Advanced Integration of Quality Control Through Inventory Management System in a Semiconductor Company in the Philippines

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Abstract: The current inventory system of the ON Semiconductor Philippines Inc can be further enhanced due to lack of inventory techniques that leads to some delays in some processes or elements in terms of storing and retrieving Integrated Circuits (ICs) in the staging racks. This study is aiming to apply the advanced process integration of quality control through proper inventory management system on their system for effective inventory and monitoring purposes. Moreover, to improve their current inventory system by applying the researcher's proposed system that can lead for easy managing the staging racks in terms of storing, retrieving, and monitoring of ICs for easy distribution. The proposed system generally will not just lessen the time of process present in the of storing and retrieving of ICs but also it will to help monitor the status of staging racks and at the same time, it will eliminate misplaced inventory items and have an organization or synchronization among production elements.

Keywords: Advanced Process Integration, Rack Management, Inventory

I. INTRODUCTION

Advanced Process Integration (API) is essential for businesses looking to connect systems and information efficiently. API allows for automation of business processes, integration of systems and services, and the secure sharing of data across numerous applications. (Advanced Process Integration, 2015). Overcoming integration challenges allows organizations to connect systems internally and externally. Moreover, API allows for the automation of management, operational, and supporting processes which means combining needs or tasks of "opposite" kinds so that Savings (or Synergies) can be obtained. (Gundersen, 2013) This gives businesses an edge over competitors as they can spend less time concerned about the challenges of integration and more time and energy on driving new business.

Previously, process integration software was only available to large enterprise companies and in other countries that could afford it. Today, businesses of all sizes need an efficient integration solution to streamline processes between marketing, sales, customer service, and supply chain management, etc. Integration among administrative, operational, and support processes increases productivity by simplifying regular enterprise functions.

Integration without the proper tools is complicated. Many businesses implement custom integration to take on the challenge of creating seamless connectivity (Von Berg et al., 2010). This method calls for a developer to create point-to-point integrations between applications and services. As a business grows and the number of integrations increases, the point-to-point architecture or "spaghetti code", becomes complex, fragile, and expensive to maintain.

Furthermore, companies without an integration solution often resort to manual data entry. This method requires individuals to transfer data from one application to another by hand, often resulting in "swivel chair" data entry. Such a technique is time consuming and expensive. Some companies employ data loaders or other tools to help integration, yet with limited connectivity to certain services, they are not always scalable. That is why Advanced Process Integration should be applied with Quality Control because it enables to measure and control the quality of the inventory as it is being developed which provide routine and consistent checks to ensure data integrity, correctness, and completeness, identify and address errors and omissions and even document and archive inventory material and record all QC activities (Gadd, 2014).

Advanced Process Integration with Quality Control also strives to improve processes and align the needs of customers with company objectives. This gives businesses visibility and flexibility, making them more efficient and innovative.

Moreover, workflow automation promotes efficient interactions between process models and data models. Business process re-engineering works towards improving efficiency across the business model by helping companies evaluate and implement best practices for process automation and business integration. Critical governance and operations processes can be automated and synchronized to ensure businesses follow standards. Core business processes relating to marketing, sales, and purchases can be integrated with support and accounting to enhance visibility and improve communication across the team (Harnden, 2015). With critical business processes automated, companies are free to focus primarily on driving new business.

One of the application of Advanced Process Integration can be done using the Inventory Management System wherein is an integral part of any successful business, serving to provide uninterrupted production, sales and/or customer service at a minimum cost. Inventories usually consist of goods, raw materials and finished products (Hayden, 2014). Since each of these elements is essentially equal to money for the business owner,

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Effective management of these assets is key to making a profit and having optimum stock of items in the inventory. Meaning, ineffective inventory management can contribute to losses or business failure, since this crucial component is so vital to the profits and costs of the business.

In the Philippines, ineffective inventory management can contribute to losses or business failure, since this crucial component is so vital to the profits and costs of the business (Samantha Carr, 2013). And the companies that really need a process integration of quality control through inventory management system is those who are in the field semiconductor like ON Semiconductor Philippines Inc. that was founded in 1978 and the company located at Golden Mile Business Park, Special Governor's Drive, Barrio Maduya Carmona, 4116 Philippines. The company's line of business includes the manufacturing of semiconductors and related solid-state devices. ON Semiconductor Philippines is known for its driving energy efficient innovations, empowering customers to reduce global energy use. The company offers a comprehensive portfolio of energy efficient power and signal management, logic, discrete and custom solutions to help design engineers solve their unique design challenges in automotive, communications, computing, consumer, industrial, LED lighting, medical, military/aerospace and power supply applications.

