categories, it is also assumed that management has allocated specific cycles to each category. With each category assigned a different cycle, counting frequency provides a means of grouping SKU's into counting urgency categories, which can in turn be used on the monitoring dashboard of the module. A dashboard, in the simplest terms is a collection of different reports, all in one page or view (Jethwa, Nilesh, 2008).

The main dashboard of the module will present the summarized data. This dashboard will act as the main counting schedule monitoring system, from here several actions can be taken to further investigate the current state of the cycle counting schedule or to produce stock take capture sheets.

The main dashboard will display a bar graph as depicted below:

Figure 10 - Sum of SKU's in each zone



As mentioned, each colour zone displays the number of SKU's within the corresponding counting urgency category. In order to view the SKU's in each of the zones can be done clicking/taping on a specific zone via the use of a mouse/touch screen (depending on platform used). This then displays a new window to the user listing all SKU's in the selected colour/counting urgency zone. For example, if the Yellow (medium counting urgency) zone have been selected an extract as depicted in Table 4 below will be presented to the user displaying all relevant SKU information.

(Note: Some fields have been omitted for displaying purposes)

Table 4 - Extract: Colour/Counting Urgency Selection

StockCode	Wareh use	UnitCo st	StockV aule (Calc)	StockVal ue (Transfor med)	ABCCI ass (Calc)	CntFr eq	Days Betw een Count	DateLastSto ckCnt	TimeL ast Stock Cnt	StockCntDu eDate	Days Left	%BufferTim eLeft	CntUrge ncy	QtyOnH and	Cou nt	Varia nce
260SKELE TJAM	PF	582.71 644	8158.0 3	0.0184	A	Wee kly	7	09 October 2012		16 October 2012	4	57.143	Medium	14	12	2
260SKELE TJAM	RF	582.71 644	3496.3 0	0.0079	A	Wee kly	7	09 October 2012		16 October 2012	4	57.143	Medium	6	5	1
70ARCHIT RAVE	PF	138.08 08	2209.2 9	0.0050	A	Wee kly	7	09 October 2012		16 October 2012	4	57.143	Medium	16	17	-1
BSHRZFS2	PF	274.64 993	39824. 24	0.0898	A	Wee kly	7	09 October 2012		16 October 2012	4	57.143	Medium	145	129	16
BSHRZMS 2	RF	161.81 907	6634.5 8	0.0150	A	Wee kly	7	09 October 2012		16 October 2012	4	57.143	Medium	41	39	2
BSHRZMS 2	SF	161.81 907	1780.0 1	0.0040	A	Wee kly	7	09 October 2012		16 October 2012	4	57.143	Medium	11	11	0
BSMLDMS 0	SF	138.68 353	1664.2 0	0.0037	A	Wee kly	7	09 October 2012		16 October 2012	4	57.143	Medium	12	12	0
BSSBTMS0 HS	SF	254.07 205	2540.7 2	0.0057	A	Wee kly	7	09 October 2012		16 October 2012	4	57.143	Medium	10	10	0
CATSTAN D	PP	258	3354.0 0	0.0076	A	Wee kly	7	08 October 2012		15 October 2012	3	42.857	Medium	13	14	-1
CBSTDLI01 2062	RF	143.36 466	2150.4 7	0.0048	A	Wee kly	7	09 October 2012		16 October 2012	4	57.143	Medium	15	13	2
CBSTDLI01 5114	RF	55.758 07	1115.1 6	0.0025	A	Wee kly	7	09 October 2012		16 October 2012	4	57.143	Medium	20	21	-1
CDBFLHS0	RF	657.11 007	6571.1 0	0.0148	A	Wee kly	7	09 October 2012		16 October 2012	4	57.143	Medium	10	10	0
CDBFLHS0	SF	657.11 007	3942.6 6	0.0089	A	Wee kly	7	09 October 2012		16 October 2012	4	57.143	Medium	6	5	1
CDSPNHS0	PF	657.11 007	126822 .24	0.2860	A	Wee kly	7	09 October 2012		16 October 2012	4	57.143	Medium	193	182	11

The module dashboard will also display the counting urgency levels per warehouse as depicted in Figure 11 below:

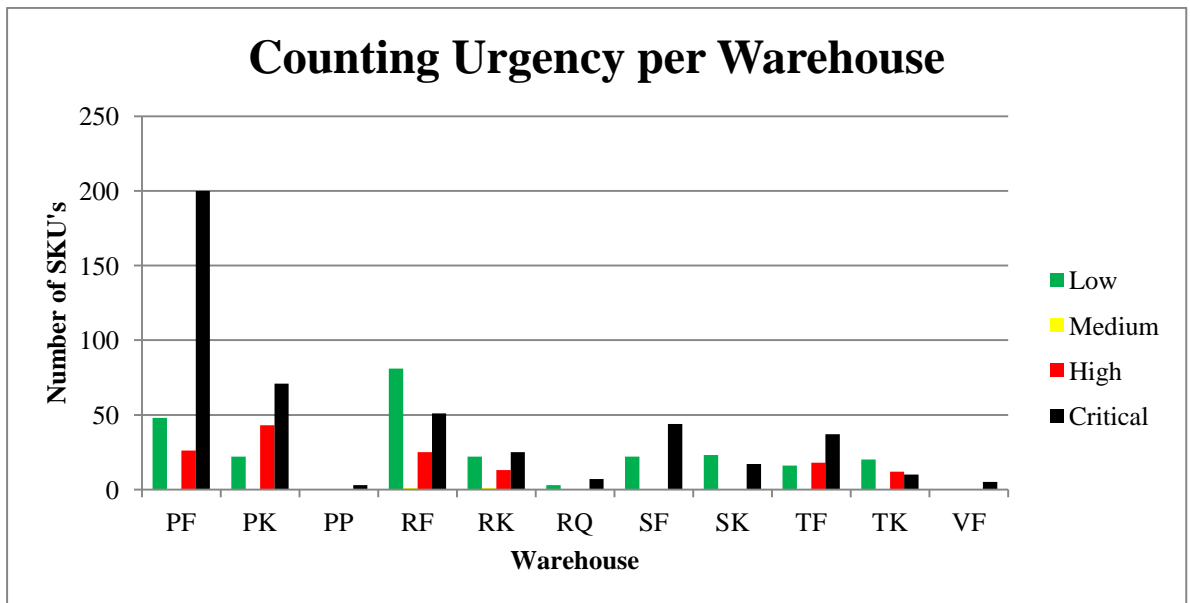


Figure 11 - Sum of SKU's in counting urgency zones (warehouse specific)

To view the SKU's in a specific zone from a particular warehouse can be done by following the identical procedure as stated for the main dashboard.

The shape of Figure 10 also tells a story. If there are no Black or Red SKU's on the graph it indicates that either the counting capacity of the company is too high (too many workers performing cycle counts), cycle times decided upon by management is incorrect, or the warehouse discipline (worker efficiencies) is not on standard. If Black zone items are always present and/or if Red zone items are more than the Yellow zone items on the graph it indicates either that the company has a lack of counting capacity (too few workers performing cycle counting) or that the cycle times decided upon by management is incorrect and the daily cycle counting lists are too long. The preferred shape of Figure 10 is a triangular shape but without SKU's in the Critical/Black zone.

The purpose of the main dashboard is to monitor the current success of the cycle counting schedule and to provide a means for the user to pinpoint the most critical SKU's that needs to be counted.

3.4 Technical Specification

The technical specification transforms the blueprint into a systems or technical document.

3.4.1 Cycle Counting Scheduling Module Entity Relationship Diagram (ERD)

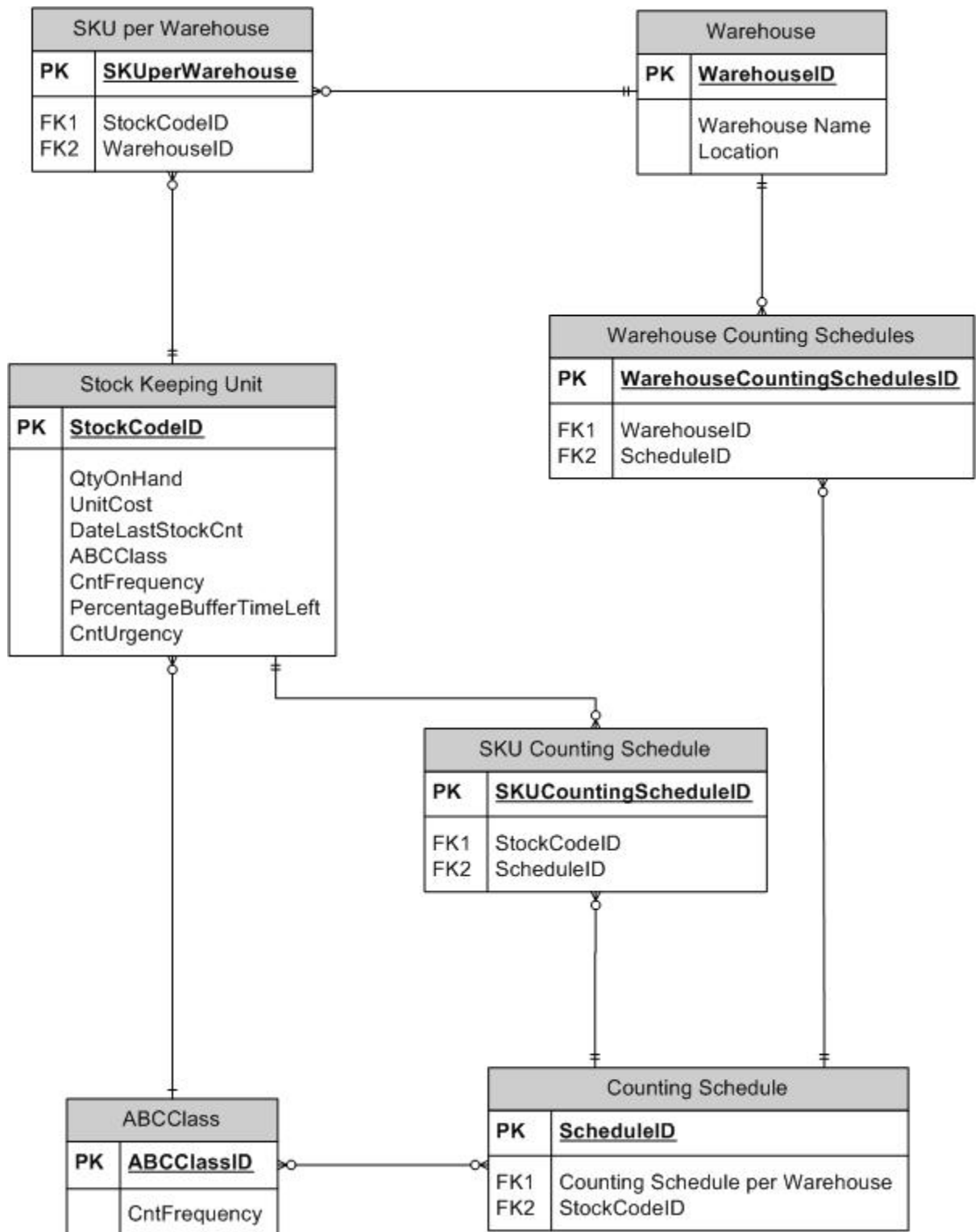


Figure 12 - CCSM ERD

3.4.2 Data/Table structures

Field	Type	Description
StockCode	Text	
Warehouse	Text	Each warehouse has a two character ID
QtyOnHand	Number	The number of stock units
UnitCost	Currency	A valid number (>0)
StockValue	Currency	Calculation of QtyOnHand multiplied by UnitCost
StockValue (Transformed)	Decimal	Calculation of stock value relative to other SKU's (Transformed)
ABCClass	Text	Classification of SKU's according to StockValue (Transformed)
CntFreq	Text	Categorization linked to ABCClass (Weekly, Monthly, Quarterly, Special/Custom)
S/C Note	Text	Note linked to Special/Custom CntFreq categorization for user specific input
DaysBetweenCount	Number	The number of days between counting for Special/Custom CntFreq SKU's
DateLastStockCnt	Date	Date on which last stock count was performed
StockCntDueDate	Date	Date before next stock count must be done
DaysLeft	Number	The number of days left before StockCntDueDate is reached
%BufferTimeLeft	Percentage	Calculation of the remaining counting time left relative to the total counting time allocated
CntUrgency	Text	Urgency of count linked to %BufferTimeLeft (Low, Medium, High, Critical)

Table 5 - Data/Table Structures

3.4.2.1 *Technical interfacing*

To fully understand the flow of the entire cycle counting process the need for a swimlane diagram was identified. Figure 13 indicates the various entities and their responsibilities within the process, each of these will be discussed in detail:

i. **Scheduler**

3.4.2.2 **Process Begins**

This marks the start of the entire process and is initiated by the program itself

3.4.2.3 **Stock take Determination**

The program calculates the counting urgency levels of all stock items in every warehouse and displays this in the form of a bar graph similar to Figure 16.

