

Development of Application Software for Management of Industrial Organization: A Study of Millennium Industries Ltd.

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ABSTRACT

Millennium Industries Limited and many other companies have the problem of streamlining their business processes, integrating their business units, and providing organizational members with greater access to real-time information. Most organizations make use of standalone software applications to run their various departmental functions, such as Human Resources, Finance, Manufacturing, Warehouse Management, Logistics etc. These various standalone software applications cannot communicate with each other. All these problems and more can be resolved with an application software called business solution software (BSS) system. This dissertation presents a solution for standardizing an organization's operation, leveraging all processes across the organization at an optimized cost by using BSS system framework. BSS is an integrated set of programs that provide support for core organizational activities such as manufacturing and logistics, finance and accounting, sales and marketing, and human resources. It is expected to be a commercial-off the-shelf type of software developed using an incremental process model by carrying out the basic software development practices. It is also documented. It is coded using Personal Homepage Hypertext Preprocessor (PHP) programming language. The result of this research is a software that can be used by Millennium Industries limited to increase speed and performance of business processes and lower cost by about 50% as they run their business. It can also be used by other small and medium scale enterprises, and even bigger organizations, such as manufacturing companies, etc, rather than using numerous standalone applications. The BSS system developed in this research can be a vital strategic tool in today's competitive business environment.

Key words: BSS, business process, software development practices, automatic counting system, PHP, XAMP

1.0 INTRODUCTION

In order to improve organizational efficiency and flexibility, and transform the same into effectiveness and prompt responses to the customers, companies have been concentrating on their business processes, which flow across the internal boundaries of departments and external boundaries to support customers and suppliers. Today, companies are pondering over ways and means to achieve high level of integration with partners, suppliers and customers' processes to synergize the business operations all along the supply chains. This calls for need to integrate these business processes. A **Business process** is a collection of related, structured activities or tasks that produce a specific service or product (serve a particular goal) for a particular customer or customers.

Software is what helps the live-ware (users) to communicate with the hardware in order to complete a certain task. Quinn, (1998) in a research found that any company using supply chain management system decreased the production cycle and level of inventory to about 50% and improve 17% of delivery time. Jennings et al. (2000) developed an agent-based process management system using a service model. But the business is restricted in one enterprise. Joseph et al (2001), Enterprise application software (EAS) is software intended to solve an enterprise problem (rather than a departmental problem) and often written using an Enterprise Software Architecture. Due to the cost of building what is often proprietary software, only large enterprises attempt to build such enterprise software that models the entire business enterprise and is the core of communication within the enterprise.

2.0 MODEL CONCEPT

Business Solution Software was developed using an incremental process model of the object oriented paradigm which applies linear sequences in a stagger fashion as calendar time progresses. Each linear sequence produces deliverable increments of the software application. The methodology employed in this research includes site visit to the Millennium Industries Ltd to gather information on their business processes, business units and their functions. Various process framework activities were carried out, such as communication, planning, modeling, construction and implementation.

Java and PHP programming languages were used for generating the code. Testing was carried out to uncover errors that might occur in the code. Figure 1 is the block diagram of the incremental process model used in the design showing the various process framework activities and software development practices carried out.