ON Semiconductor Philippines Inc. also operates a responsive, reliable, world-class supply chain and quality program, and a network of manufacturing facilities, sales offices and design centers in key markets throughout North America, Europe, and the Asia Pacific regions. In addition to that, the company has also global corporate headquarters are in Phoenix, Arizona. It operates a network of manufacturing facilities, sales offices, and design centers in key markets throughout North America, Europe, and the Asia Pacific regions.

The researcher conducted a preliminary observation in ON Semiconductor Philippines Inc. and found certain problems that require improvement especially about the system in managing the staging racks. Unorganized arrangement of staging racks and even unsorted Integrated Circuits (ICs) for distribution that will really affect the inventory of the company were identified that convinced the researcher to use an Advanced Process Integration of Quality Control through Inventory Management System. Because of this integration, the researcher created an Inventory Management System that made the managing of racks organized, easy to monitor and generate reports and at the same time, made easier to sort the Integrated Circuits (ICs) for distribution.

A. Theoretical / Conceptual Framework

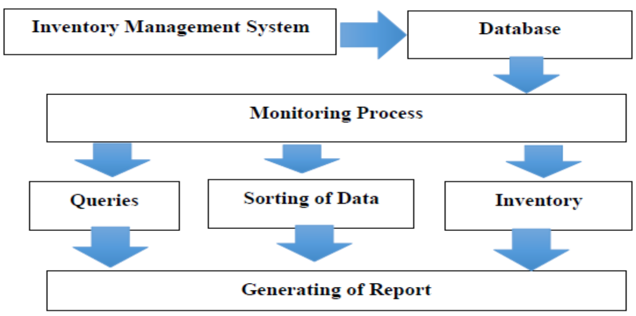
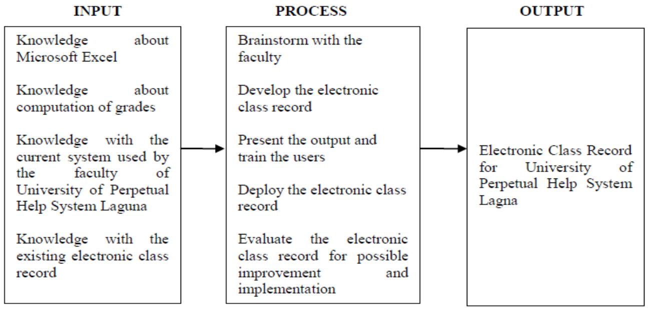


Figure 1 Conceptual Framework

The figure 1 shows the conceptual framework of the study. The user will be able to log in. to the system through a security passcode and it will show the queries and inventory of the products. In monitoring the process of the products, the user will input the number and its kind in the database for each rack. The user will also determine whether if it is for input or output products from their respective racks. The system will show the date and time of inputting and releasing of products and the person-in-charge in both input and output transactions. In generating reports, the user can choose what kind of report he will going to print through the system's sorting of data.

B. Operational Model



The process of improving the system is having the finished products to be stored in properly labeled cabinets for a systematic way of storing. Cabinets should be in fixed positions or stations for easy retrieval for distribution. Hence, the users can do generation and monitoring of reports any time they need.

C. Statement of the Problem

The main problem of the study was the optimization of the system in managing the staging racks at ON Semiconductor Philippines Inc. More specifically, it sought answers to the following sub-problems:

1. What is the current status of managing the staging racks?
2. What is the monitoring system used for easy distribution of Integrated Circuits (ICs)?
3. What are the problems encountered in the current system?
4. What system can be developed from the problems encountered in the current system?
5. Is there any significant difference between the current system and the proposed system in managing the staging racks?

D. Hypothesis of the Study

1. There is no significant difference between the current system and the proposed system in managing the staging racks.

E. Definition of Terms

For better understanding of the study, the following terms were defined operationally and contextually:

Process Integration is the science and mechanism of managing the movement of data,

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And the invocation of processes in the correct and proper order to support the management and execution of common processes that exist in and between organizations.

Quality Control System is a process system in the final testing of the production area.

Integrated Circuit is a tiny slice of semiconductor material imprinted with complex functions.

Rack is a framework which primary function is to hold, hang, or display various materials.

Inventory Management is a science primarily about specifying the shape and percentage of stocked goods.