3.4.2.4 **Update Inventory Records**

This action is only performed after a stock count has been approved by the Supply Chain Supervisor. The counted stock figures are entered and saved into the program. The program then displays an updated graph indicating the new counting urgency levels.

3.4.2.5 **Process Ends**

This indicates the end of the process.

ii. **Supply Chain Supervisor (SC Supervisor)**

Select Stock Take Data

The SC supervisor is presented with several graphs displayed on the program dashboard. These graphs include the counting urgency levels over all warehouses as well as warehouse specific graphs. The SC Supervisor can view each graph or sections of the graph in more detail by selecting a colored bar from the graph, this will in turn present a new window to the SC Supervisor including a list of all the stock items in that specific counting urgency level (either per warehouse or in general). Individual stock items can also be view by selecting a stock item from the secondary

window presented. This in turn will again present a new window to the SC Supervisor and will include detailed information regarding the specific stock item.

After viewing the graphs on the system dashboard the SC Supervisor can then choose the contents of a stock taking list. The SC Supervisor can either select every stock item in inventory or filter stock items according to specific warehouses, stock categories or counting urgencies.

The number of stock items in the current stock taking list will be displayed at the top right-hand side of the form. This value will change as the user changes the filtering criteria.

When the SC Supervisor is satisfied with the current stock taking list he/she can then send it to the respective warehouse managers.

A snapshot of the current inventory record status is saved for future use in variance reports.

Inventory Records (SYSPRO)

Inventory records from SYSPRO are needed in order to compile a stock taking list.

Review Variance Report

The SC Supervisor has the responsibility to review the variance report compiled by the warehouse manager. The need for a second more senior review is required to ensure that variances are within company specifications.

Acceptable?

The SC Supervisor can review the variance report and choose to either accept or reject it.

Confirm & Approve Stock Take

If the SC Supervisor chooses to accept the variance report the stock take data is imported into the Scheduler in order to update the respective inventory records.

Reject Variance Report

If the SC Supervisor chooses to reject the variance report then the stock take needs to be performed again and is sent back to the Warehouse Supervisor.

Acceptance Levels

This information input indicates the various variance levels of each product as determined by the company.

iii. **Warehouse Manager**

Print Stock Count Form

Upon receiving a stock take list from the SC Supervisor the Warehouse Manager then checks and prints this list out. The Warehouse Manager can break this list down into several sections according to the number of Stock Controllers available. The Warehouse Manager then hands these broken down lists to the Stock Controllers for counting.

Verify Scanner Counter

If the warehouse has stock taking scanners (barcode scanners) and if the stock items in the warehouse will allow for barcode scanners, these scanner counters have to be verified for accuracy purposes.

Capture Stock Count

The Warehouse Manager has the responsibility to capture the stock count upon completion. This capturing is done in the snapshot state saved by the SC Supervisor earlier.

Compose Variance Report

After the Warehouse Manager has completed capturing the stock count, he/she then has the responsibility to compile a variance report. This is done by comparing the actual figures of stock items to the theoretical figures as is saved in the snapshot. If

any variance do exists the Warehouse Manager then has to determine why the variances exist with possible explanations.

Review variance Report

After the Warehouse Supervisor has compiled his/her variance report he/she then has to review it to ensure all variances are accounted for and explanations for the variances are provided in full.

Acceptable?

The Warehouse Supervisor can review the variance report and choose to either accept or reject it.

If the Warehouse Supervisor is not satisfied with the variance report he/she has compiled or could not explain the variances, he/she can the request the Stock Controllers to redo the stock count.

Submit for Approval

If the Warehouse Supervisor is satisfied with the variance report he/she then submits the report to the SC Supervisor for a second, more senior review.

Acceptance Levels

This information input indicates the various variance levels of each product as determined by the company.

iv. Stock Controller

Scanners?

Does the warehouse have stock taking scanners (barcode scanners) and does the stock items in the warehouse allow for barcode scanners?

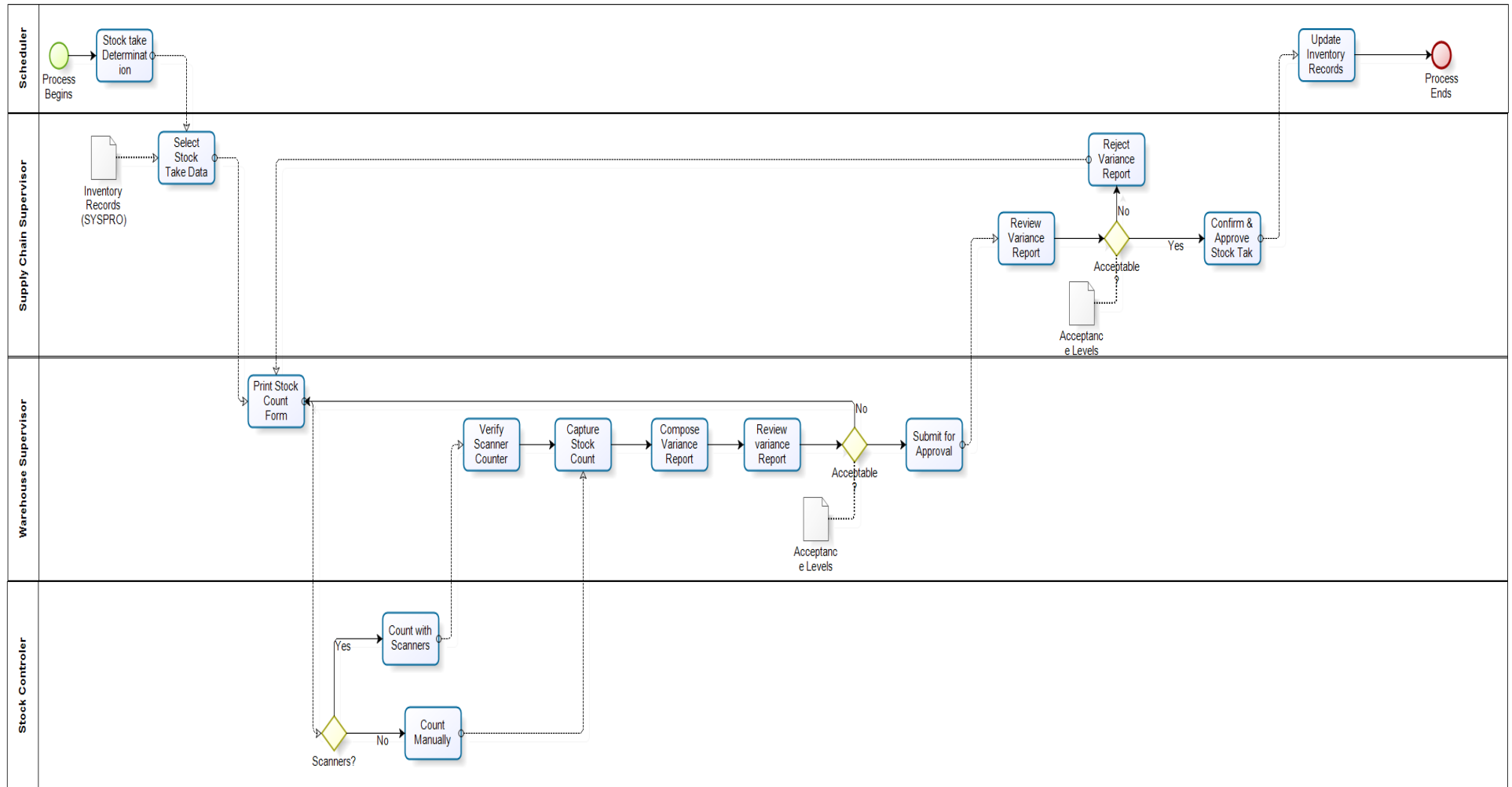
Count with Scanners

If the warehouse has stock taking scanners (barcode scanners) and if the stock items in the warehouse will allow for barcode scanners, then they should be used for stock counting.

Count Manually

If the warehouse doesn't have stock taking scanners (barcode scanners) or if the stock items in the warehouse do not allow for barcode scanners, then it is recommended that manual stock taking is performed.

Figure 13 - Cycle Counting Process Flow (Swimlane Diagram)



4 Prototyping

4.1 Sample Screen Layouts

All graphs, tables and extracts display the original state of the system before prototyping was done.

4.1.1 ABC Method

4.1.1.1 Screen: Calculation Screenshot

The screenshot below displays all the relevant data fields drawn from SYSPRO and those added to aid with the classification and categorization of stock items.

