

An Information System for Management of National Open University of Nigeria (NOUN) Study Centres

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Abstract

An information system that will help keep track of course materials distribution, counselling history, students and staff records, and financial operations, all in respect of the course materials at the Study Centres of the National Open University of Nigeria (NOUN) is discussed. This integrated system will help facilitate the duties of the clerks, administrative officers, accountants, store officers, ICT staff, centre director, library officers, counsellors and students with unique interface created for each user. The nature of demand for course materials by students was determined using records of monthly demand for five course materials selected at random, for a period of six years. The reordering pattern of the Yola Study Centre was studied using information on stock supplied between 2005 and 2010. An information system based on the Periodic Review Inventory Model was developed to provide better inventory management in the study centres.

Keywords: Study centre, ICT, automate, information system, demand, supply, inventory model

Introduction

The techniques and equipment used to input data, process it, output and communicate information are improving daily to meet the increasing

demands of information seekers and providers. From the pre-mechanical era through the mechanical and electro-mechanical eras to present day electronic era, there has been constant improvement of information and communication facilities and practices. Thus, the way we collect teleprocess it, output and communicate the resultant information is ever changing. One aspect of the society that has been revolutionised most by this improvement of information and communication practices is the mode of educational delivery particularly through distance learning. Distance learning which started in form of correspondence that was sent weekly between teacher and student has grown greatly. According to Nasseh (1997), in the years between the World Wars (1918-1946), the United States government granted radio broadcasting licenses to 202 colleges, universities, and school boards.

After World War II, television was considered as another delivery option in the correspondence study. In 1968, the Division of Independent Study provided more options for the delivery of education in the form of videotape programmed instruction, television, telephone, and other multimedia teaching and learning (National University Extension Association (NUEA), 1969). In the late 1970s and early 1980s, cable and satellite television came into use as a delivery medium for distance education courses (Wright, 1991). In the fall of 1991, eighteen institutions, including the University of California, the University of Oklahoma, Penn State, and Washington State, used the Mind Extension University (MEU), Educational Network to deliver video course materials for independent study courses (MEU catalog, 1999). According to UNESCO (2002), the rapid development of information and communication technologic (ICTs) and the move towards more knowledge .intensive, interdependent and internationalised societies create tew challenges and opportunities for the design and delivery of education. The World Bank (2002) defined ICTs as the convergence of activities that facilitate capturing, processing, transmission and display of information through digital electronic devices, telecommunication, internet, World Wide Web, virtual realities and cyber space. ICTs open up new horizons for progress and the exchange of creativity and intercultural dialogue. According to **Pena-Bandalaria** (2007), today's generation of open and distance earning can be aptly described using the terms c-Learning (electronic learning), m-Learning (mobile learning), and u-Learning (ubiquitous Learning). According to Georgiev et al. (2004), Mobile learning(m-learning)

is the delivery of electronic learning materials with built-in learning strategies on portable computing devices to allow access from anywhere and at any time.

Trends in Office Automation

According to Inc small business magazine encyclopedia, the history of modern office automation began with the typewriter and the copy machine which mechanised previously manual task. The advent of personal computers (PC) revolutionised office automation. Today, popular operating systems and user-friendly interfaces dominate office computer systems. This revolution has infiltrated so many areas of business that almost all businesses today, use at least one commercial computer business application in the course of daily activities. Even the smallest firms today utilise computer technology to maintain financial records, inventory information, payroll records and other pertinent business information. The field of Operations Research (OR) which uses scientific and systemic approaches in solving problems in businesses and firms is a pioneer and leader in this field of global transformation. Historically, the solutions offered by an Operations Researcher would be incomplete without presenting them in forms that can be utilised by the Decision Maker (DM). Most firms today, prefer computerized solutions which are faster, more reliable and fit into their mode of work. Hence, the interest is to utilise OR approach in deriving an improved solution to the information needs of the National Open University of Nigeria (NOUN) and further present the solution in form of computer software which will be of greater benefit to the organisation.

Inventory Management

At the NOUN Study Centres, a lot of inventory items need to be managed. Inventory management is a major challenge. This work focuses more on handling of printed course materials usually issued to students after registering a course. According to Bronack (2001), Inventory Management is an enterprise-wide discipline concerned with the identification and tracking information services (IS) hardware and software assets.