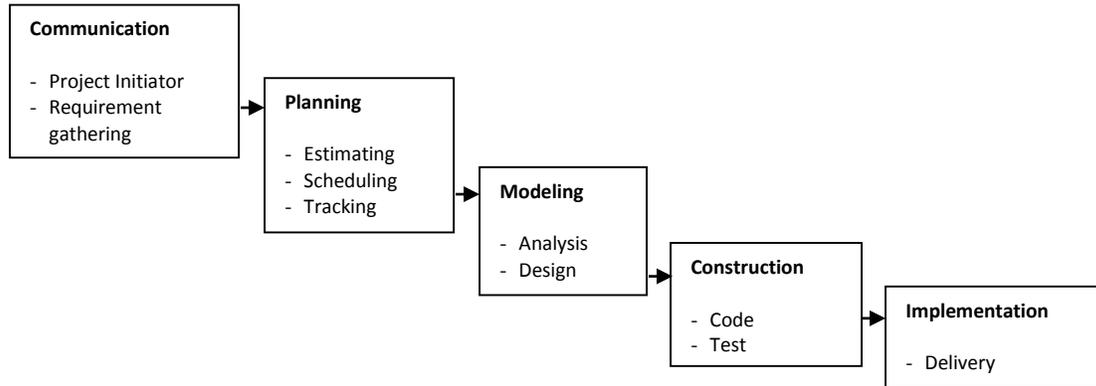


Figure 1: Block Diagram of Incremental Process Model

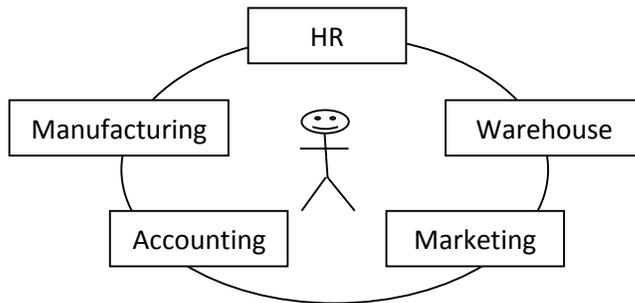


Figure 2: Existing Model of Software at Millennium Industries.

The block diagram of the existing organizational model of software at millennium industries ltd is shown in figure 2. The various departments like accounting and manufacturing make use of standalone software application, and paper work for documentation. There is no way these standalone software can communicate with each other as shown in figure 2 above. For a personnel in a particular department to communicate or access another department he/she will have to call or trek to the department in order to get the information needed, thereby wasting some valuable time and reducing the speed of business activities.

3.0 Overview of the Proposed BSS Model

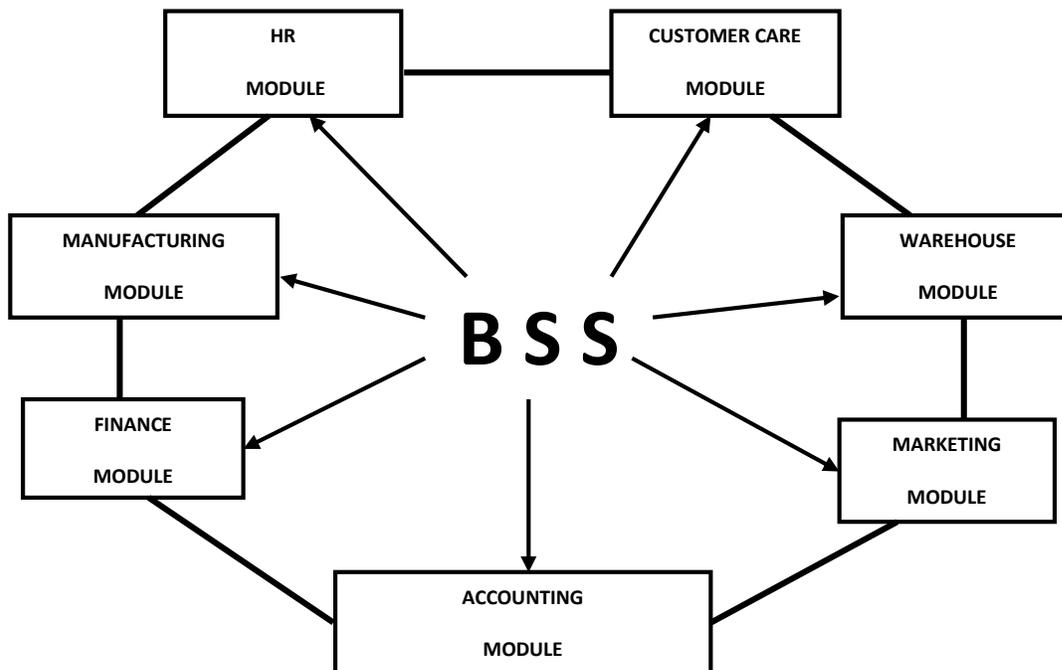


Figure 3: Proposed BSS Model For Millennium Industries Ltd.

The arrows pointing out from the BSS to the modules as shown in figure 3, simply means that it radiates out to seven modules, while the lines joining the modules show how they are connected together as a single application.

Each of the modules of the BSS model has its own components. Figure 5 shows the seven modules, and then under each module lays its components. For instance just as the warehouse module has Check Orders, Receiving, Put Away and Delivery Method as its components, so do others.

3.1 SUMMARY OF BSS MODULES AND THEIR COMPONENTS

The modules and their components are summarized in the figure 4 below.

