

BUSINESS SOLUTION SOFTWARE MODEL FOR MANAGEMENT OF INDUSTRIAL ORGANISATIONS

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Abstract

Many 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, like Human Resources, Finance, Manufacturing, Warehouse Management, Logistics etc. There is no way, these various standalone software applications can communicate with each other. All these problems and more can be resolved with business solution software (BSS) system. This research presents a solution on how to standardize an organization's operation, leverage common processes across the organization and cut cost by using this 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 will 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 PHP programming language. The result of this research is a software can be used by small and medium scale enterprises to run their businesses, it can also be used by other bigger organizations, like manufacturing companies, Banks, industries 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.

Keywords: *BSS, Business processes, PHP, Software development practices, XAMPP.*

1.0 Introduction

In order to improve organizational efficiency and flexibility and transform the same into effectiveness and responsiveness 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. Most organizations make use of standalone software applications to run their various departmental functions, like Human Resources, Finance, Manufacturing, Warehouse Management, Logistics etc. These various standalone software applications cannot communicate with each other. For instance, a customer that wants to make an order in a marketing department will like to know which goods are available and their quantities. This invariably will lead the sales person going to the warehouse to check stock, or calling

the warehouse or even ask the customer to go to the warehouse for enquiry. To maintain the human resources element of an organization is another challenge. In most cases, an organization will be required to deal with extensive amounts of paper when a new person is hired, as a number of forms have to be filled out. Some of these forms are applications, drug test information, and tax forms. One can imagine, how this paper work will grow as the organization hires more employees [1]. All these problems and more do reduce productivity, speed and performance of an organization.

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. These call for the need to integrate

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 [2]. A business process can be decomposed into several sub-processes, which have their own attributes, but also contribute to achieving the goal of the super process. The analysis of business processes typically includes the mapping of processes and sub-processes down to activity level [2]. Since every organization is looking for a way to reduce expenditure and to maximize profit, the aim of designing a Business Solution Software (BSS) is to provide for profit oriented organizations an easy means of running their businesses. It is an application software developed for the various business units of an organization and at the same time allows information flow and communication among the business units.

An organization has a purpose. In order to achieve its purpose as efficiently as possible, work is broken down into a number of discreet functions. A function may be Marketing, Billing, Delivery, Human Resources. All functions work together to contribute towards what the organization exists for. Each of these functions will have its own purpose and responsibilities which contributes to the overall goals. This research focuses on six organizational functions, which is classified into six modules, namely:

- Human Resources Module
- Manufacturing Module
- Marketing Module
- Finance Module
- Accounting Module
- Warehouse Module

These modules are integrated into one single application program such that:

- Organizations can realize the full potential of the knowledge and data within the company, making it

available when and where it can be of most value to the business.

- It allows an organization to fully deploy the strengths and assets of its existing systems to support the changing needs of the business.
- The integration between business processes helps develop communication and information distribution, leading to remarkable increase in productivity, speed and performance of any organization.
- The system is flexible such that it can be adapted to different environments as the need may arise.
- Tracking and forecasting is enhanced.

2.0 Literature Review

Software is what helps the live-ware (users) to communicate with the hardware in order to complete a certain task. Software has evolved throughout the ages to become faster, more reliable, more user-friendly and sometimes, to even think a little. There are two main types of software: system software and application software. System software is used to create the link between the user and the hardware. Application software is the type of software that helps you to get your work done. Business software falls into both of these categories depending on the type of use. Business software is any type of software that helps a business to increase and measure their productivity. Businesses can be classified business into three main sizes: small scale businesses, medium scale businesses and large scale businesses. These three types of businesses use business software in different ways. For example a small business would use general applications like accounting software and office suites like Microsoft office. Medium scale businesses would use a much wider range of software like customer relations software, human resource software, management software, outsource relationship management software and so on. These software in general help to maintain order throughout

the business. Large scale businesses use enterprise software applications such as: enterprise content management or ECM software, business process management software and enterprise resource management software [3]. Several research groups have published works regarding ECM software, business process management, and enterprise resource management software.

Quinn et. al. [4] in a research found that any company using supply chain management system decrease the production cycle and level of inventory to about 50% and improve 17% of delivery time.

