DATABASE AND WEB INTERFACE FOR SUPPLY PLANNING COMPUTER APPLICATION WITH PRODUCTION MATERIALS FROM SUPPLIERS

BUJDOIU Radu-Marian, CATANĂ Madalin-Gabriel
Faculty Industrial Engineering and Robotics, Study program: Applied Computer Science in Industrial Engineering , 4th Study year, e-mail: radubujdoiu101099@gmail.com,

ABSTRACT: The method of determining the optimal order quantity is one of the methods to discover the quantity to be ordered at the optimal time and cost. It was desired to implement a program that would apply this method using a database and a WEB interface. This paper presents the way in which this database, made in Access, and this WEB Interface, made with the Python language, are created and processed.

KEY WORDS: Database, WEB Interface, EOQ

1. Introduction

In today's context, one of the main requirements of companies, when it comes to supply, is to achieve a minimum cost for it in terms of meeting production requirements. In practice, but also in theory, there are many ways to meet this requirement, through different methods of calculation and analysis. In the present work, it is proposed to create a database and a WEB interface, which will become the basis for the application of such a method to determine the optimal supply cost. The database and the WEB interface will become the material on which, later, a program will be applied to determine an optimal supply under some given conditions.

To understand the place of supply in a company, however, it is very important to emphasize that it is part of a much more complex notion, namely the Material Requirements Plan. It contains, as can be seen in Fig. 1, elements such as: the quantity ordered, the quantity to be processed, the material plan and reports on them and, obviously, the stock of materials. From its analysis, together with a mathematical calculation method, the optimal amount of material to be ordered from suppliers for production can be determined.

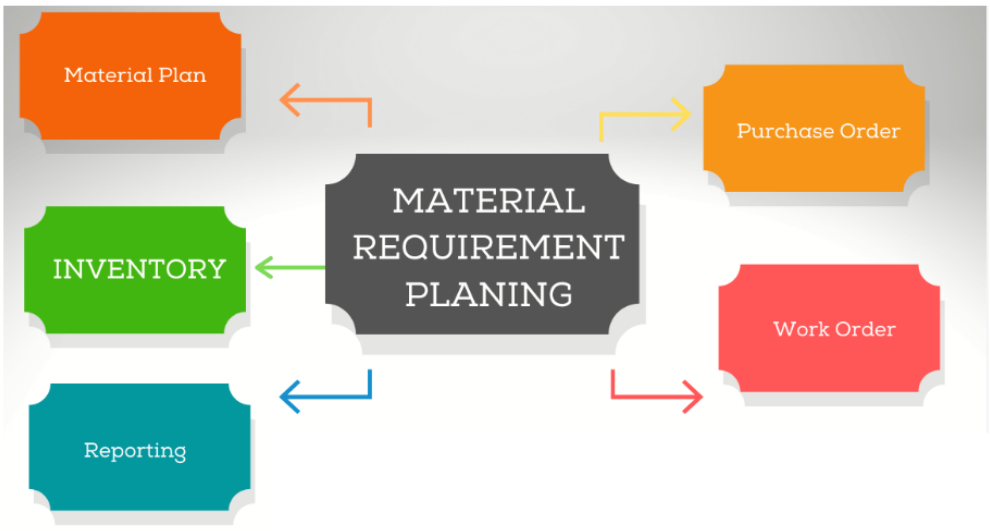


Fig. 1. Elements of the Material Requirements Plan [4]

Among the many reasons for the need for a material warehouse in a manufacturing company, the most obvious stand out: the need to have the raw material or semi-finished part required by the production unit at the right time and moment, to prevent unexpected requests for materials and production syncopations etc. Thus, inventories in a firm represent, in other words, the quantities of materials purchased and not immediately used. Also, the security offered by the large stocks in the warehouse, which ensures the supply of production at any time, creates certain costs, which must be balanced by referring to the real needs of the company. Among these costs are: the cost of storing the material, the cost of the material in case of its alteration, the cost of taxes and insurances and possibly the cost of obsolescence for certain product categories. On the other hand, it should also be taken into account that the supply of large quantities can lead to the application of discounts from suppliers, but, in the same sense, the stocks in the warehouse increase their cost with the increase of the stagnation period in the respective warehouse [3]. Thus, all of the above represent additional reasons for firms to find the optimal quantities for supply and the motivation to present in the present paper such a method.