It is required at different locations within a facility or within many locations of a supply network to precede the regular and planned course of production and stock of materials. The literature and studies that were reviewed were found to have bearing on the present study. They served as bases for the conceptualization the study's research problem, research design and methodology.

II. PROCESS INTEGRATION

According to Mohanti (2010), processes integration is a part of process intensification and it is also a fairly new term that emerged in 80's and has been extensively used in the 90's to describe certain systems oriented activities related primary to cover almost complete process design It enables the process engineer to see the big picture first and the details later.

In addition, process integration is also concerned to the advanced management of material energy and information flows in a production plant and the surrounding community based on the multi criteria optimization of the processing systems that make the process integration plays key roles in enabling business application integration/collaboration across multiple organizations. Integration can be categorized into two types: internal and external. To stay competitive, companies must be agile in adapting processes to ever-changing market dynamics, looking beyond traditional enterprises/marketplaces through collaborative interactions and dynamic e-business solutions (Zhang, 2014). The enterprise infrastructure must provide capability for dynamic discovery of trading partners/service providers and enable federated security mechanisms, solution monitoring/management.

In business, integration can present some surprisingly hard problems. The data and applications that an organization uses probably weren't designed to be connected. Each one has its own view of the world, expressed in its own idiosyncratic way. And over time, an organization's IT environment tends to get more complex. Applications and databases are deployed at different times by different groups to address different business needs. In most firms, this complexity is an inescapable corollary of growth: It's hard to avoid. All of this makes integration challenging, both technically and from a broader business perspective.

That is why Microsoft and other vendors have responded to this by creating integration technologies to help address these challenges. Yet understanding the benefits these technologies provide can itself be challenging. So you can knowing exactly which integration technology to use in a particular situation (Chappell, 2010). A useful way to think about integration is to divide it into two categories: Application integration, where the focus is on connecting different applications. One common reason for doing this is to automate more of a business process. Data integration, where the goal is to work more intelligently with data. This most often means keeping data synchronized across systems or creating a data warehouse.

In addition to that, companies used the Business Process Integration (BPI) which refers to the ability to define a commonly acceptable business process model that specifies the sequence, hierarchy, events, execution logic and information movement between systems residing in the same enterprise (viz. EAI) or systems residing in multiple interconnected enterprises.

Wherein through Business Process Integration, business process embedded in one application is being bridged into the process of another. The business processes linked together are described in terms of activities or Workflows and bring human Actors as a distinguishing element of the solution.

BPI solutions also allow enterprises to take advantage of systems that are already in place by automating and managing the business processes that span these systems. With BPI, enterprises can preserve major investments in legacy systems thereby avoiding the expense of having to write additional code to replicate existing functionality (Liegener, 2012).

With that automation and process integration, the product will fully meet all the intended requirements and will have all the expected characteristics for a good quality control in any process. When any product is brought to market, there are a number of steps which have to be followed correctly to result in the desired goods to sell. This applies equally to literally anything bought or sold. When crops are harvested, if they are not cut, processed and shipped correctly, they could be ruined or even be mixed with dirt or other less desirable materials. When a machine is assembled, all the nuts, bolts, and every other part has to be put together correctly for the final function of that machine to operate correctly. When the very nuts and bolts themselves are manufactured, they must meet many strict requirements of their own in terms of allowable dimensions, materials, finishing and markings. The process the machine will be used for will likely have quality requirements of its own, this may be to cut, weld, drill, wrap, cook, print, move or whatever its end purpose is quality can almost never be ignored (Hayes, 2013).

In the study of business management, process integration has become an interesting area of research that affects analysts studying and working on existing system plans. Process integration aims to investigate relationships across a business compendium to produce classifications and merge similar activities into a standardized system. Integration is the process of merging elements from two similar antecedent processes to create a single process that can be used to replace the original processes (Morisson, 2010).

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This paper proposes a practical method for process integration and provides a theoretical framework and metrics for business process integration assessment. In the provision of metrics that take into account similarity of activities within processes we are able to offer solutions that provide minimal change reducing change costs, and minimizing change impact risks.

Process integration of distillation columns with focus on multi-effect distillation is studied in this thesis. Columns are integrated by using different pressures, so that the condensing duty of one column can be used to boil a second column. This system of multi-effect integration is applied to a complex distillation system;

a prefractionator arrangement (Engelien, 2010). The resulting multi-effect prefractionator arrangement has a much lower energy requirement than a conventional distillation arrangement and it is shown that the savings can be in excess of 70 %. The emphasis of the work is on the energy savings of such arrangement, looked at mainly in terms of minimum vapour flow requirements. Energy savings are considered in terms of both design and operational issues.