Estherlydia et. al. [5] in a research work developed Chef Tec. Chef Tec is an integrated software program with recipe and menu costing, inventory control and nutritional analysis. Its functions are:

- Recipe and menu costing: These module stores, scales and size an *unlimited number of recipes etc.*
- Nutritional analysis: Carries out a quick and accurate analysis of nutritional values for up to 5,000 most commonly used ingredients etc.
- Inventory control: Track rising food costs automatically, compare vendor pricing at the touch of a button (from purchases or bids) etc.

In references [6] and [7], some researchers from IBM proposed web service technology to support the execution of business services among different enterprises. They also put forward WSFL (a Web Service Flow Language). WSFL addresses workflow on two levels.

- It takes a directed-graph model approach to defining and executing business processes;
- It defines a public interface that allows business processes to advertise themselves as web services.

Jenning et. al. [8] developed an agent-based process management system using a service model. The study proposed decentralization of responsibility and local autonomy within and across enterprises. An important feature of APMS (Agent-Based Process Management System) is the absence of a centralized business process representation.

Krishna et. al. [9] worked on CARD (i.e. Computer-Aided Administration of Registration Department). CARD is designed to digitize and expedite the registration and transfer of land and other real property for a single jurisdiction. It was implemented to save time and to circumvent notoriously corrupt systems previously in place.

Weigel et. al. [10] applied GIS (i.e. Geographical Information System) in conjunction with Operations Research (OR) techniques to solve technician dispatching and home delivery problems at Sears, and Roebuck. The combination of GIS and OR techniques improved the Sears technician dispatching and home delivery business. It (i) reduced driving times by 6%, (ii) increased the number of service orders each technician completed per day by 3%, (iii) reduced overtime by 15%, (iv) helped to consolidate routing offices from 46 to 22, and (v) achieved annual savings of \$9 million. The success of this application also suggested a promising link between GIS and OR techniques.

3.0 Methodology

Business Solution Software can be developed using different process models such as an incremental process model which applies linear sequences in a stagger fashion as calendar time progresses. Each linear sequence produces deliverable increments of the software application [11].

The methodology employed in this research includes site visit to some organizations and companies, like: Millennium Industries, Awka, Chikason Group, Nnewi and Cutix Plc, Nnewi, all in Nigeria to gather information on their business processes, business units and their functions. Information was gathered through series of interviews with departmental/sectional heads, some times with the aid of questionnaires. This research also used information from secondary data such as in books. With the information gathered, a BSS model was developed. The modules and sub-modules of the BSS model are translated into codes using PHP programming language. These codes are tested to uncover errors that might occur in it.

3.1 Tools Used for Development

Some software packages used for developing the BSS include:

- **PHP:** a general-purpose scripting language that is especially suited for web development. PHP generally runs on a web server. Any PHP code in a requested file is executed by the PHP runtime, usually to create dynamic web page content.
- **XAMPP:** a free and open source cross-platform web server package, consisting mainly of the Apache HTTP Server, MySQL database, and interpreters for scripts written in the PHP and Perl programming languages.

4.0 System Design

This section discusses the development of the BSS in this research. It takes into account the understanding of a generic sector, the business model and the various business processes of a business organization. These business processes are

integrated and modeled. The model developed is then used to generate the code.

4.1 System Overview

The diagram below shows the organizational modules used for Business Solution Software (BSS) model.

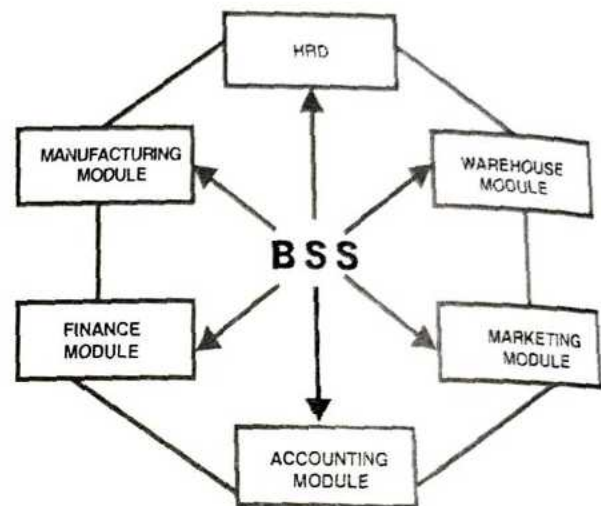


Figure 1: BSS Model

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

4.2 BSS Modules and Their Components

Each of the modules of the BSS model has its own components. The figure below shows the six modules, 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.