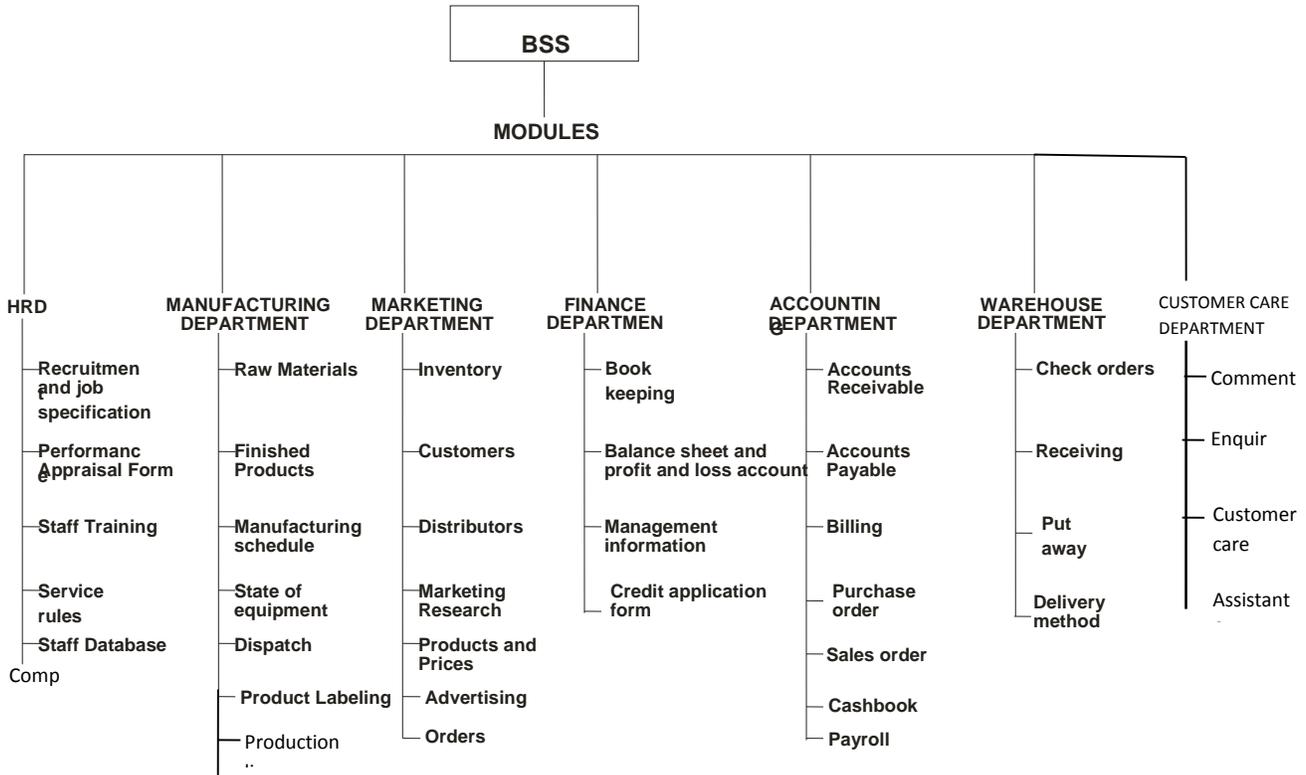


Figure 4: Modules and Components of BSS

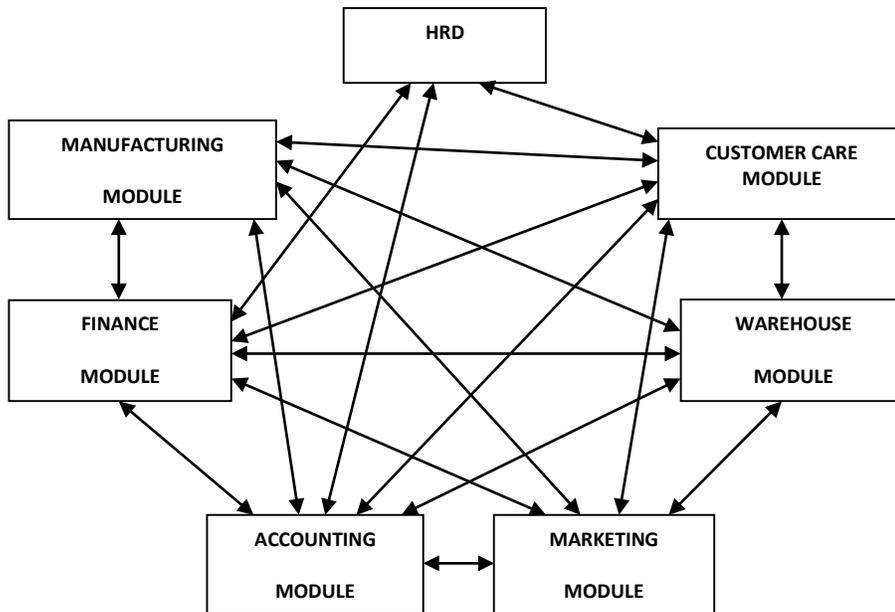


Figure 5: BSS Architectural Design

Figure 5 is a network structure type of architecture used for developing the BSS. The bi-directional arrows show how the modules are inter-connected and how they share data. They also show how information can flow among the modules.

Zener Diode parameter is $I_2 = 20\text{mA}$; $V_2 = 3\text{V}$

$$\text{Then, } R_3 = \frac{V_{CC} - V_Z}{I_2} \quad (3.3)$$

$$= \frac{5 - 3}{20 \times 10^{-3}} = \frac{2 \times 10^3}{20} = 100\Omega \quad (3.4)$$

R_{V1} is the variable resistor across the Zener Diode. The function of the variable resistor is to allow for presetting the reference voltage at the inverting input of the comparator.

$$R_{V1} = \frac{V_Z}{I R_v} \quad (3.5)$$

Allow the current through R_{V1} to be 5mA

$$\text{Thus; } R_{V1} = \frac{3}{5 \times 10^{-3}} = \frac{3 \times 10^3}{5} = 600\Omega \quad (3.6)$$

3.3 Code Generation

The application code was developed using PHP programming language. In the program each of the modules and their various components are created as a web page. Each page exists as a value or a data that is assigned to a variable. And each variable is enclosed in a container that is created to accommodate it. The created pages are then linked together based on how they share information. In summary, each line of the program link and connect the various modules and sub-modules as a single unit, just the way electronics components like; resistors, diodes, microcontroller, etc were being soldered and connected in the circuit in our traditional engineering. Technically the code can be said to be generated but in the real sense they were written. Below is some part of the code. The complete code is shown below.