According to Sharma (2005):

- Inventory helps in smooth and efficient running of business
- inventory provides service to the customers immediately or at a short notice
- due to absence of stock, the company may have to pay high prices because of piece-wise purchasing. Maintaining of inventory may earn price discount because of bulk-purchasing
- inventory also acts as a buffer stock when raw materials are received late and so many sale-orders are likely to be rejected
- inventory also reduces produce costs because there is an additional advantage of batching and long smooth running production runs
- inventory helps in maintaining the economy by absorbing some of the fluctuations when the demand for an item fluctuates or is seasonal
- pipeline stock (also called process and movement inventories) are also necessary where the significant amount of time is consumed in the trans-shipment of items from one location to another.

The Problem Statement

The challenges associated with the manual collection and processing of data in organisations, increase as the size of the organisations increases. These challenges include: errors in data processing, time wastage in information retrieval, frequently running out of essential inventory items, increasing need of information storage space, difficulty in utilising stored data for basic scientific analysis such as forecasting and decision making processes, and so on. These challenges were brought to fore in NOUN, Yola Study Centre while responding to an urgent request from the NOUN headquarters for information on course materials. In response to this challenge, Operation Research method was used to study the system with a view to developing a better, cost effective and easy-to-use information system that will be helpful to decision makers at the study centres. It was observed that most NOUN Study Centres nationwide have similar operational structures. Hence, the study of a well established study centre was sufficient enough to derive reliable solution. Yola Study Centre was hence chosen at random from a list of the earliest established study centres as a case study.

The study, therefore, is an attempt to enable:

- i. the store officer determine the Economic Order Quantity (EOQ) of course materials before placing order for them; hence exercising control over the inventory system
- ii. the student counsellor collects and organise students counselling history in an analyzable form
- iii. management maintain an e-filing system of students' records for the purpose of easy retrieval and meaningful analysis
- iv. management maintain an effective record of financial transaction of the study centre particularly with reference to the course work materials
- V. a more reliable, concise and flexible databank that can easily be manipulated to obtain desired results.

Development of a Suitable Inventory Model

The following processes were followed in developing an optimum inventory model for stock keeping in the NOUN, Yola Study Centre:

- taking of the physical stock of all the various study material types as well as other items in stock
- classification of the stock of items into categories
- assignment of suitable code to each item
- estimation of lead-time, safety stock, and reorder level
- development of the inventory model.

To determine the type of inventory model that is suitable, the study needed to determine if the approximation of demand is acceptable using the following steps:

- I. compute the mean and the standard deviation of consumption for a given period of time compute the coefficient of variation

$$V = \frac{\text{Standard Deviation} \times 100}{\text{Mean}}$$

The results can then be used to determine the nature of demand using the following general guidelines:

- a) . If the average monthly demand is approximately constant for all months and V is reasonably small (<20%), then the demand may be

- considered deterministic and constant with its value equal to the average of all monthly demands.
- If the average monthly demand varies appreciably among the different months but V remains reasonably small, then the demand is considered deterministic but variable.
 - If in case (a), V is high ($> 20\%$) but approximately constant, then the demand is probabilistic and stationary.
 - The only remaining case is the probabilistic non-stationary demand which occurs when the means and coefficients of variation vary appreciably over time.

This test was carried out on the monthly demand of five (5) items selected at random from items that we observed frequently run out of stock, over a period of six (6) years. The results (Table 1), show that the average monthly demands varies among the different months but V remained reasonably small, hence an inventory model in which the monthly demand is approximately deterministic but variable was to be developed. Furthermore, the reordering pattern of the institution over five (5) years was studied. The study reveals that a Periodic Review Model was most suitable for management of inventory at the NOUN, Yola Study Centre (see figure 1).