StockCode	Warehouse	QtyOnHand	UnitCost	QtyAllocated	MinimumQty	MaximumQty	OpeningBalance	SafetyStockQty	StockVaule (Calc)	StockValue (Transforme (Calc)	ABCClass (Calc)	CntFreq	S/C Note	DaysBetween Count	DateLastStockCnt	TimeLastStockCnt	StockCntDueDate	DaysLeft	%BufferTimeLeft	CntUrgency
1	PD20	PF	955	464.3063	41	0	1201	840	1920	443412.52	1.0000	C	Quaterly		91	22 May 2012	22 September 2012	101	110.989	Low
2	PD1/OB/BR	PF	800	452.33705	5	0	900	722	1175	361869.64	0.8159	B	Monthly		30	22 May 2012	22 June 2012	9	30.000	High
3	KYD8S	PF	834	427.38544	19	0	0	590	1160	356439.46	0.8036	B	Monthly		30	22 May 2012	22 June 2012	9	30.000	High
4	PD60	PF	290	708.62173	3	0	80	286	420	205500.30	0.4628	A	Weekly		7	22 May 2012	29 May 2012	-15	-214.286	Critical
5	HC7024	RF	416	435.62	6	0	0	251	190	181217.92	0.4080	A	Weekly		7	06 June 2012	13 June 2012	0	0.000	High
6	KFC1/NS	PF	801	220.39652	0	0	0	840	931	176537.61	0.3974	A	Weekly		7	12 June 2012	19 June 2012	6	85.714	Low
7	KYD8	RF	411	411.78806	54	0	0	455	424	169244.89	0.3810	A	Weekly		7	16 May 2012	23 May 2012	-21	-300.000	Critical
8	CDSPNH50	PF	193	657.11007	4	0	27	159	340	126822.24	0.2852	A	Weekly		7	22 May 2012	29 May 2012	-15	-214.286	Critical
9	TH22X69X3.OPAR	PK	2195	43.494	5	0	0	452	871	95469.33	0.2144	A	Weekly		7	31 May 2012	07 June 2012	-6	-85.714	Critical
10	KYD1S/OB	PF	249	345.90535	0	0	0	171	485	86130.43	0.1933	A	Weekly		7	22 May 2012	29 May 2012	-15	-214.286	Critical
11	KFA1/OO/S	PF	280	287.55024	3	0	332	296	354	80514.07	0.1806	A	Weekly		7	12 June 2012	19 June 2012	6	85.714	Low
12	WA3SP	PF	150	531.8657	1	0	160	150	190	79779.86	0.1790	A	Weekly		7	30 May 2012	06 June 2012	-7	-100.000	Critical
13	KYD8	SF	179	411.78806	33	0	0	231	140	73710.06	0.1653	A	Weekly		7	24 May 2012	31 May 2012	-13	-185.714	Critical
14	KS2L	PF	433	166.39486	25	0	120	469	480	72048.97	0.1615	A	Weekly		7	30 May 2012	06 June 2012	-7	-100.000	Critical
15	PD3	PF	222	318.49199	6	0	500	202	237	70705.22	0.1585	A	Weekly		7	22 May 2012	29 May 2012	-15	-214.286	Critical
16	TP22X69X2.4PAR	PK	4580	14.97192	0	0	0	3432	4800	68571.39	0.1537	A	Weekly		7	24 May 2012	31 May 2012	-13	-185.714	Critical
17	PD11/1612	PF	71	922.40229	1	0	120	64	85	65490.56	0.1467	A	Weekly		7	22 May 2012	29 May 2012	-15	-214.286	Critical
18	WA3	PF	147	401.85528	1	0	170	139	180	59072.73	0.1322	A	Weekly		7	30 May 2012	06 June 2012	-7	-100.000	Critical
19	FA1/NS/S	PF	214	255.56894	0	0	301	291	240	54691.75	0.1223	A	Weekly		7	12 June 2012	19 June 2012	6	85.714	Low
20	TP13X67X3.OSSK	PK	3469	14.8164	0	0	0	2506	3500	51398.09	0.1149	A	Weekly		7	07 June 2012	14 June 2012	1	14.286	High
21	HC7003	RF	141	355.35	0	0	0	11	59	50104.35	0.1120	A	Weekly		7	06 June 2012	13 June 2012	0	0.000	High
22	TP22X69X3.OPAR	PK	2667	18.7044	25	0	0	2969	3200	49884.63	0.1115	A	Weekly		7	24 May 2012	31 May 2012	-13	-185.714	Critical
23	WC3SP	PF	134	371.20498	1	0	90	135	150	49741.47	0.1112	A	Weekly		7	30 May 2012	06 June 2012	-7	-100.000	Critical
24	HC3023M	SF	348	142.2	48	0	0	279	300	49485.60	0.1106	A	Weekly		7	12 June 2012	19 June 2012	6	85.714	Low
25	EBCLNLI0	RF	340	144.54537	39	0	350	426	375	49145.43	0.1098	A	Weekly		7	16 May 2012	23 May 2012	-21	-300.000	Critical
26	TH10X19X3.6HRO	PK	4704	10.07941	0	0	0	2554	5000	47413.54	0.1059	A	Weekly		7	17 May 2012	24 May 2012	-20	-285.714	Critical
27	WB3	PF	138	336.39988	1	0	130	172	180	46414.90	0.1037	A	Weekly		7	30 May 2012	06 June 2012	-7	-100.000	Critical
28	PD11	PF	99	455.31104	5	0	475	117	142	45075.79	0.1006	A	Weekly		7	22 May 2012	29 May 2012	-15	-214.286	Critical
29	WB3F	PF	109	395.03206	0	0	90	83	120	43058.49	0.0961	A	Weekly		7	30 May 2012	06 June 2012	-7	-100.000	Critical
30	HC2118M	SF	116	359.23	0	0	0	100	106	41670.68	0.0929	A	Weekly		7	30 May 2012	06 June 2012	-7	-100.000	Critical
31	BSHRZFS2	PF	145	274.64993	50	0	150	164	300	39824.24	0.0888	A	Weekly		7	22 May 2012	29 May 2012	-15	-214.286	Critical
32	KFB1/OI	TF	239	164.39482	0	0	106	338	350	39290.36	0.0876	A	Weekly		7	17 May 2012	24 May 2012	-20	-285.714	Critical
33	WB3SP	PF	89	440.14404	1	0	160	90	130	39172.82	0.0873	A	Weekly		7	30 May 2012	06 June 2012	-7	-100.000	Critical
34	WS-GCPVICBF30	VF	115	329.17506	240	0	0	120	0	37855.13	0.0843	A	Weekly		7	21 May 2012	28 May 2012	-16	-228.571	Critical
35	KYD6	RF	94	397.04231	15	0	0	97	97	37321.98	0.0831	A	Weekly		7	16 May 2012	23 May 2012	-21	-300.000	Critical
36	HC2118S	RF	164	225.45552	10	0	0	149	150	36974.71	0.0823	A	Weekly		7	06 June 2012	13 June 2012	0	0.000	High
37	TP22X44X1.8PAR	PK	5767	6.31464	224	0	0	4969	7000	36416.53	0.0811	A	Weekly		7	24 May 2012	31 May 2012	-13	-185.714	Critical
38	EBABNLI0BR	PF	278	124.00277	10	0	390	400	748	34472.77	0.0767	A	Weekly		7	22 May 2012	29 May 2012	-15	-214.286	Critical

Figure 14 - ABC Method Calculations

i. Screen: Stock Take Dashboard

The Stock Take Dashboard displays a single focusing tool for the end user in which they can visually see the level of stock items in each Counting Urgency Category. As mentioned in paragraph 3.3.1.4, several actions can be taken from here.

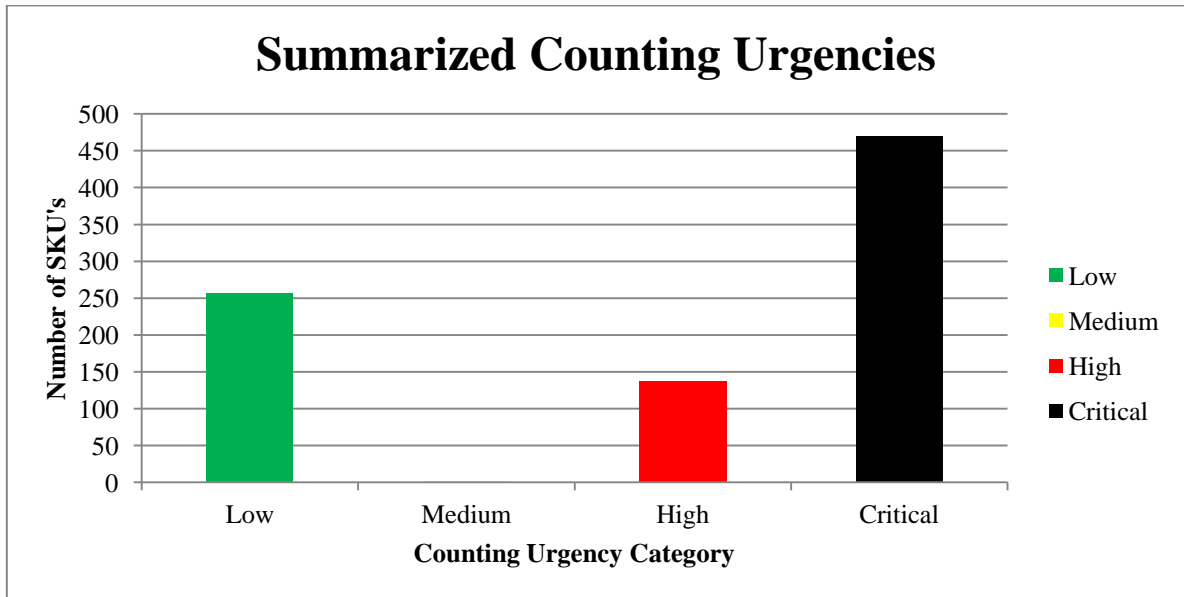


Figure 15 - ABC Method Dashboard

ii. Screen: Counting Urgency per Warehouse

The Counting Urgency per Warehouse screen displays the Counting Urgency levels for each warehouse. This will aid the user in the scheduling of stock counts as to which warehouses to select when compiling the stock take capture sheets.

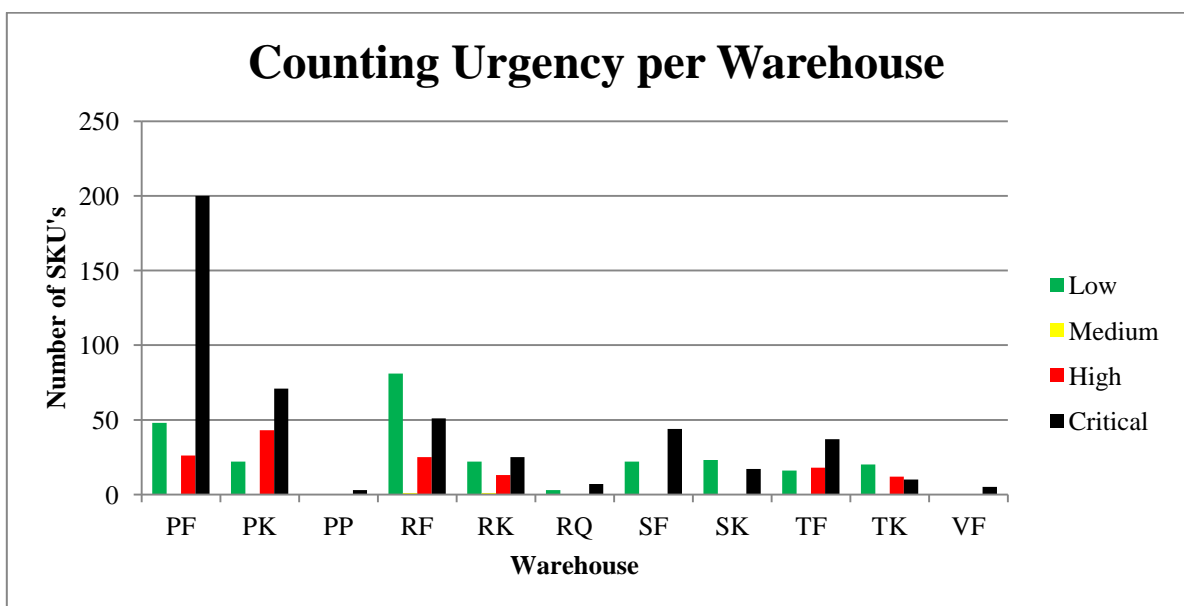


Figure 16 - ABC Method Warehouse Counting Urgency

iii. Screen: Stock Take Capture Sheet

This screen displays a shortened list of stock items in the current stock take list as is determined by the Filter Criteria that is currently set. It is this stock take list that is sent to warehouse managers which in turn gives it to warehouse workers whom should then perform the actual stock count.

In order to shorten the list or to attain a more focused stock take list the Filter Criteria can be changed, a single or several warehouses can be selected, a specific ABCClass can be set or the counting urgency category can be changed. With each Filtering Criteria set the *Total items* number will change, this should aid the user in compiling a stock take list as to how many workers will be counting and also the timeframe available in which the stock take should be completed.