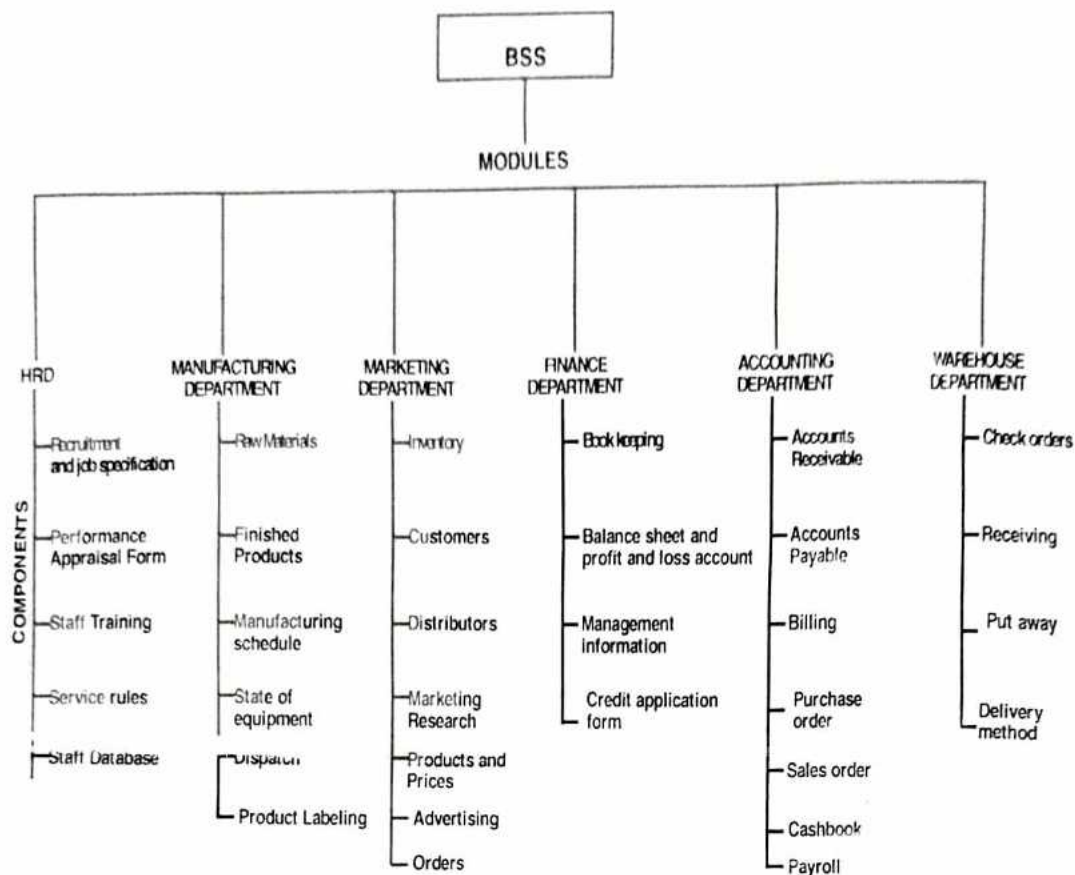


Figure 2: Modules and Components of BSS

4.3 Architectural Design

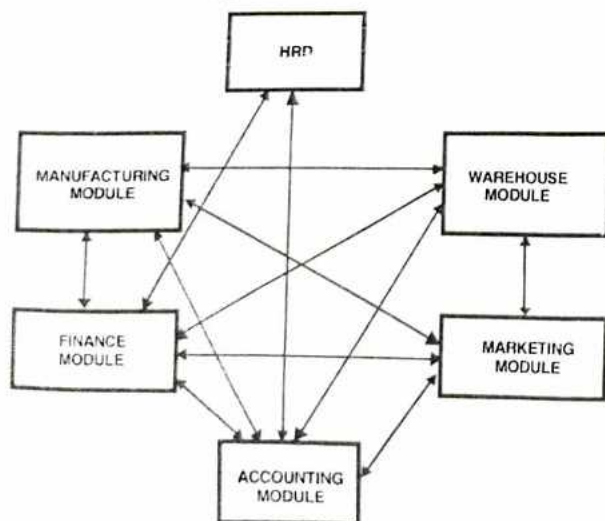


Figure 3: BSS Architectural Design

Figure 3 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.