China could be seemed as a highly developing country. There are many opportunities and challenges in China. Its preferential policies and huge potential market attract a lot of foreign companies to come to China. Meanwhile, Chinese government encourages the development of domestic enterprises. Therefore, at present there mainly coexist three forms of enterprises in China: foreign-funded companies, private companies and state-controlling companies. In order to enhance competitiveness, almost every company in china has its own supply chain network. Supply Chain management plays an important role in Chinese companies.

The purpose of this, is to study the current situation in purchasing process integration in Chinese manufacturing industry of three kinds of ownership and evaluate the purchasing process of three kinds of companies in China. In addition, it gives some suggestions to remove potential obstacles and optimize the purchasing process; and aims to help the companies to gain competitive advantage in the long term (Ying and Weihua, 2011).

III. QUALITY CONTROL

According to Mooren (2014), quality control aims to let production run smoothly, predictably, and at lowest possible cost. In some cases, it helps obtain better control and predictability of existing manufacturing processes. This requires a combination of statistical techniques, engineering knowledge and organizational aspects. Measuring critical parameters and features is an important element and introducing a capable measurement system means you have to measure specific features (product or process variables) appropriately.

Also, always consider that quality shouldn't only be a matter for quality engineers and operators, but also for senior management. We can discern three levels of control: operator level, engineering level and management level. Operators measure important characteristics of materials or the production process to determine if the process is still 'under control', which means that variation is no more than expected and allowed.

Essentially, quality control is accomplished by off-line quality control procedures, statistical process control and, to a lesser degree, by acceptance sampling plans (Popp et al., 2012). Off-line quality control involves selecting and defining controllable product and process parameters in such a way that deviations between process output and a standard will be minimized. A typical tool for such a product or process design is the statistical experimental design approach or design of experiment (DoE). Quality is here basically defined off-line before the process has actually been implemented or started. Statistical process control (SPC) in contrast compares the results or output of a process with the designated reference states and measures are taken when deviations from a desired condition of a process are statistically significant. When the process is poorly designed (by inappropriate off-line quality control measures, that is, unsuitable or sub-optimal processes) these deviations may be large and cannot be compensated for by statistical process control. Hence, it is obvious that off-line quality control by well-designed processes which are based on a thorough understanding of the effects of the involved process factors on the critical quality features of the product.

According to Bronack (2012), through the process integration and proper practice of quality control, the good Inventory Management System of the company will also follow. Because Inventory Management System should be integrated within the everyday functions performed by personnel associated with entering and maintaining asset information. The system will reduce the effort devoted to asset management, while supplying many personnel with the information they need to perform their functional responsibilities. Wherein, every effort should be made to develop a central Asset Repository in terms of Inventory Management System that covers the entire enterprise, rather than having separate Asset Repositories for mainframe, network, and distributed environments. Having a single repository will simplify accounting and asset management, while allowing for the implementation of enterprise-wide asset management standards and procedures.

According to Lofgren (2012), a manufacturer of vehicles is it vital to have control over the processes in the company. There are regulations from authorities stating an approved vehicle manufacturer should be able to always produce vehicles according to conformance. Companies who want to produce products of high quality, high safety and want approval often need some kind of quality control system (QCS) since there are regulations and laws that demand special quality control on certain products. To be approved as manufacturer of vehicles is it necessary to be able to guarantee each vehicle is safe and does not deviate from the type approval. The production process shall be the same for every product. A quality control shall therefore support a company to keep the quality at a constant and high level.

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A recently started company called Nimbell is in need of developing the business. The company wants therefore to start a project for developing a quality control system since they had not yet focused on the quality work in the organization. The company has the intention to be an approved vehicle manufacturer in the future. The purpose with this thesis is to find out how to develop and implement a quality management system in a startup company.

According to McGown (2010), this thesis is a comparative analysis of quality control practices in Japan and Australia in the 1980s and the 1990s. The methodology employed consists of two main components. The first is a comparative analysis of the literature in Japanese and in English, to highlight the differences in the interpretation of quality management systems. The second is the analysis, through extensive interviews, of five case studies (including Japanese firms in Japan, Japanese subsidiaries in Australia and Australian firms) to identify the differences in actual practice in the two countries. One aim is to define the characteristics of the 'mature' system of Japanese quality control in place around 1990, as a basis for comparative analysis. Three important aspects of the Japanese approach are a reliance on formal structures, procedures and data, the key role played by engineering staff and an emphasis on the technical rather than the social aspects of quality control systems in Japan. By contrast the Australian practice focused on people issues, labor-management relations and achieving cultural change, but formal structures, data and the role of engineering staff were generally inadequate. Some evidence is found of a 'reverse effect', that addressing technical production problems contributes to a positive experience of work, but the converse is unlikely to be an effective approach to installing a quality management system.