Filter Criteria

Warehouse	(All)
ABCClass (Calc)	(All)
CntUrgency	(All)

Total items:
697

Row Labels	Count	Notes
260SKELETJAM		
70ARCHITRAVE		
BHRZFS2		
BHRZMS2		
BSMLDMS0		
BSSBTMS0HS		
CATSTAND		
CBSTDLI012062		
CBSTDLI015114		
CDBFLHS0		
CDELPHS0		
CDSPNHS0		
COL-HRO1.8HX3.0D		
COL-HRO2.4HX3.0D		
COM008		
COM022		
COM057		
COM078		
COM160		
COM182		
COM186		
COM202		
COM235		
COM249		
COM275		
COM307		

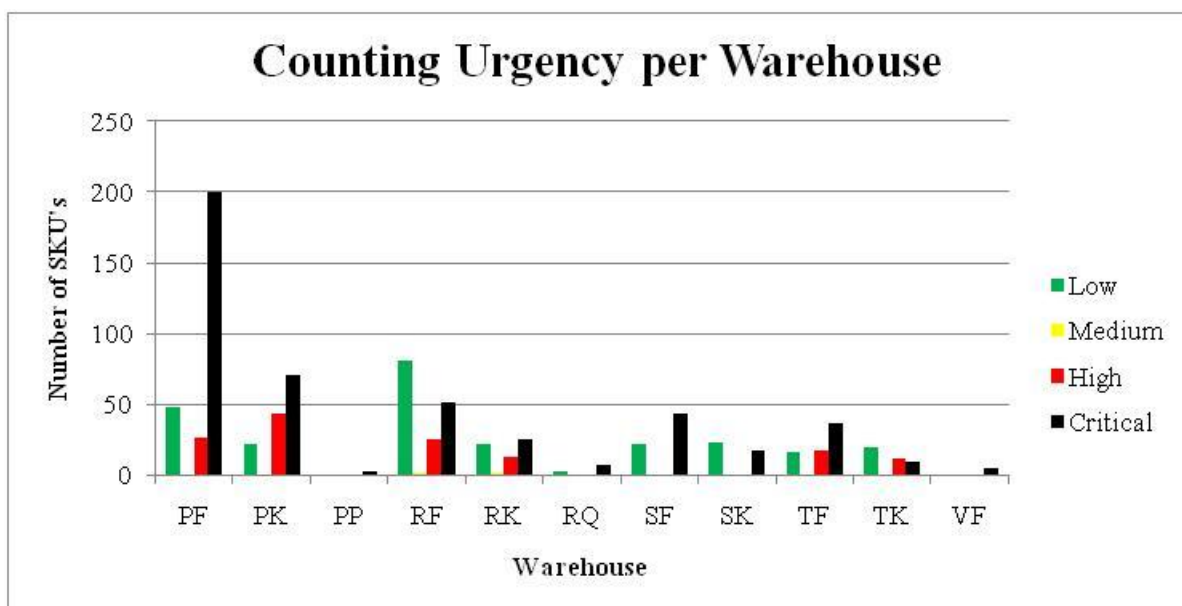
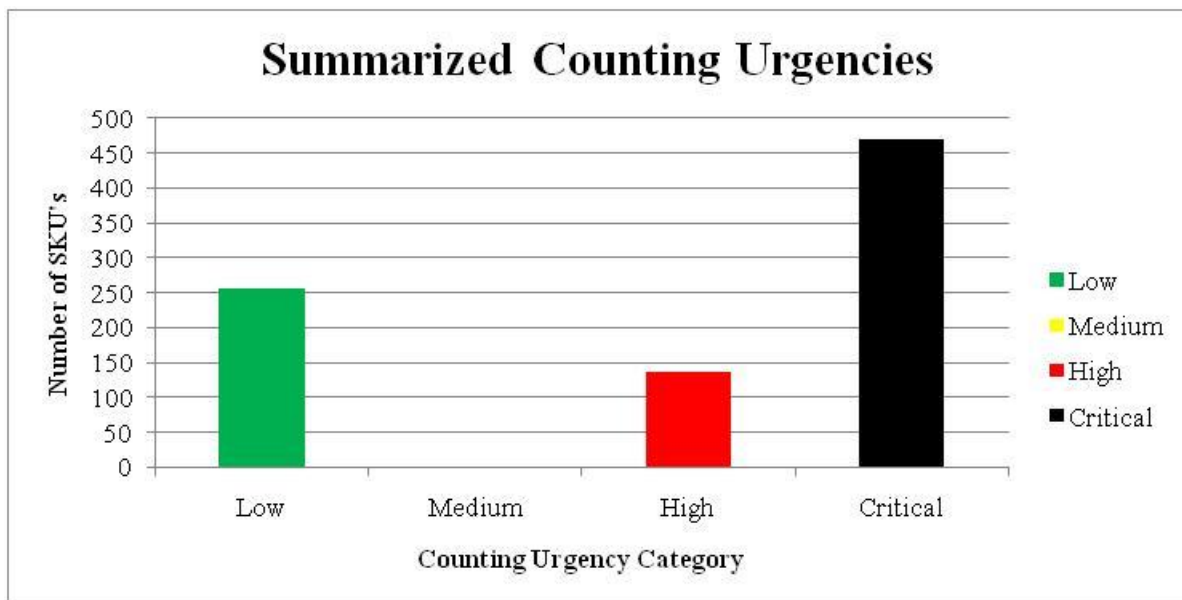
Table 6 – Example ABC Method Stock Take Capture Sheet

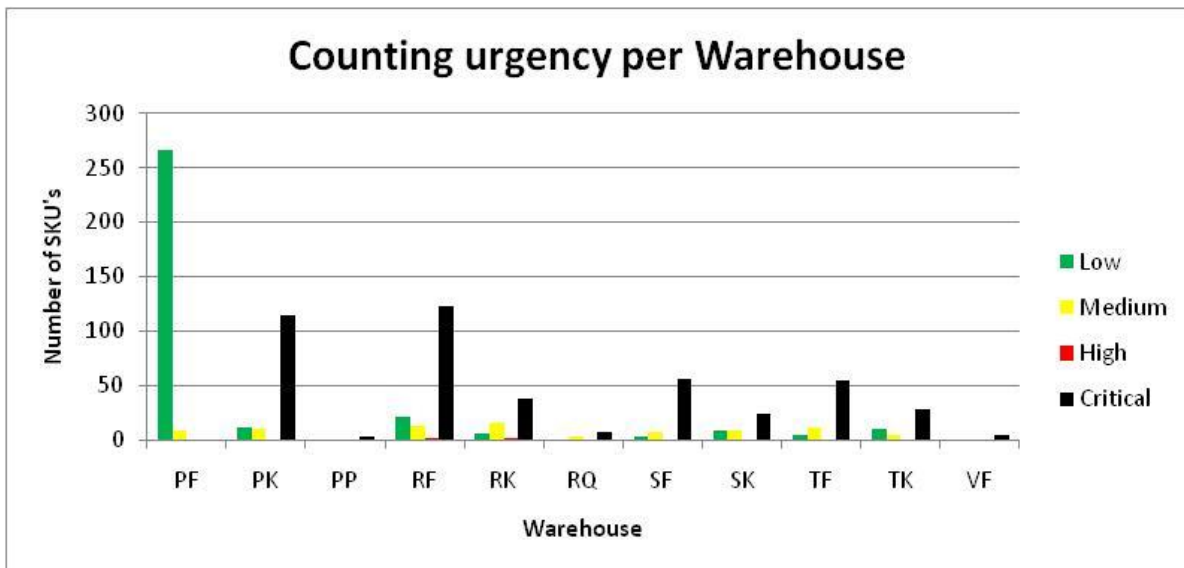
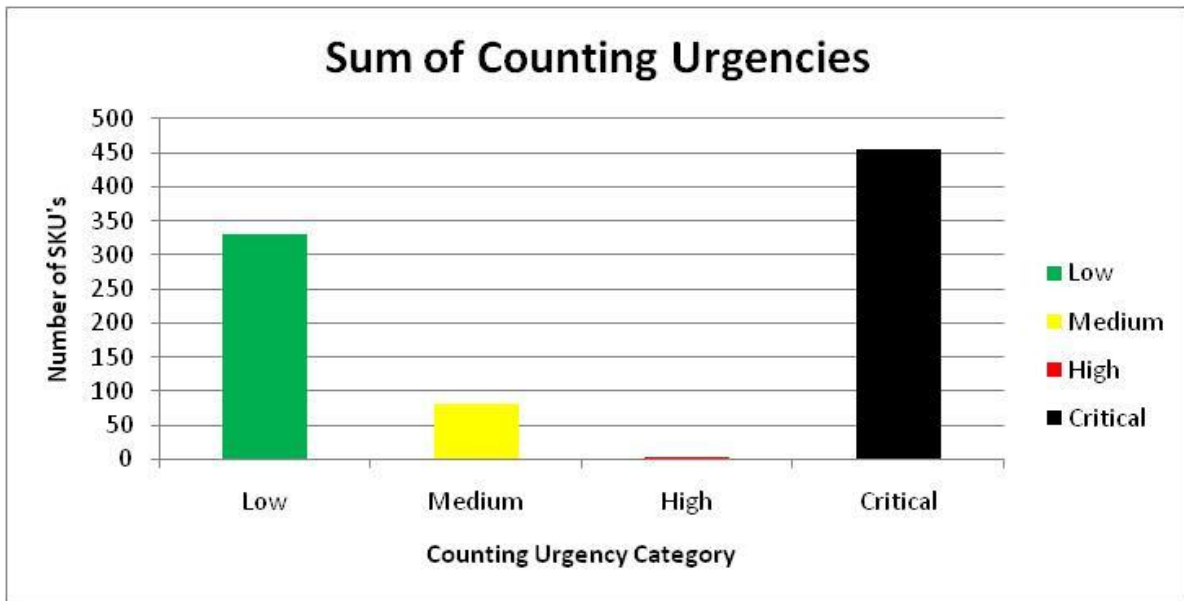
4.2 Module Testing