4.4 Interface Design

Figure 4 shows the application interface developed in this research. The interface has the menu bar and the navigational menu, both of which consists of the major functions like, Marketing, Finance, Manufacturing, HRD, Accounting, Warehouse, Home, and About Us. The modules in the menu bar all have a drop-down menu that contains their components as they appear in figure 2. Both the menu

bar and navigational menu makes the developed application easily usable.



Figure 4: Interface Design

4.5 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. Below is some part of the code.

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD
HTML 4.01 Transitional//EN">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="Content-Type"
content="text/html; charset=utf-8" />
<title>About Us</title>
<link rel="stylesheet" href="styles.css"
type="text/css" />
</head>

<body>
<div id="container">
<div id="header">
```

```
<h1><strong>Business Solution Software
</strong></h1>
<h2>solutions Every Where</h2><br><br>
<h4><a href="dept-admin.php">Admin</a>
</h4>
<div class="clear"></div>
</div>
<div id="nav">
<ul>
<li><a href="index.php">Home</a></li>
<li><a
href="marketing.php">Marketing</a></li>
<li><a
href="finance.php">Finance</a></li>
<li><a
href="manufacturing.php">Manufacturing</a>
</li>
<li><a
href="accounts.php">Account</a></li>
<li><a href="hrd.php">HRD</a></li>
<li><a href="warehouse.php">Ware
House</a></li>
<li><a href="aboutus.php">About Us</a>
</li>
</ul>
</div>
<div id="body">
<div id="content">
<p style="margin:
0;">Welcome to Business Solution Software. It is
an Information Technology and Business
Automation Consulting firm that specializes in
financial and business intelligence management,
customer relationship management and retail
management.</p>
<p style="margin: 0;">&nbsp;</p>
</div>
<h3>Leave Contact and Message</h3>

<fieldset>
<legend>Form legend</legend>
<form action="#" method="get">
<p><label for="name">Name:</label>
<input name="name" id="name"
value="" type="text" /></p>
<p><label for="email">Email:</label>
<input name="email" id="email"
value="" type="text" /></p>
<p><label
for="message">Message:</label>
<textarea cols="37" rows="11"
name="message" id="message"></textarea></p>
<p><input name="send" style=
"margin-left: 150px;" class="formbutton"
value="Send" type="submit" /></p>
</form>
</fieldset>
```

```

</div>

<div class="sidebar">
  <ul>
    <li>
      <h4><span>Navigate</span></h4>
      <ul class="blocklist">
        <li><a
href="index.php">Home</a></li>
        <li><a
href="marketing.php">Marketing</a></li>
        <li><a
href="finance.php">Finance</a></li>
        <li><a
href="manufacturing.php">Manufacturing</a></li>
        <li><a
href="accounts.php">Account</a></li>
        <li><a
href="hrd.php">HRD</a></li>
        <li><a href="warehouse.php">Ware
House</a></li>
        <li><a href="aboutus.php">About
Us</a></li>
      </ul>
    </li>
    <li>
      <h4>About</h4>
      <ul>
        <li>
          <p style="margin: 0;">Welcome
to Business Solution Software. It is an Information
Technology and Business Automation Consulting
firm that specializes financial and business
intelligence management, customer relationship
management and retail management.</p>
          </li>
        </li>
        <li>
          <h4>Search</h4>
          <ul>
            <li>
              <form
class="searchform"
action="http://wpdemo.justfreetemplates.com/">
                <p>
                  <input type="text" size="24"
value="" name="s" class="s" />
                  <input type="submit"
class="searchsubmit formbutton" value="Search"
/>
                </p>

```