IV. INVENTORY MANAGEMENT

According to Opeyemi et al., (2013), inventory management is the process of efficiently overseeing the constant flow of units into and out of an existing stock of goods. This process usually involves controlling the transfer of units in order to prevent the inventory from becoming too high, or dwindling to levels that could put the operation of the company into jeopardy. Inventory management is primarily about specifying the size and placement of stocked goods. It is a science primarily about specifying the shape and percentage of stocked goods. Inventory management is required at different locations within a facility or within multiple locations of a supply network to protect the regular and planned course of production against the random disturbance of running out of materials or goods. The scope of inventory management also concerns the fine lines between replenishment lead time, carrying costs of inventory, asset management, inventory forecasting, inventory valuation, inventory visibility, future inventory price forecasting, physical inventory, available physical space for inventory, quality management, replenishment, returns and defective goods and demand forecasting.

The thesis regarding assembles a new framework for evaluating the relative monetary impact of one inventory management process when compared to another. The purpose is to compare the inventory management processes in a holistic way, evaluating them from three different perspectives. These are defined in this study as (1) process quality, (2) process efficacy and the (3) strength of inventory control. This framework was then applied, and used to assess the merits of a logistical service performed by HUS Logistics, Täyttöpalvelu, translated here as Replenishment Service (RS), comparing the inventory management process it forms with the inventory management process that exists in hospital units that have not adopted the service, referred to here as NRS.

The findings of the study relate to the usefulness of the new framework in comparing inventory management processes. It is deemed a useful tool, and the effectiveness of using a novel method for analyzing inventory efficiency is assessed (Saraste, 2013). With regards to the case study, the thesis concludes that RS is a superior process. Out of the three perspectives considered, the results were fairly clear for two, and ambiguous for one. The study calls for the choice of subscription to RS to concentrate more on system-level benefits, which are even more significant than unit-level ones.

The Global Formula Racing (GFR) team is an organization of student designers at Oregon State University (OSU) and at Duale Hochschule Baden-Württemberg (DHBW) in Germany working to create two race cars to compete in international competitions through the Society of Automotive Engineers (SAE). The large scope of this project necessitates the formation of organized management systems. This project sought to create an effective inventory management system for the GFR team. A database of the fasteners used by the team was created and includes information such as annual demand, inventory value, and lead times. This information was used, along with the appropriate formulas, to calculate the economic order quantity (EOQ), the total material cost (TMC) and the order point (OP) for each part. A comparison of two major vendors was also included, and the vendor with lowest TMC was recommended (Daeschel, 2012). Face to face communication methods to convey this new idea were recommended. Lean manufacturing techniques to help implement this new system were researched including 5S tools and a pokayoke. Student designers will now know exactly when to economically order a part, how many to order, and who to order from. This will save money, as well as increase productivity and professionalism.

V. METHODOLOGY

The researcher utilized the descriptive method of research both survey and documentary analysis. A questionnaire was used as a survey to determine the problems encountered during the operation of the Rack Management System of the said company. The general population of this study were the workers at ON Semiconductor Philippines Inc. particularly at Management Information Systems Department, numbering forty three (43) respondents. This also served as the samples of the study. In addition,

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System Development Life Cycle (SDLC) was used to determine the existing rack management system and create improvement for it and the Process Mapping that served as a tool for examining the process in detail to identify areas of possible improvements.

Descriptive statistics (average time, t-test, and percentile ranks) were used to determine the average time of five trials conducted in both current and the proposed system, to know the percent equivalent of the respondents' answered in terms of monitoring system that the employees used for easy distribution of Integrated Circuits (ICs), and to determine if there any significant difference between the current system and the proposed system.