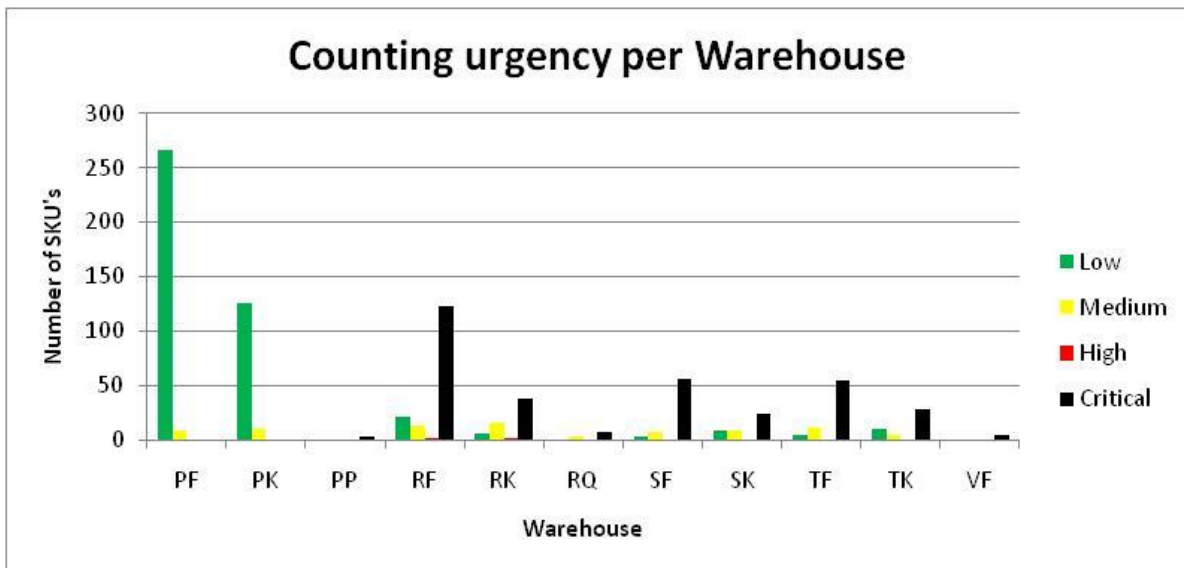
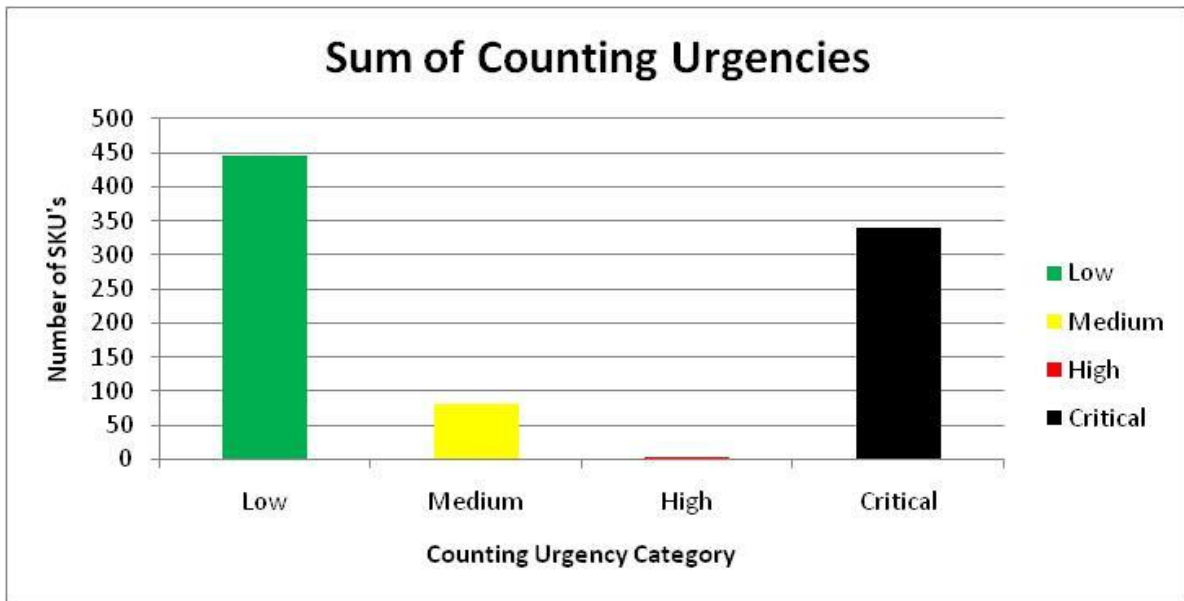
Assuming the module has been signed off and is approved by management, the next step would be to test whether the module will work. Therefore, the following figures display how the counting urgency levels change over a period of two weeks (2010/10/01 to 2012/10/14) in which a large effort was initiated by management to count all stock items with a critical counting urgency. Stock counting will be done one warehouse per day, the results thereof can be seen on the Counting Urgency per Warehouse graph (second graph)

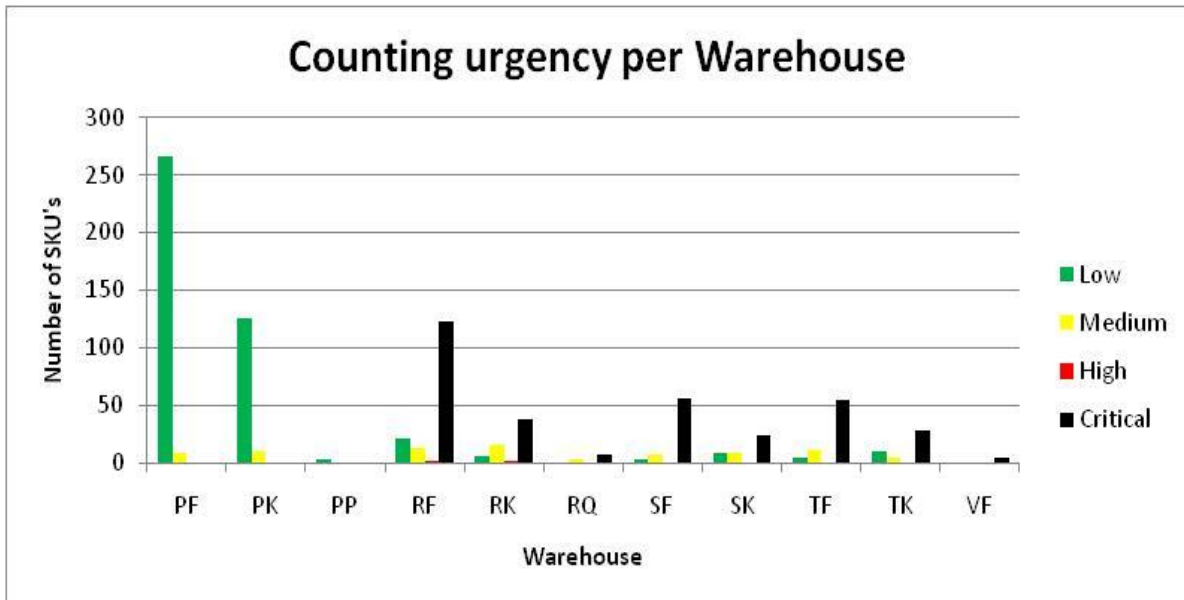
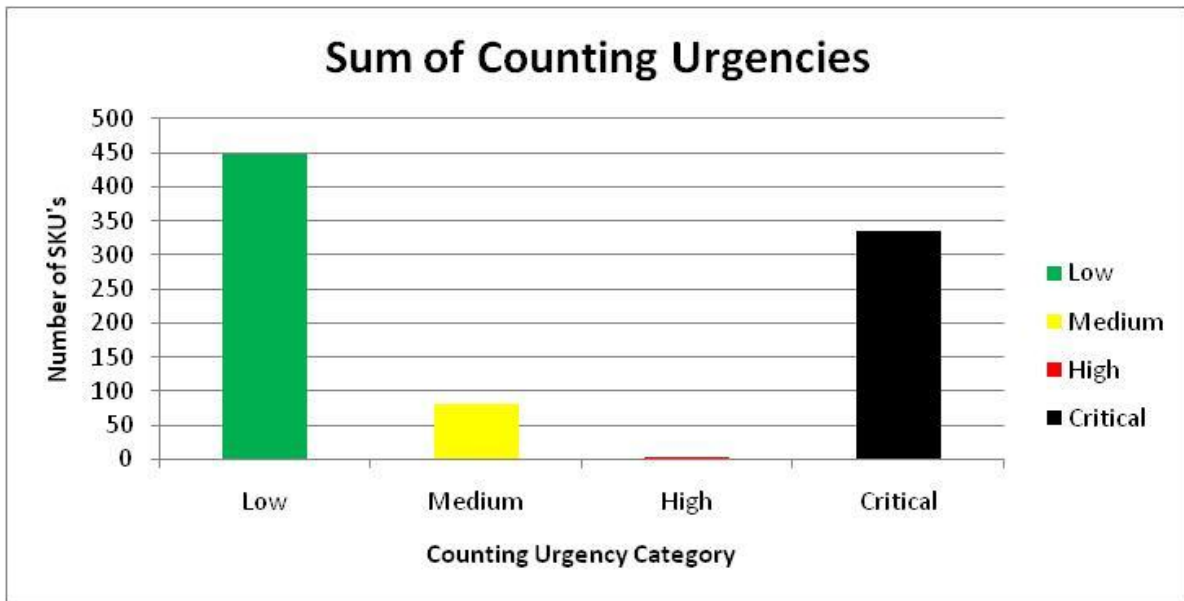
The assumption was made that no stock taking will take place over weekends. The graphs displayed indicate the state of the counting schedule at the beginning of the day.

Day 1 (Initial state – 2012/10/01)

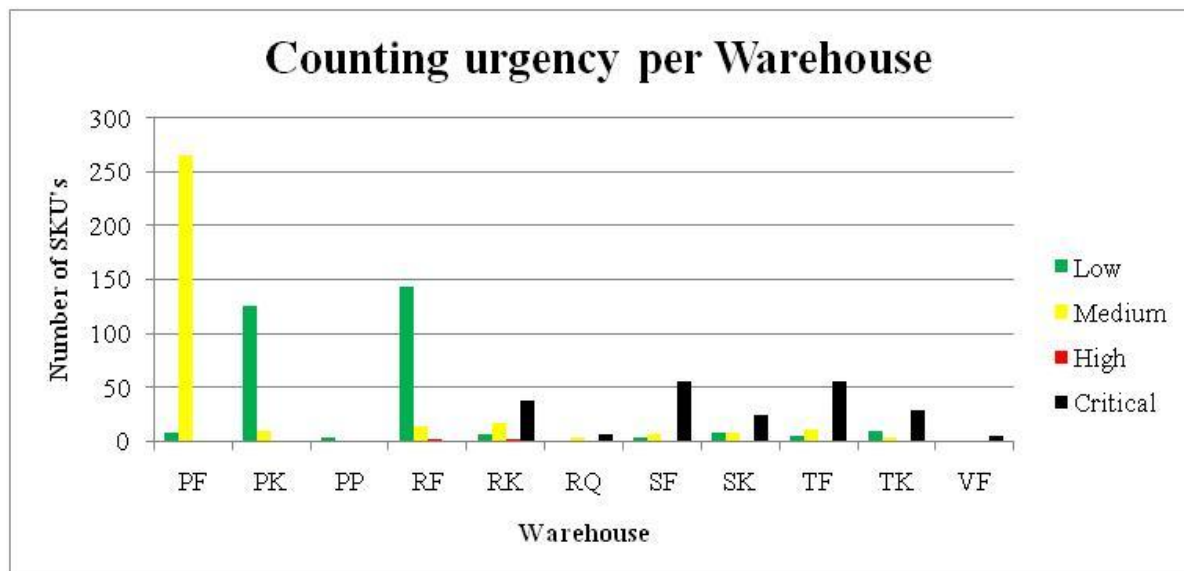
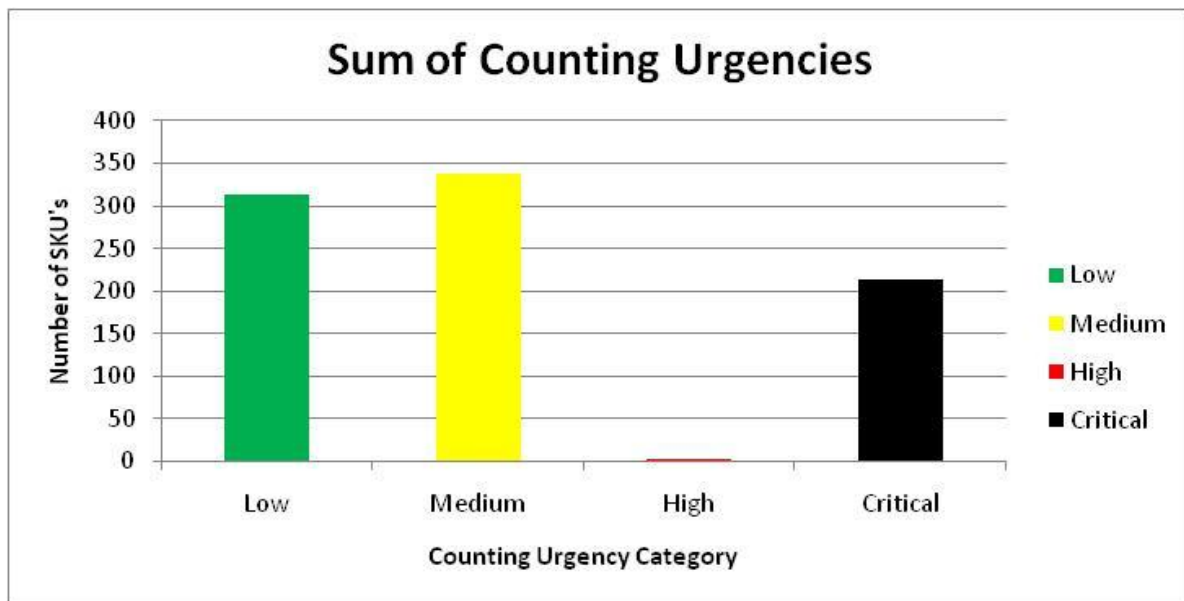








Day 5 (2012/10/05)



From here on, one can see the shift of SKU's from a low counting urgency level (green) to a higher counting urgency level (yellow). This is due to the fact that the SKU's counted on Day 1, which has a counting frequency of a week, have now reached the point where they have to be counted again soon to avoid them reaching entering either the red or black zones and causing a backlog of stock to be counted. It is at this point where the relevant warehouse supervisor will have to schedule a new stock counting opportunity.