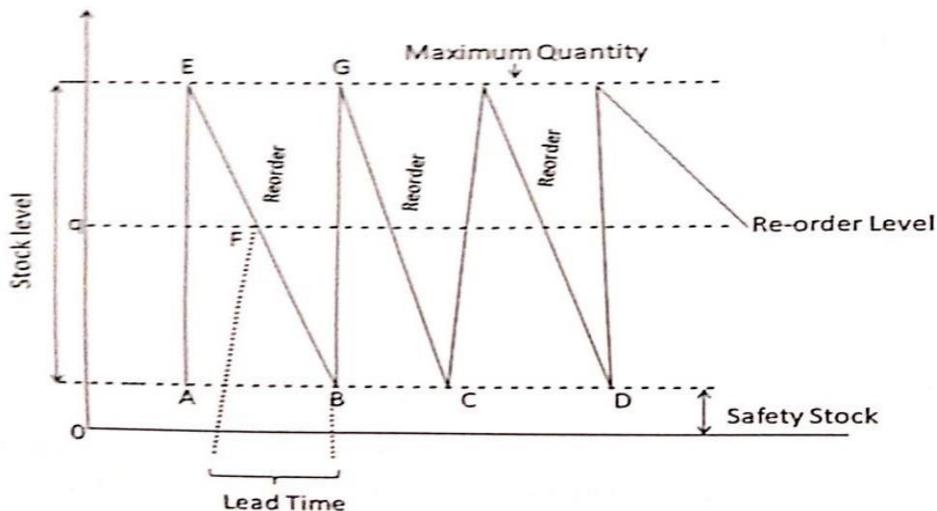


Fig.1: Procurement and Consumption Cycle of the Periodic Review Model

Table 1: Records of Monthly Demand of GST107 (Jan-Dec 2006-2011)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
2006	7	7	9	8	10	8	9	8	0	8	7	7
2007	8	9	0	12	8	11	11	6	9	10	8	8
2008	8	9	0	9	6	9	10	8	10	10	9	10
2009	10	10	9	8	10	10	8	9	0	11	10	10
2010	11	11	12	11	8	0	11	9	8	12	11	11
2011	8	7	0	11	10	12	12	10	0	13	11	12
Monthly Average	8.67	8.83	5.00	9.83	8.67	8.33	10.17	8.33	4.50	10.67	9.33	9.67
Standard Deviation	1.51	1.60	5.59	1.72	1.63	4.32	1.47	1.37	4.97	1.75	1.63	1.86
Coefficient of Variation V(%)	17.37	18.14	111.71	17.52	18.84	51.85	14.48	16.40	110.45	16.42	17.50	19.26

Table 2: Reordering Intervals (2005-2010)

Issue Date	19/01/2005	26/06/2006	21/05/2009	24/06/2009	17/08/2009	17/08/2010	02/09/2010
Interval (month)	-	17	35	1	2	12	1

Total months involved=17+35+1+2+12+1=68

No of supplies =7. Average Cycle Length=68/7=9.months = 291days.

Application of the Inventory Model

The Periodic Review Inventory Model developed here will be very useful in managing inventory in the organisation. It was designed using primary data collected from NOUN, Yola Study Centre. Conditions peculiar to the Study Centre was taken into account. The information system designed will assist the NOUN, particularly Yola Study Centre in the following ways:

1. maintain an appreciable cycle length and hence save cost from unnecessary reordering of stock at irregular intervals

2. ensure that all items of the inventory are available throughout the reordering cycle
3. ensure that wastages resulting from reordering quantities of stock that exceed the storage capacity of the institution's store is avoided
4. ensure that the size of stock chosen as buffer is sufficient enough to meet with demand during the lead period
5. maintain proper record of demand during each reordering cycle. This may serve as source of information for management and other information seekers.

The Information System

The resultant Modern Information System consists of the following features:

1. A login form through which users of different categories gain access to their personalised pages to perform their system-required tasks.
2. Customised pages for each user - students, clerical officers, store officers, administrative officers, students' counsellors, system analyst, library officers and centre director.
3. The system analyst manages and admits new users into the system.
4. The store officer through his page is able to determine the quantity of stock to reorder.
5. The clerks through their page are able to update student records thereby feeding other sections of the system with required information.
6. The students' counsellors are able to access confidential records of students' counselling history and continuously update them. Such records enable the counsellors to make enhanced decision while performing their duties.
7. Students' login to provide vital information required of them.
8. The administrative officer performs basic operations on their page. Data fed into the system by different users are made available to them to enhance their functions and decision making process.
9. The library officer maintains an organised catalog of books, making it easy for users to search for desired books quickly. The system also facilitates proper monitoring of the library-lending activities.

- 10. The centre director is given a monitoring role in the system and hence can supervise the performance level of all other users. The entire databank is made available to him to enable him make enhanced decisions. Figure 2 is a flowchart showing how the system works.