2. Current status

Determining an optimal supply cost is therefore always done in correlation with an optimal amount of material ordered. Thus, among the many methods to determine such a ratio between the two elements, the Optimum Ordered Quantity (EOQ- Economic Order Quantity) method stands out. In the specialized literature, this method is defined as, according to Catană [2], a method by which a size, which is constant, of the supply orders is determined, taking into account the consumption and supply of the stock. In this method, over the planning horizon the demand for the item remains constant and the point at which the order is placed each time is when the stock level of the item becomes zero. Also, the cost of an item does not depend on the total number of items ordered. And Șule [3] develops a chapter on this method and highlights, as in Fig.2, the way the EOQ method works, as follows: the order point is located at the intersection of the function with the abscissa axis, and the maximum amount in stock is represented by the point from the maximum from where a diagonal line goes back to the order point, representing the amount of materials in the stock which progressively decreases.

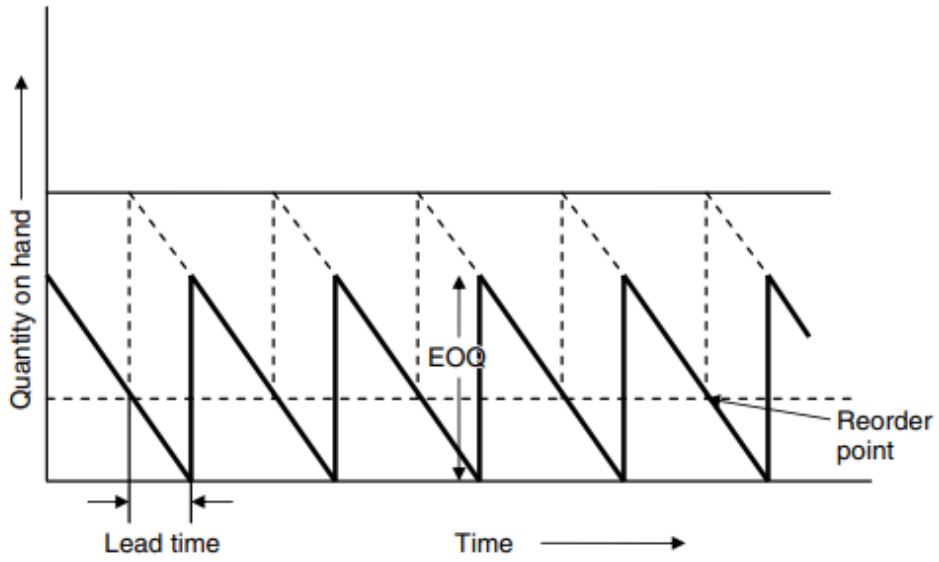


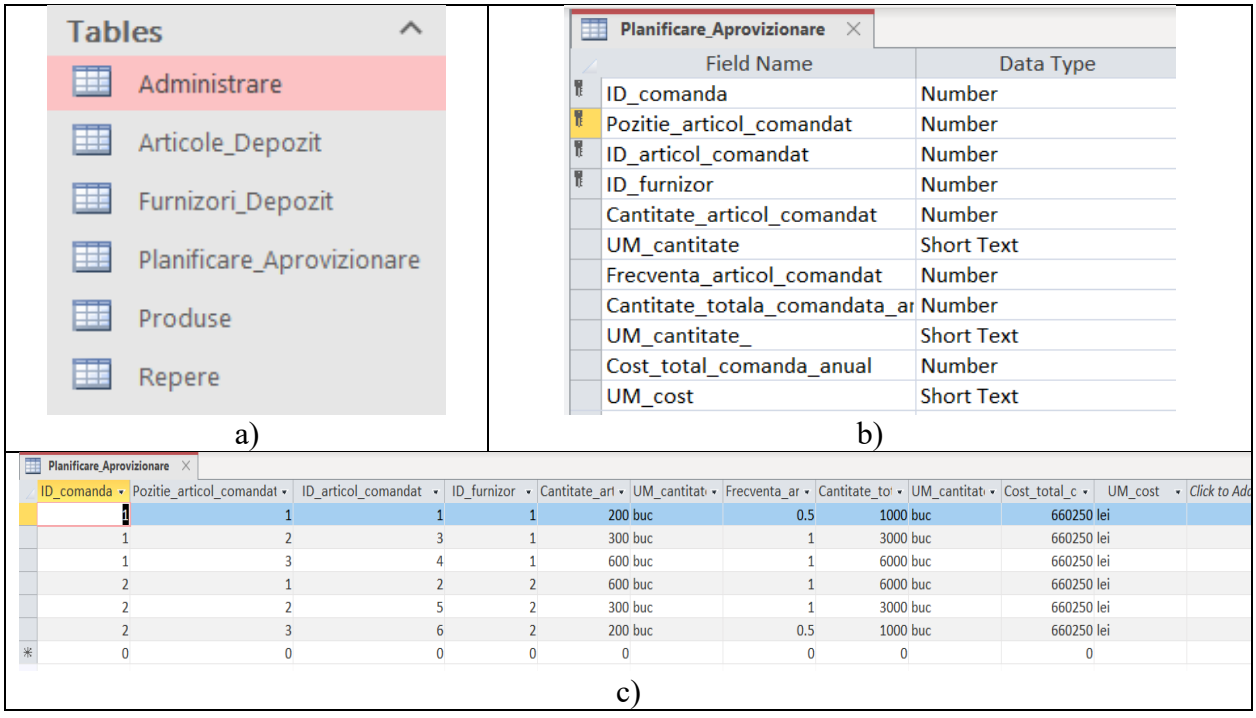
Fig. 2. Optimal order quantity with constant demand [3]