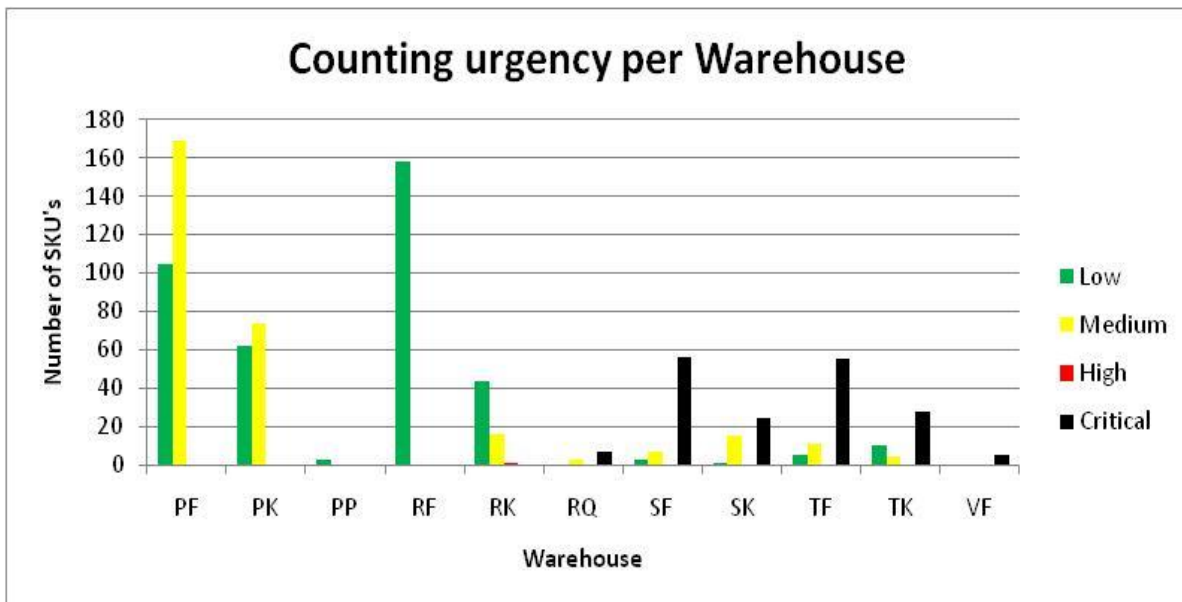
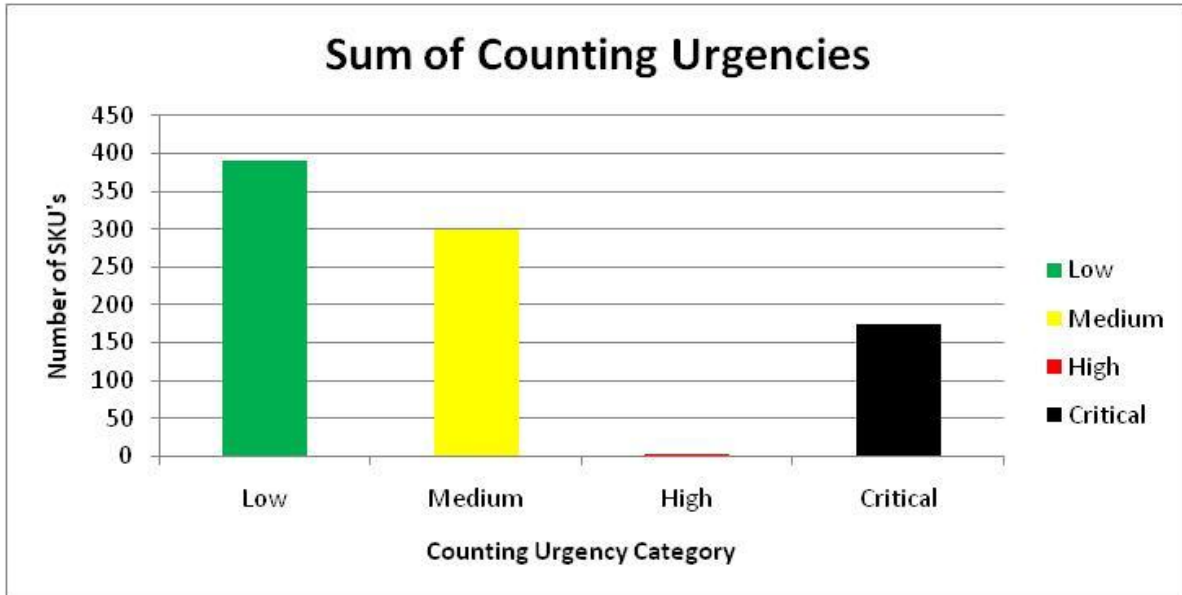
Day 6 (2012/10/06)

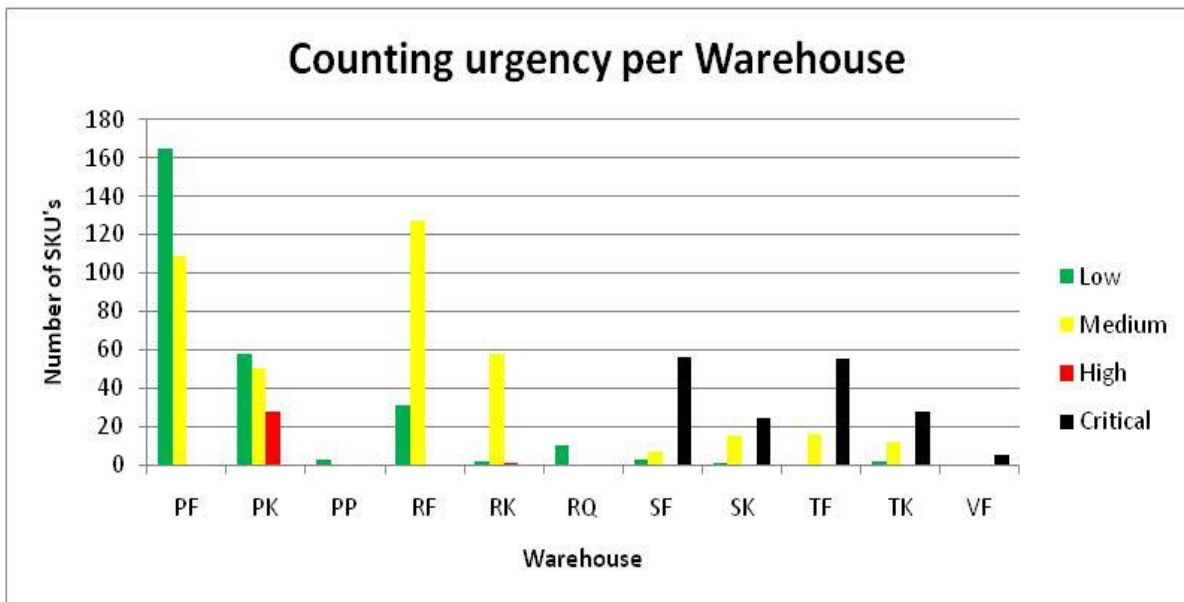
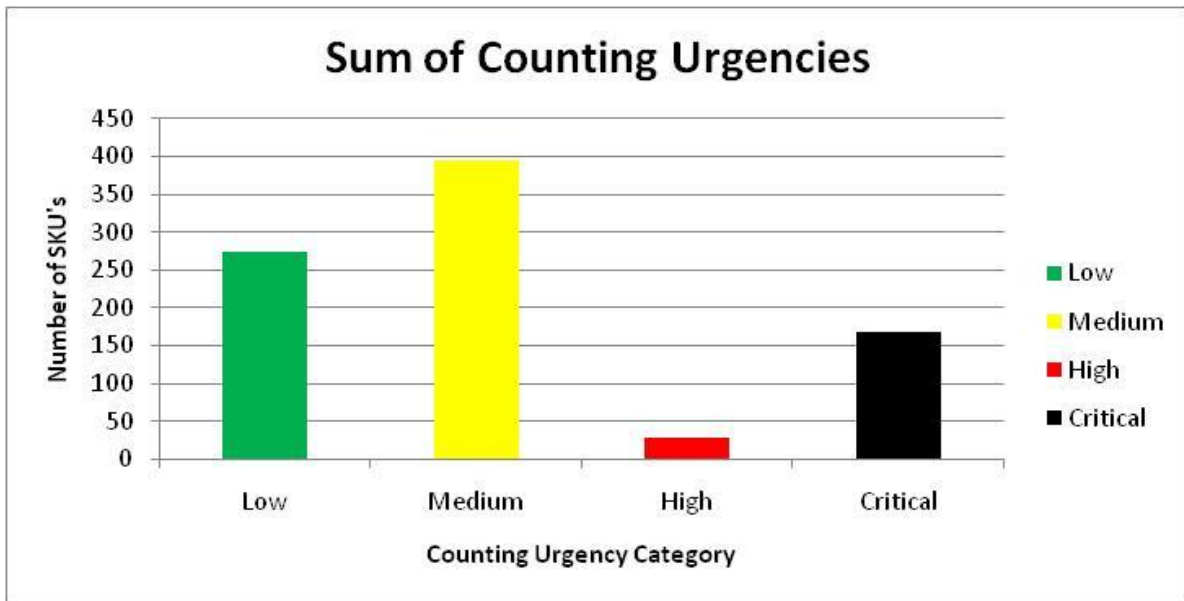
Saturday