```

</form>

</li>
</ul>
</div>
<div class="clear"></div>
</div>

<div id="footer">
  <div class="footer-content">
    <p>&copy;
    <a href="index.php">BSS</a> |
    <a href="index.php">bss.com</a></p>
  </div>
</div>
</body>
</html>

```

5.0 Results and System Implementation

This section describes the result of this research and how the system is implemented on XAMPP. In the previous section, the modules and their components were analyzed. These modules and their components are translated into code using PHP programming language. The code is then deployed on XAMPP where it runs.

5.1 System Implementation

In order to test the Business Solution Software, the software application is deployed on XAMPP which can be installed on any operating system.

The BSS application code was deployed on .html files in the htdocs folder that is in the installation root of XAMPP windows. Which can be found by default at C:/xampp/htdocs/. To access the application, http://localhost/bss/index.php is typed on a system browser which would display the application homepage as shown in figure 7. But before these, the MySQL database, HTTPS (SSL) and PHP status of the XAMPP was first activated. Figure 7, is the application homepage, where access to any of its module starts.



Figure 5: BSS Homepage

5.1 Results

Human Resources Department: This module serves mainly as a database. It stores employees' information and data. It keeps record of the organization's employees', staff training periods, service rule etc. It is the duty of the human resource system administrator to enter and keep track of this information and data, whenever it is required. The screen shot below shows the main page of the human resource module.



Manufacturing Department: This module keeps track of whatever is taking place in the manufacturing department. It keeps record of raw materials received from warehouse, quantity used and quantity remaining at each day, as well as the state of equipments used in production, finished products, product labeling etc. Those 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 5.

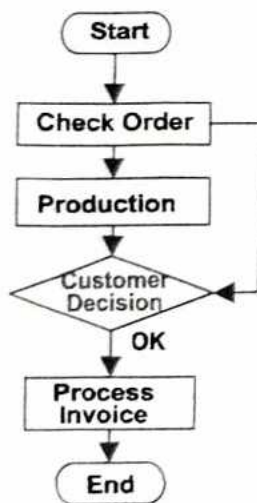


Figure 6: Manufacturing flow chart

Accounts Department: This activity processed at the end of every month by the accounting staff whose duty is to monitor the module. This module serves as a database used to perform calculations. It keeps record of sales, purchases, billing and at the same time tracks salary of the workers. Once the key transactions of a month are entered into the appropriate text fields, the module does all the necessary calculations and produces the report as it stands. With the report, the organization would know if it makes profit or loss for

the month. This activity involved is summarized in the flow chart in figure 6.

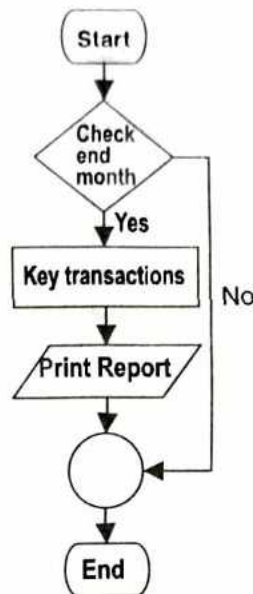


Figure 7: Accounting Flow Chart

The BSS application developed in this research for six typical business processes of an organization has solved the problem of using six different standalone applications in the organization. Someone in marketing department can easily login to warehouse to check stock, and someone in warehouse can login to accounting module to confirm payment before making a supply. Likewise somebody in manufacturing department can login to marketing module to check orders. This software facilitates communication and information flow among the modules.

6.0 Conclusion

Information system is essential for organizations. Software applications directly affect how organizations decide, plan, and manage their employees, and increasingly shape what products are produced, where, when and how, for manufacturing companies.

With the design and development of this BSS application, organizations can enjoy the following advantages:

- Organizations can realize the full potential of the knowledge and data within the company, making it available when and where it can be of most value to the business.
- It allows an organization to fully deploy the strengths and assets of its existing systems to support the changing needs of the business.
- The integration between business processes helps develop communication and information distribution, leading to remarkable increase in productivity, speed and performance of any organization.
- That the system is flexible such that it can be adapted to different environments as the need arises.
- Tracking and forecasting is enhanced.

This software can be used by small and medium scale enterprises to run their businesses, it can also be used by other bigger organizations, like manufacturing companies, Banks, industries etc, rather than using numerous standalone applications. This application would lower cost and improve standard of business operations.

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