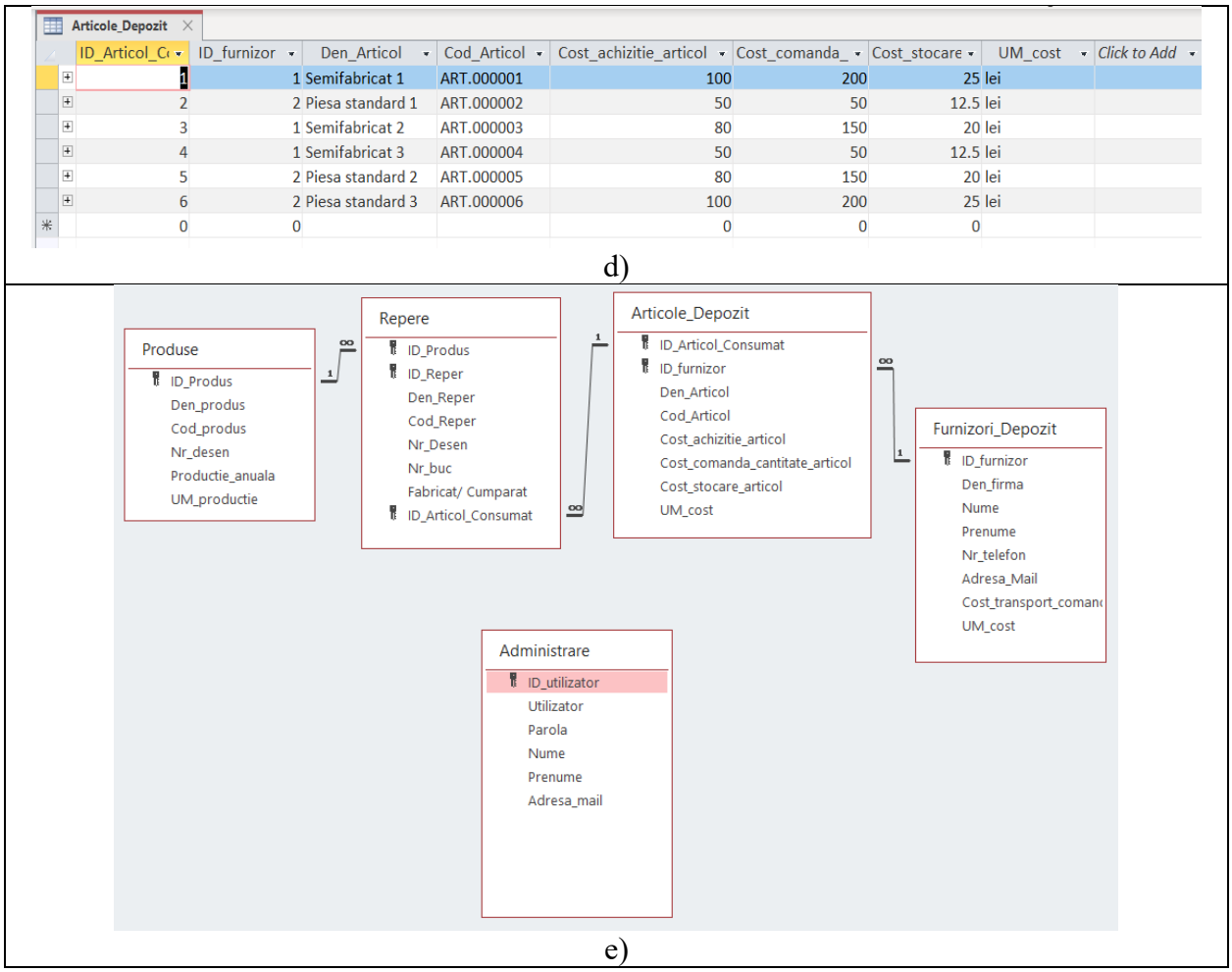
The basic material for the application of this EOQ method is represented by the database and the WEB interface, developed further.