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1" />
<title>Access Denied</title>
<link href="loginmodule.css" rel="stylesheet" type="text/css" />
</head>
<body>
<h1>Access Denied </h1>
<p align="center">&nbsp;</p>
<h4 align="center" class="err">Access Denied!<br />
You do not have access to this resource.</h4>
</body>
</html>
```

3.4 MANUFACTURING FLOW CHART

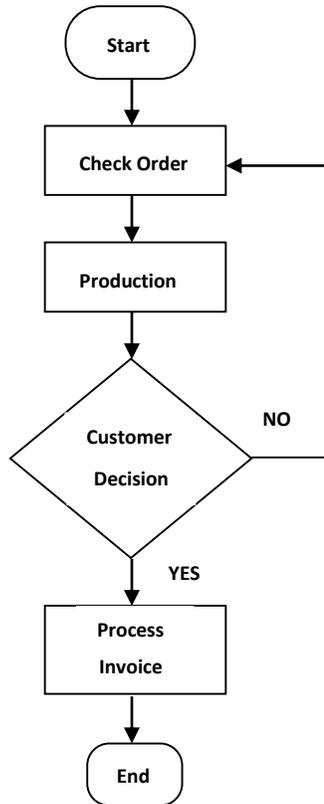


Figure 7: Manufacturing flow chart

Workers on shift simply click on check orders, to know the quantity of each product ordered by their customers. This aids in knowing the quantity of each products to produce for each day. After production, the finished products are checked to know if all customer demand is met. Corrections are made if need be. This activity can be summarized in the flow chart as shown in figure 7.

4.0 SYSTEM IMPLEMENTATION AND RESULTS

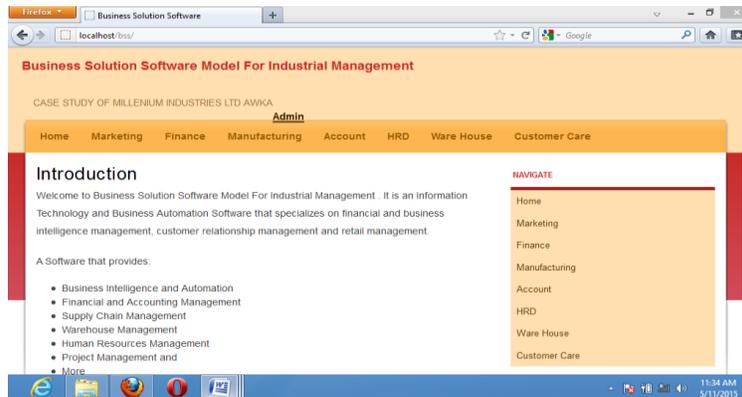


Figure 8: BSS Homepage

In order to test the Business Solution Software, the software application is deployed on XAMPP which can be installed on any operating system. To access the application, www.bssproject.com/bs is typed on a system browser which would display the application homepage, where access to any of its module starts, either through the navigation bar or menu bar. Before this one has to register on the login form as shown in figure 9. The BSS has solved the problem of multiple stand-alone software.

Table 1: List of Quantity of Products Manufactured at Different Time

S/N	QUANTITY	TIME (minutes)
1	50	10
2	100	20
3	150	30
4	200	40

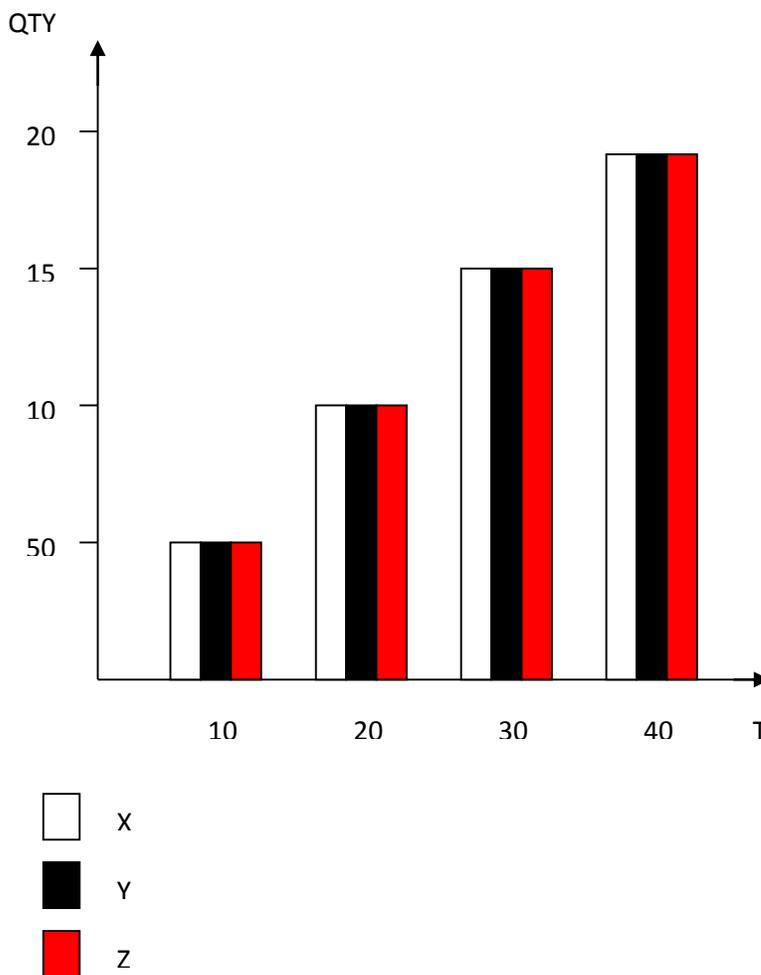


Figure 9: Graph of Quantity of Product Manufactured at Different Time.

The table in figure 9 shows the quantities of products manufactured at different time. These data are used to plot the graph in figure 4.7. The graph in figure 4.7 above shows the quantities (QTY) of products manufactured represented by bars X,Y,Z, at different time intervals (T in minutes). Assuming the production plants were started at the same time and operating at the same capacity. At time 10 minutes, fifty (50) pieces of products x,y,z were produced. At time 20 minutes,

one hundred (100) pieces of products x,y,z were produced and so on. With the aid of the BSS developed, one can be able to forecast the time a particular quantity of a given product would be available.

CONCLUSION

This BSS can be used by other small and medium organizations to run their business processes, functions and units. This application would lower cost by over 50% and improve standard of business operations. With the BSS, one can easily forecast when a product or quantity of product will be available. Also, information communication and distribution is enhanced leading to remarkable increase in productivity, speed and performance of the millennium industries ltd.

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