VI. RESULTS

1. The current status of managing the staging racks of ON Semiconductor Philippines Inc.

Table 1: Time Consumed for Storing ICs in the Staging Racks using the Current System

STORING ICs IN THE RACK (CURRENT SYSTEM)							
Trial	Element	Time (s)	Element	Time (s)	Element	Time (s)	Total Time (s)
1	Element 1	390	Element 2	795	Element 3	525	1710
2	Element 1	300	Element 2	750	Element 3	645	1695
3	Element 1	315	Element 2	615	Element 3	570	1500
4	Element 1	210	Element 2	780	Element 3	555	1545
5	Element 1	255	Element 2	855	Element 3	630	1740
Average Time:							1638

Legend:
Element 1 – Receiving the Finished Products
Element 2 – Verifying and Checking the Finished Products
Element 3 – Storing the Finished Products into the Staging Racks

Based on table 1, the first trial from Element 1 to Element 3 consumed a total time of 1710 seconds for the finished products to be stored and for the second trial, the consumed total time was 1695 seconds, third trial consumed a total time of 1500 seconds, forth trial consumed a total time of 1545 seconds, and the fifth trial consumed a total time of 1740 seconds. With all of these trials, the average time that the current system of storing ICs which was the finished products was equal to 1638 seconds for them to successfully store it in the staging racks.

Table 2: Time Consumed in Retrieving the ICs from the Staging Racks using the Current System

RETRIEVING ICs IN THE RACK (CURRENT SYSTEM)							
Trial	Element	Time (s)	Element	Time (s)	Element	Time (s)	Total Time (s)
1	Element 1	135	Element 2	120	Element 3	600	855
2	Element 1	150	Element 2	180	Element 3	795	1125
3	Element 1	195	Element 2	150	Element 3	705	1050
4	Element 1	195	Element 2	195	Element 3	810	1200
5	Element 1	210	Element 2	255	Element 3	570	1035
Average Time:							1053

Legend:
Element 1 – Receiving Request for Retrieval of the Finished Products
Element 2 – Verifying and Checking the Request
Element 3 – Retrieving the Finished Products from the Staging Racks

Based on table 2, the first trial from Element 1 to Element 3 consumed a total time of 855 seconds for the finished products to be retrieved and for the second trial, the consumed total time was 1125 seconds, third trial consumed a total time of 1050 seconds, forth trial consumed a total time of 1200 seconds, and the fifth trial consumed a total time of 1035 seconds. With all of these trials, the average time that the current system of retrieving ICs was equal to 1053 seconds for them to successfully retrieve it in the staging racks and ready for its distribution.

2. The monitoring system used for easy distribution of Integrated Circuits (ICs).

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Table 3: Monitoring System used for the Current System

Monitoring System	Frequency	Percentage	Rank
By its serial/part number	20	46.51%	1
By its name	6	13.95%	3
No specific method used	17	39.53%	2
Total	43	100%	

Through actual observation, most employees used serial or part number as the monitoring system for the finished products for them to recognize, remember and familiarize with the corresponding serials or part number of their products. While others used no specific method in monitoring process which means it is their own discretion on how they can easily monitor the ICs for easy distribution.

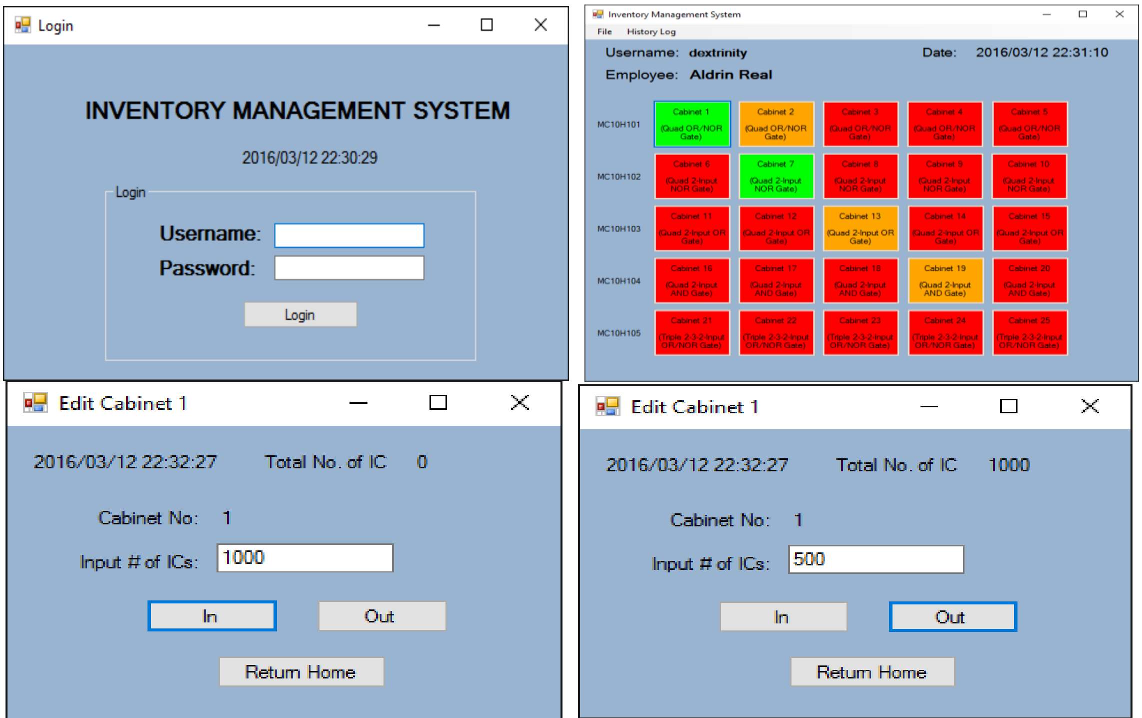
3. The problems encountered in the current system.