3. Presentation of the database

In the present work, we used the Microsoft Access program to generate the database, in which we created different fields in accordance with the implementation of the EOQ method for the supply problem. In designing these fields, the indications from Shenoy, D [1], were also used, in which the most important are: annual product demand, order cost, unit cost, ordered item frequency. The database tables are shown in Fig.3 below and list: Administration, Warehouse Items, Warehouse Suppliers, Supply Planning, Products, Landmarks. Each table has one or more primary keys, some of which are duplicated, to properly preserve the relationships between the tables. In Fig.2 (b), it is captured how each field related to each table is set to its main type characteristics: Integer, Long Text, Short Text, etc. Also, for the ease and correctness of data entry by the user through the WEB interface, mandatory conditions have been set for certain fields in the database, these fields are as follows: Product ID, Landmark ID, Consumed Item ID, Supplier ID .

The logic of entering this data in Access has gone from the most independent unit, i.e. the landmark, to the most complex of them, namely the administration. In this way, the specific and representative fields for the Landmarks table were thought out (number of pieces, name, code, drawing code, etc.) and continued with the identification of the other important fields for the other tables, up to Administration. The introduction of the specifications of each field was followed carefully, including the obligation to enter it by the client (required - yes/no), the number of characters allowed for Long Text fields, the identification of the primary key, the creation of a set of answers for certain fields from which the customer can choose (Lookup feature) etc. .





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3	1	Semifabricat 2	ART.000003	80	150	20	lei	
4	1	Semifabricat 3	ART.000004	50	50	12.5	lei	
5	2	Piesa standard 2	ART.000005	80	150	20	lei	
6	2	Piesa standard 3	ART.000006	100	200	25	lei	
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d)

e)

Fig. 3. (a) – Fields from the database in table form, (b)- Entering the specific characteristics of each field, (c)- Entering data in the Supply_Planning table, (d)- Entering data in the Warehouse_Items table, (e)- Dependency relationships between tables

4. WEB Interface Presentation

The WEB interface creates the link between the database and the user. This part was made with the help of the Visual Studio program, in which I implemented a code in the Python programming language, to give him the related instructions and create an interface as intuitive as possible for the client, thereby achieving an efficiency of work in the company. The WEB interface respects the fields in the database, being created based on it, and is the way the user manipulates the database. For a better use of this WEB interface, as well as for the security of company data, the fact that before accessing the database the user must enter an ID and a password has also been observed. This address and password is part of the Administration table in the Database created earlier and allows each user specific access to the information in the database. The connections between the tables in the Database are not simple, and its administrator had to carefully follow the good development of the information in it.

In Fig. 4. captures are presented during the operation of this Web Interface, as well as from its creation. Thus, Fig.4 a) captures a piece of code in the Python language necessary to create the Interface, code that must include well-defined instructions for the site. Fig.4 b) is a snapshot from the site, when a user enters his password, with the example of user1 and password1. In Fig.4. c) the main "home" page of the site is represented, from where the user can continue to choose the page he wants to work on. And in Fig.4 c) is represented the moment when the user chose his Planning_Supply page and the Web Interface provided him with all the details and related information, taken accordingly from the Database to which it was linked.