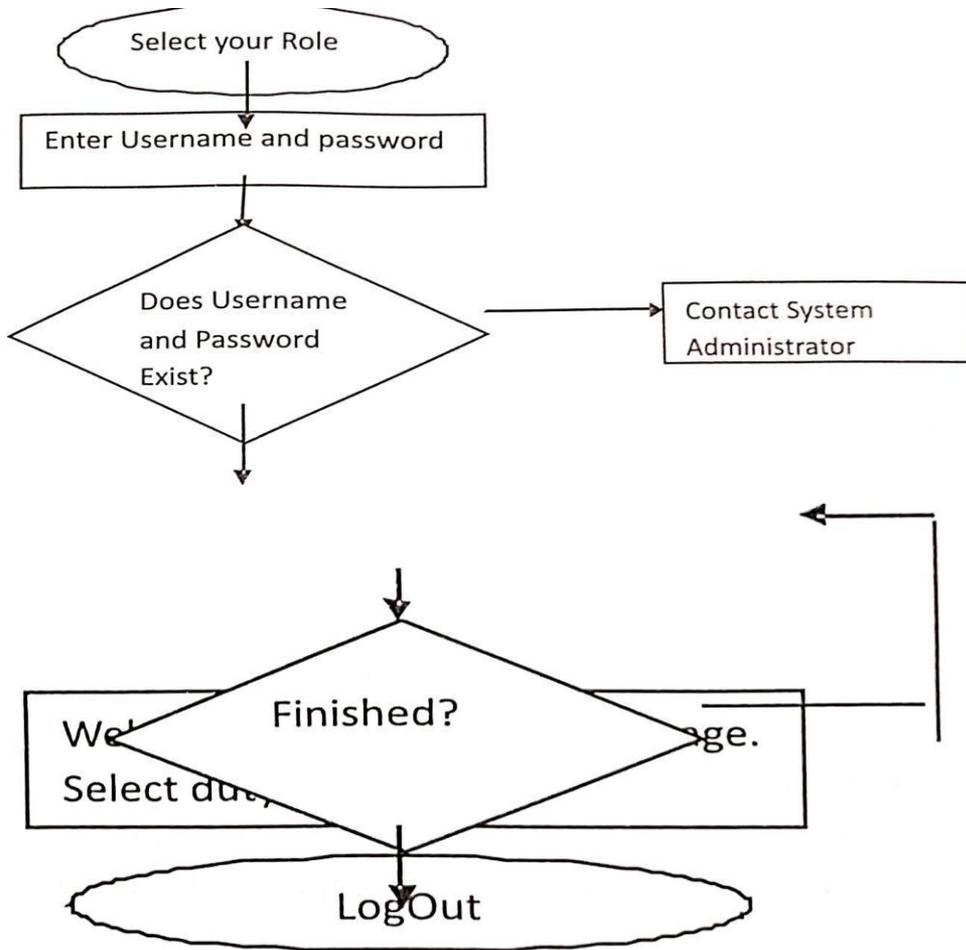


Fig. 2: A Diagram Showing How the System Works

Conclusion

The Modern Information System for the National Open University of Nigeria (NOUN) Study Centres will help keep record of operations in the study centres and assist management in the process of decision making. The Periodic Review Inventory Model which is at the heart of the information system will help to manage inventory at Study Centres. Microsoft Access and VB.Net 2008 were used to develop the final integrated system. This system has the following advantages to the study centres:

- i. save time and energy when information is demanded
- ii. provide better inventory management
- iii. avail the students' counsellor a better understanding of his students by provision of relevant historic events which can be used for forecasting outcome of counselling
- iv. save cost in the long-run as cost of producing students' files, file cabinets and shelves will be reduced.

The approach of operations research which consists of problem formulation, construction of models, model validation, derivation of solution from the model, implementation and subsequent maintenance of the solution, was followed in carrying out the study.

Recommendations

Based on findings made from this study, it is recommended that the management of National Open University of Nigeria should:

1. ensure that the information system is implemented
2. ensure that all users are trained and encouraged to use the system in performing their duties to ensure that required data are constantly updated
3. adhere to the inventory management policy provided by the system
4. maintain the system and ensure that the approach of operations research is followed in updating the system when the need arises.

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