Table 4: Problems Encountered in the Current System

THE PROBLEMS ENCOUNTERED IN THE CURRENT SYSTEM		
Problems Encountered	Frequency	Rank
Lack of organization/synchronization among production elements	31	4
Delays	34	2.5
Lack of system optimization	34	2.5
Misplaced inventory items	23	6
Decentralized inventory system	38	1
Labeling	15	7
Inaccurate quantity	29	5
Multiple responses		

Due to decentralized inventory system and lack of system optimization, it causes delays in some elements or processes present in the execution of storing and retrieving of Integrated Circuits (ICs) in the staging racks and also, due to lack of organization or synchronization among production Elements, misplaced inventory items and inaccurate quantity were sometimes occurred.

4. The system that can be developed from the problems encountered in the current system.



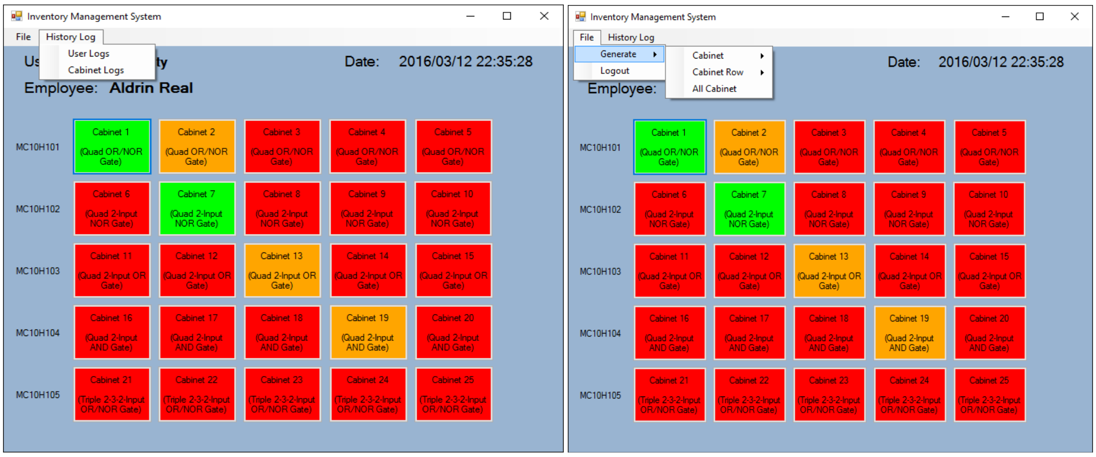


Figure 4 Proposed System (Improved Inventory Management System)

Based on figure 4, the model or system can be developed in order to solve or minimize the effects of problems encountered in the current system is to have an improved Inventory Management System that can easily monitor the status of each rack or cabinet, enables to in and out of finished products, records the process or transactions that the employee did, and generate reports about the some necessary transactions related to the process of the system.

5. The significant difference between the current system and the proposed system.

Table 5: Difference between the Current System and the Proposed System in Storing ICs into the Staging Racks

Element	Mean Time (in seconds)		t-test	p-value	Interpretation
	Current	Proposed			
Element 1	294	216	1.694	0.126	Not Significant
Element 2	759	690	1.174	0.274	Not Significant
Element 3	585	153	14.154	0	Significant
Total time	1638	1059	9.227	0	Significant
Significant @ 0.05					

Legend:
Element 1 – Receiving the Finished Products
Element 2 – Verifying and Checking the Finished Products
Element 3 – Storing the Finished Product into the Staging Racks

Since both Element 1 and Element 2 were both present in current system and in the proposed system their corresponding time were very near to each other that made it not significant. Even tough, Element 3 was present in the current system and the proposed system their corresponding time was different from each other in terms of storing because proposed system showed the status of each rack whether the rack or cabinet was full or not yet full and its location that made it for the employee for easy storing the ICs and wherein the current system cannot do. That made the Element 3 had a significant difference in terms of time using current system and the proposed system.