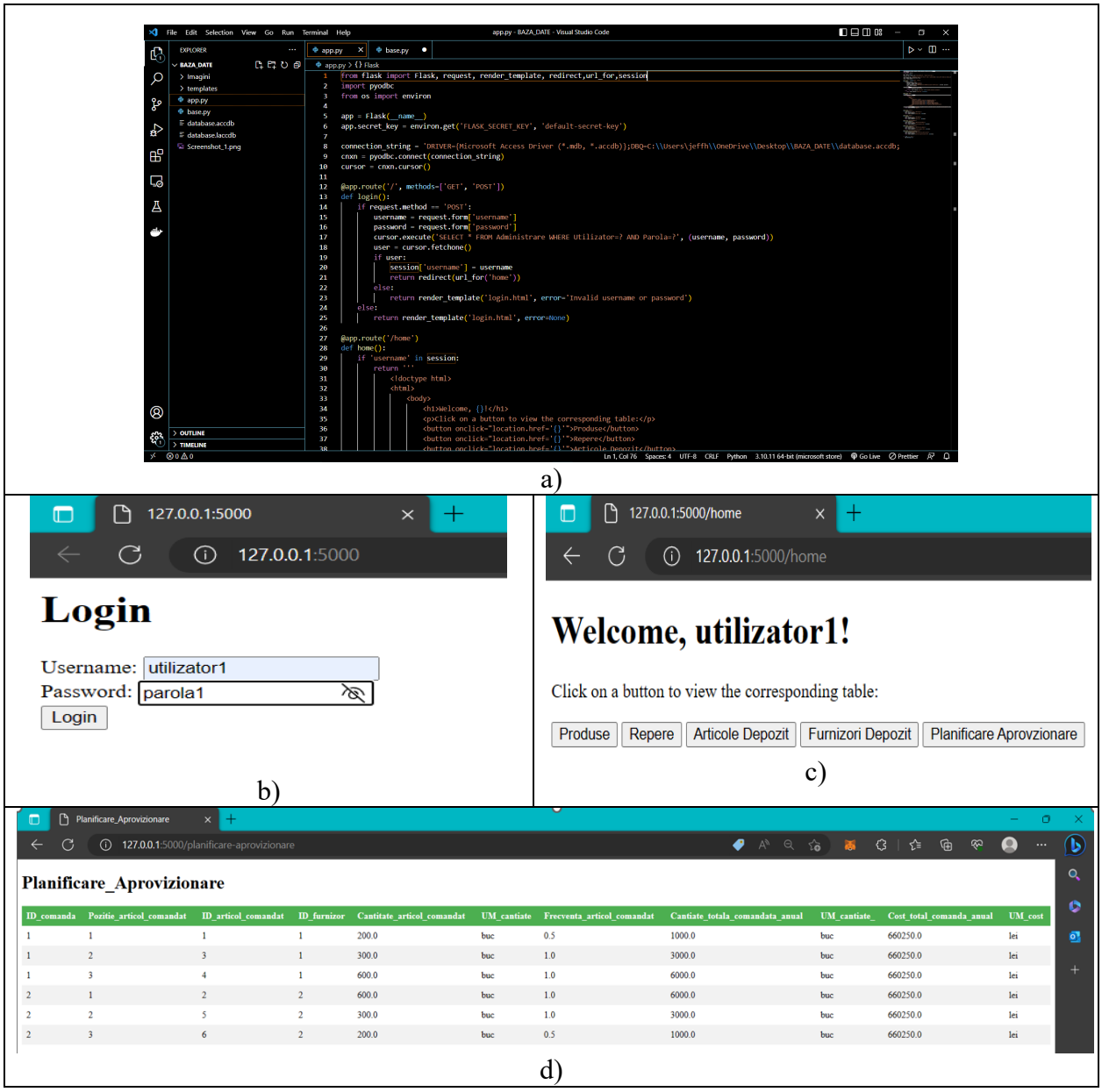

Fig. 4. (a) – Code for the WEB Interface, (b)- Log in Page, (c)- Menu Page, (d)- Display information from the database

5. Conclusions

In conclusion, the present paper presents how a database and a WEB interface were created, these to become the basis for later developing a computer program that links these two entities and provides an optimal amount of order using the EOQ method. This method was preferred in the present work to the others that provide by mathematical calculation a specific quantity for the order from the suppliers and it is to be implemented in a computer algorithm, with information from these two entities, the Database and the Web Interface.

The database was created with the help of the Access program, respecting all the necessary specifications of all the entered fields, as well as the correct relationships between the Tables, and the WEB interface was made with the help of the Python programming language in the Visual Studio program.

In the future, the application could be improved by adding new functionality, such as automatic notifications for stock replenishment or the integration of an invoicing system.

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