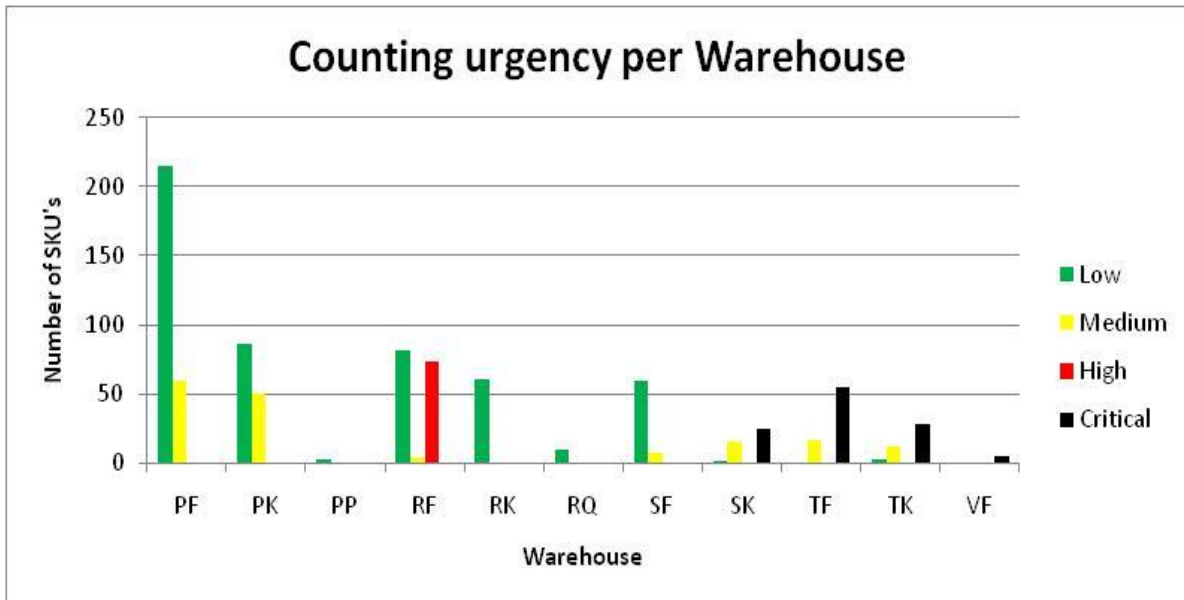
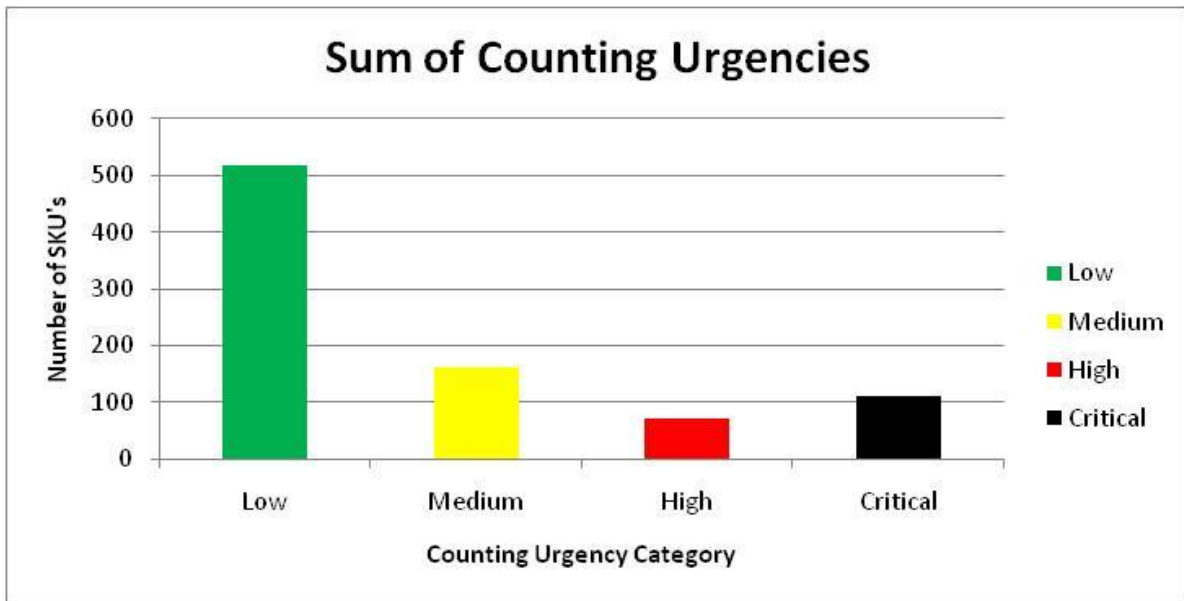
Day 7 (2012/10/07)

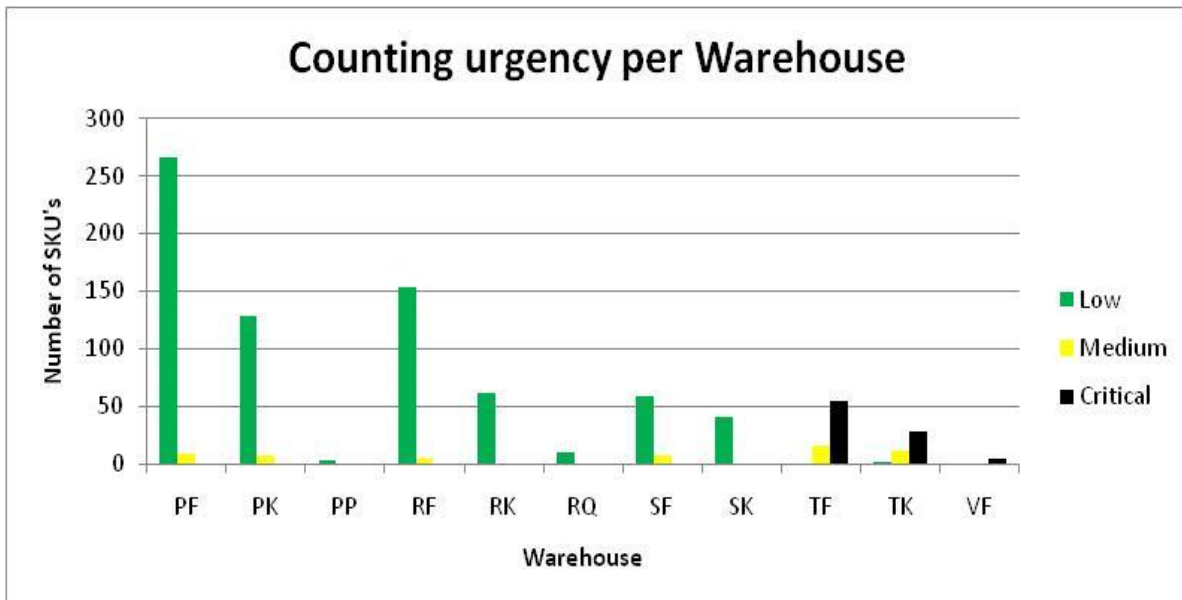
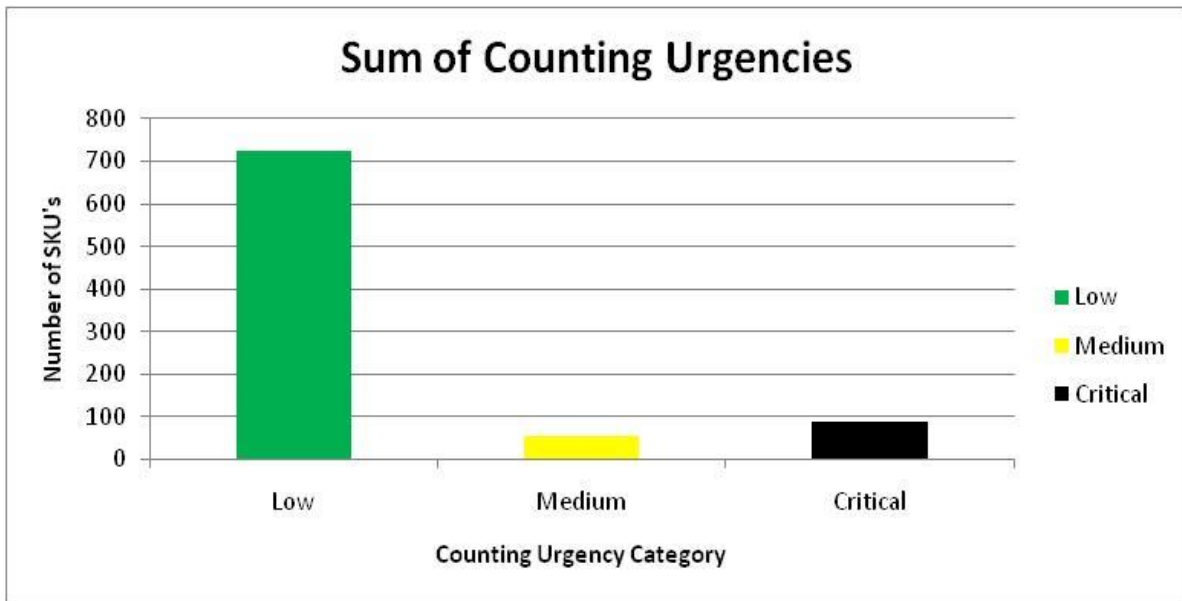
Sunday

Day 8 (Start of Week 2 - 2012/10/08)

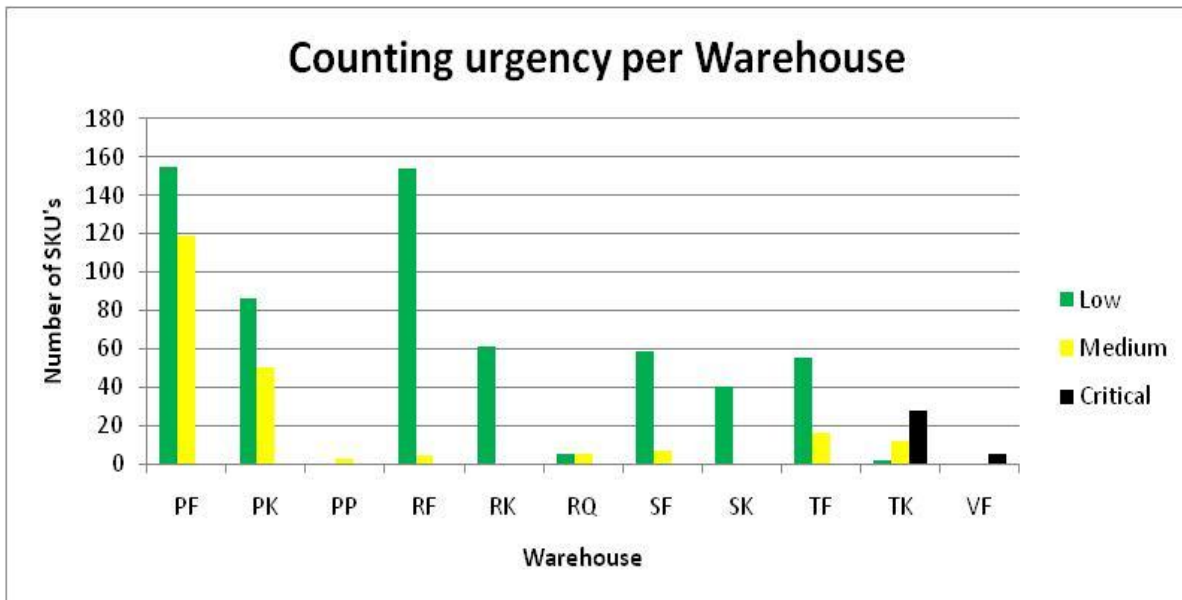
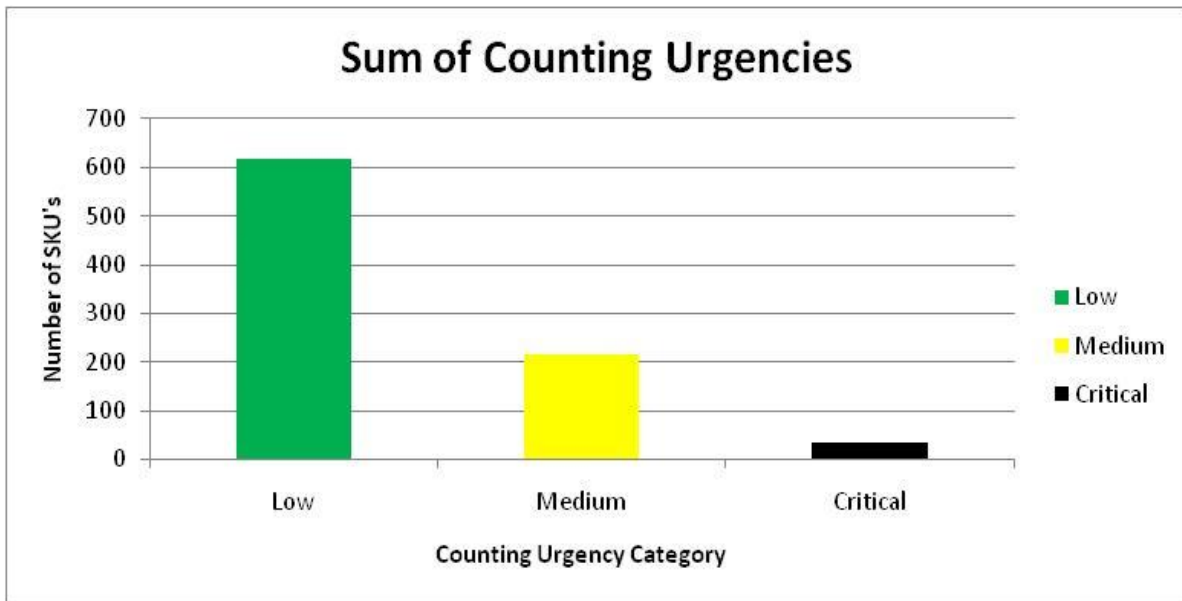