Table 6: Difference between the Current System and the Proposed System in Retrieving the ICs from the Staging Racks

Element	Mean Time (in seconds)		t-test	p-value	Interpretation
	Current	Proposed			
Element 1	177	186	-0.507	0.626	Not Significant
Element 2	180	186	-0.174	0.866	Not Significant
Element 3	696	285	7.956	0.001	Significant
Total time	1053	657	5.519	0.001	Significant
Significant @ 0.05					

Legend:
Element 1 – Receiving Request for Retrieval of the Finished Products
Element 2 – Verifying and Checking the Request
Element 3 – Retrieving the Finished Products from the Staging Racks

Since both Element 1 and Element 2 were both present in current system and in the proposed system their corresponding time were very near to each other that made it not significant. Even tough,

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Element 3 was present in the current system and the proposed system their corresponding time was different from each other in terms of retrieving because proposed system showed the status of each rack whether the rack or cabinet was full or not yet full and its location that made it for the employee for easy retrieving the ICs and wherein the current system cannot do. That made the Element 3 had a significant difference in terms of time using current system and the proposed system.

VII. CONCLUSION AND RECOMMENDATION

This section presents the conclusions and recommendations of the research study. The primary purpose of the study was to improve the system in managing the staging racks at ON Semiconductor Philippines Inc.

VIII. CONCLUSIONS

1. The current status of managing the staging racks in terms of storing and retrieving ICs at ON Semiconductor Philippines Inc. can be further enhanced because it took longer time to store and retrieve the ICs into the staging racks because the employee needs to search and determine the vacant or not yet full racks or cabinets to store or retrieve it. Thus, the total time of the entire process was also affected both in storing and retrieving because of the scenarios cited.
2. Even tough, most of the employees used serial or part number for the sake of monitoring process for the easy distribution of Integrated Circuits (ICs) there were still problems arose because they could only know what type of ICs was inside the racks or cabinets but cannot easily determine how many ICs were there by using that serial or part number.
3. The most common problems encountered by the current system were the decentralized inventory system that therefore contributed to find difficulty in searching for misplaced inventory items and also the lack of system optimization together with the lack of organization. Or synchronization. among production elements that caused delays in the entire process and inaccurate quantity for the inventory items.
4. A proposed system could possibly help to reduce time in both storing and retrieving process in managing the staging racks for Integrated Circuits (ICs) and can really help in monitoring the ICs in different racks or cabinets for easy distribution. A new proposed system would be the proposal of the researcher in order to improve the current system in managing the staging racks of ICs at ON Semiconductor Philippines Inc.
5. The researcher concluded that in storing the ICs into the staging racks using the current system and the proposed system, both the Element 1 (Receiving the Finished Products) and the Element 2 (Verifying and Checking the Finished Products) had no significant difference in terms of time. Unlike the Element 3 (Retrieving the Finished Products from the Staging Racks) had a significant difference in terms of time using the current and the proposed system.

RECOMMENDATIONS

After dealing with the findings and conclusion, the researcher recommends the following to ON Semiconductor Philippines Inc. that would help and improve the current system of managing the staging racks for Integrated Circuits (ICs):

1. Storing and retrieving of ICs should be done using an improved Inventory Management System with proper monitoring method that will easily determine the availability, status and the location rack or cabinet for immediate storage or retrieval of ICs.
2. Combine the use of serial or part number together with its corresponding product name in terms of labeling the rack or cabinet and reflect it to the system by creating virtual rack or cabinets that will enable the employee to view easily the status of each rack or cabinet without going regularly to the staging racks room.
3. Innovate or improve the current system for it to solve the decentralized inventory system so that it will enables to minimize the time for the process of storing and retrieving of ICs and at the same time, delays and misplaced inventory items will be avoided.
4. Through the use of the proposed system it will help to solve or minimize the effects of the problems encountered in the current system.
5. The researcher recommends the use of the proposed system in order to reduce the time and make it convenient for the employee in monitoring and searching for a rack or cabinet for storage and retrieval of ICs for distribution.

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