Day 12 (2012/10/012)



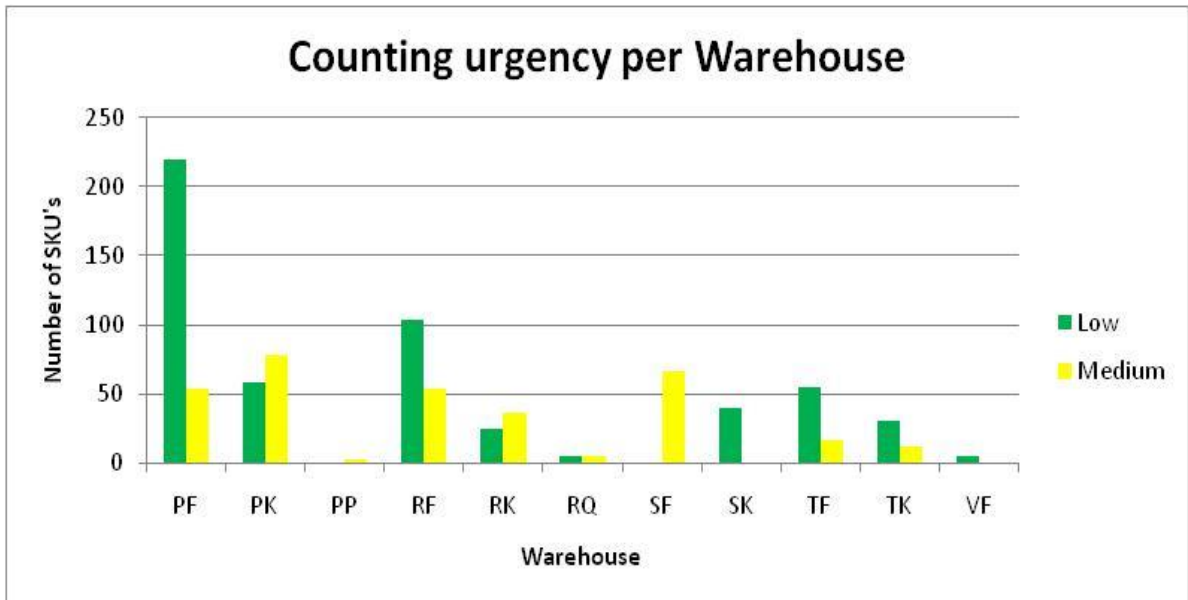
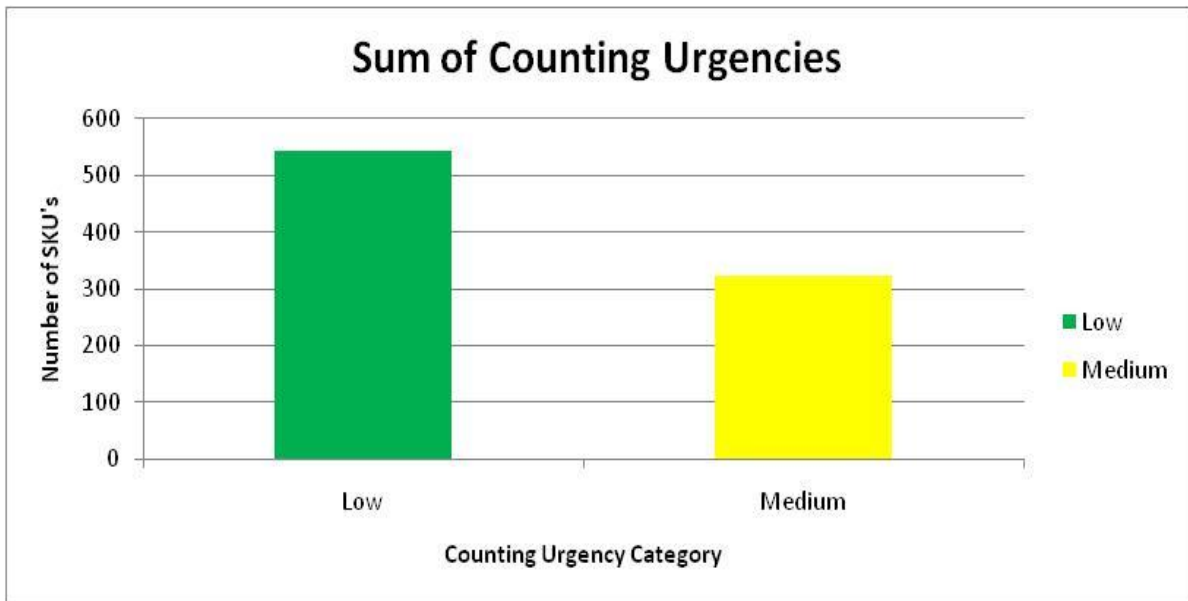
Day 13 (2012/10/13)

Saturday

Day 14 (2012/10/14)

Sunday

Day 15 (Start of Week 3 - 2012/10/15)



4.3 User Manual (Prototype version)

4.3.1 Before module usage

Microsoft Excel is required to run this Cycle Counting Scheduling Module (CCSM)

The CCSM module requires data input from an ERP system (Preferably SYSPRO). Specific inventory records and data fields will be selected by the CCSM which will be downloaded and stored into a file for future module access and reference.

Therefore, ensure that the computer has access to the ERP's databases with all relevant permissions and codes accounted for.

4.3.2 Software Purpose

The CCSM has several functions which it can perform with the main objective of providing the user with a single focusing tool displaying the current "state" of the cycle counting schedule.

As noted in the preceding paragraph, the CCSM has several other functions which it can also perform, these include:

- Set up of cycle counting schedules;
- Compile stock take capture sheets;
- Display cycle counting urgency levels for both
 - Company overview and
 - Warehouse specific

- Determine Stock on Hand discrepancies
- Aid with discrepancy reports
- Aid in capturing of approved stock takes

4.3.3 User Interfaces

4.3.3.1 Main Menu/Dashboard

The CCSM has a main dashboard window displaying two (2) graphs, both Company Overview Counting Urgencies and Warehouse Specific Counting Urgencies. These graphs indicate the number of Stock Keeping Units (SKU's) in each of the counting urgency zones.

In order to view the SKU's in each of these zones can be done clicking/taping on a specific zone via the use of a mouse/touch screen (depending on platform used). By doing this, a

new window will be displayed listing all of the SKU's in the selected colour/counting urgency zone.

4.3.3.2 Stock Take Capture Sheets

The CCSM, as mentioned, is also able to aid with compiling stock take capture sheets. This is done via the Stock Take Capture Sheets window. On this window, the user is able to select the either (or all) of the warehouse listed in the company's SYSPRO databases. The user can also select a specific (if not all) counting urgency category (Low, Medium, High Critical). By selecting either of these options will alter the list of SKU's listed on the stock take capture sheet.

Upon completion of a stock take capture sheet the user can either print the sheet on a network printer or save an electronic version of the sheet on the computer for future use, filing or managerial approval.

4.3.4 Common Tasks

4.3.4.1 Compiling Stock Take Capture Sheets

As noted in 4.3.3.2, an electronic version of the compiled stock take captures sheet can be saved on the computer. This electronic version can be saved in several different formats depending on user or managerial preferences. Saving the stock take capture sheet can be done as follows:

- Step 1: Select the Stock Take Capture sheet
- Step 2: Click on the Microsoft Office button at the top left corner of the screen,
- Step 3: Go down to the "Save As" expansion list,
- Step 4: Select preferred format,
- Step 5: Select location to save the document,
- Step 6: Rename the document,
- Step 7: Click on the "OK" button

Alternative:

Press F12 on the keyboard to skip steps 1 – 3

4.3.5 Advance Functions

4.3.5.1 *Updating inventory records*

Updating stock on hand figures in the module can be done as follows:

- Step 1: Select the Calculation sheet at the bottom of the window,
- Step 2: Filter the fields to corresponding to the stock take capture sheet,
- Step 3: Search for the corresponding SKU,
- Step 4: Go to the “Count” column,
- Step 5: Enter the “Count” value from the stock take capture sheet into the “Count” column on the Calculations sheet,
- Step 6: Continue to enter the remaining SKU “Count” values until finished,
- Step 7: Click on the Save button at the top left-hand corner of the screen.

4.3.6 Troubleshooting Guide

#	Issue	Solution
1	The program is not responding to any input?	<ul style="list-style-type: none"> • Ensure all input devices are connected properly; • Close other applications to free computer RAM; • Close and restart the CCSM;
2	Several data entries on the Calculation sheet display “value!” or “ERROR” messages?	<ul style="list-style-type: none"> • Ensure newly entered data corresponds to the data field requirements;
3	Not all SKU entries is shown on the Calculation sheet	<ul style="list-style-type: none"> • Ensure no filtering criteria is set on any of the columns;
4	The graphs on the Main Dashboard sheet displays the same values regardless of changes made to several data entries	<ul style="list-style-type: none"> • Press F9 on the keyboard to refresh calculations; • Go to the “Data” tab on the Toolbar > Look for the “Connections” tab on the Ribbon displayed > Click/tap the “Refresh All” button;
5	The graphs on the Main Dashboard does not display all Counting Urgency Zones or Warehouses	<ul style="list-style-type: none"> • Ensure no filtering criteria is set; • Refer to the solution #3;
6	The SKU's in the Stock Take Capture Sheet list does not change regardless of setting different filtering criteria	<ul style="list-style-type: none"> • Press F9 on the keyboard to refresh calculations; • Go to the “Data” tab on the Toolbar > Look for the “Connections” tab on the Ribbon displayed > Click/tap the “Refresh All” button;
7	The Stock Take Capture Sheet list does not display the all Counting Urgency Zones or Warehouses	<ul style="list-style-type: none"> • Ensure no filtering criteria is set; • Refer to the solution #5;
8	The CCSM is unable to print or save Stock Count Capture Sheets	<ul style="list-style-type: none"> • Ensure a network printer is connected and installed on the computer • Close other applications to free computer RAM; • Close and restart the CCSM;
9	For any Excel related issues	<ul style="list-style-type: none"> • Refer to the Microsoft Excel Trouble shooting Guide;

Table 7 - Troubleshooting Guide

5 Conclusion

The Cycle Counting Scheduling Module (CCSM) will aid the user in the scheduling of cycle stock takes and will act as single focusing tool for monitoring the success of the cycle counting schedules. The CCSM will reduce the workload of the warehouse supervisor allowing them to attend or focus on other warehouse activities. This module will ensure that all stock items are counted in the required timeframe and in doing so decrease the pressure at financial year end when the Finance Department requires stock figures.

The key requirements to ensure that the CCSM is used and implemented efficiently include:

- Up to date inventory records from SYSPRO;
- Rational counting frequencies and preferences made by management and
- Sound user understanding of the module.

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