DOI:10.5281/zenodo.15116472

DEVELOPING BUSINESS APPLICATIONS BY MODULARIZING OPERATIONAL FUNCTIONS IN INFORMATION SYSTEMS

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Abstract*: The paper presents the increase in the development of business applications by modularizing operational functions in information systems. Operational information systems process data generated and used in business operations. Depending on the role they play, there are several categories: transaction processing systems - record and process data resulting from transactions, update databases and produce a variety of documents and reports; process control systems - provide operational decisions that control physical processes; automated service systems - those that support communications. Information systems have always been necessary for processing data generated and used in business operations. Operational IS produce a variety of information, but they (the information) do not highlight which information products are most suitable for managers. For this reason, further processing through information systems is necessary. Operational information systems include most transaction processing systems, which have evolved from manual IS to mechanical data processing systems and then to electronic data processing systems. Transaction processing systems record and process data resulting from transactions such as sales, purchases, and inventory changes. They can process data created by changes to items in a database file like changes in a customer's name and address, generating a variety of information products for internal or external use such as customer invoices, paychecks, sales receipts, purchase orders, dividend payments, tax payments, and financial statements), and documenting the databases used by an organization for further processing through management information systems. Operational information systems play an important role within companies by storing data related to production activities and using it later for managers' decision-making processes.*

Keywords*: economic applications, system modules, operational computer systems, environment of business, data for data usage, customized design of, business decisions*

JEL Classification: *C23, C26, C38, C55, C81, C87*

1. Introduction

Operational information systems generate information to support routine decisions that control programmed operational processes. Decision rules outline the actions to be taken when a computer system is confronted with a set of events. There is a category of computer systems called process control systems, in which decisions to adjust the production process are made automatically by computers. Automated assembly lines in enterprises use such systems, which monitor a physical process, acquire and process data detected by sensors, and make adjustments to the process in real tiObj1. One of the roles of operational information systems is to develop traditional methods of office automation and paper-based communications. Automated service systems acquire, process, store, and transmit data and information in a form specific to electronic communications. Automated systems rely on word processing, telecommunications, and other information systems technologies. Examples of typical office automation applications include word processors, electronic mail, publishing, teleconferencing, and image processing.

Management information systems provide information to support decision-making. The most important management systems have as their objectives: pre-defined and planned reporting for managers – provided by information reporting systems; interactive and ad-hoc support for decision-making by managers – provided by decision support systems; important information for top management – provided by executive information systems. Management information systems are designed to provide accurate, timely and relevant information, necessary for effective decision-making. The concept of management information system was developed to counteract the inefficient development and ineffective use of electronic computers (Bernhardt, Liu, and Serfes, 2023; Campolmi, Fadinger, and Forlati, 2024).

The importance of management information systems lies in the fact that they emphasize the managerial orientation of information processing in business. An important purpose of information systems based on information and communication technology is to support management decision-making and not just to process data generated by the operational system. This emphasizes the fact that a systemic framework must be used to organize the activities and functions of information systems.

Management information systems support the decision-making needs of strategic, tactical and operational management. Operational information systems support the information processing requirements involved in a particular activity (Aydinonat 2023; Varian, Farrell, and Shapiro, 2023).

Providing information and supporting managerial decision-making at all levels of management is a complex problem. Conceptually, several types of information systems are needed to support the responsibilities of managerial users, of which three are of greater importance: decision-alternative reporting systems, decision support systems, and executive information systems.

2. Use data for customize applications functions used in applications

Reporting systems provide managers with information that largely supports decision-making needs by accessing databases of information about internal operations previously processed by transaction processing systems. Data about the business environment is obtained from external sources. The information accessible to managers includes reports provided on demand, periodically – according to a predetermined schedule or under exceptional conditions. For example, sales managers can access reports generated instantly in response to a request to analyze the sale of a particular product, weekly sales analysis reports to evaluate the sales results of products, agents and sales territories, or automatic reports generated whenever a sales agent does not achieve the expected sales results during a specified period.

Decision support systems are a natural evolution from information reporting systems to transaction processing systems. These systems are interactive, ICT-based information systems that use decision models and specialized databases to assist managers in decision-making processes. As such, they are different from transaction processing systems, which focus on processing data generated by transactions and businesses. They also differ from information reporting systems, which focus on providing managers with pre-specified reports that help them make complex decisions. In contrast, decision support systems provide managers with information in an interactive session or in an ad-hoc manner (depending on the need). Such a system provides analytical modeling, data retrieval systems, and information presentation capabilities that allow managers to generate the information needed to make decisions in an interactive computerized process (Mansell, and Steinmueller, 2022; Otter, 2022).

For example, spreadsheet applications allow a manager to receive interactive responses to ad hoc requests for sales or profit forecasts formulated within analytical models. The responses differ from the pre-specified responses of information reporting systems. When using a decision support system, managers explore possible alternatives and receive experimental information based on a set of alternative assumptions. Thus, decision makers do not have to specify information requirements a priori, the system interactively assists

them in finding the information they need (Campolmi, Fadinger, and Forlati, 2024; Otter, 2022).

Executive information systems are managerial information systems built on the information needs of strategic management. Managers obtain the necessary information from several sources, including letters, notes, journals and reports made manually or through computer systems, from meetings, telephone conversations and social activities. The main purpose of executive information systems is to provide decision makers who ensure the strategic management of the organization with quick and easy access to information about the critical factors in achieving strategic objectives. Such systems involve the use of graphical representations and quick access to the content of databases to provide information about the current status and projected trends of the strategic components of the organization.

Starting from the general definition of the notion of a system – according to which it can be any entity in real life, for which a set of components such as phenomena, objects, processes, notions, concepts, entities or collectivities are identified that are in mutual relationships as well as with the environment and that act jointly to achieve well-established objectives – we can easily establish that any economic organization can be considered an open, adaptable system that operates in a business environment (Aydinonat, 2023; Campolmi, Fadinger, and Forlati, 2024).

Seen as a system, any organization comprises six interdependent system components:

Input - economic resources such as human, financial, material, machinery, land, facilities, energy and information, which are taken from its environment and used in system activities.

Transformation function - organizational processes such as research, development, production, marketing, sales, which transform input into output.

Output - the results of the transformation function, which consist of products and services, employee and supplier payments, dividends, contributions, taxes and information to the external system - the environment (Mansell, and Steinmueller, 2022; Varian, Farrell, and Shapiro, 2023).

Feedback - is the defining element of a cybernetic system, which ensures the self-regulation function, when the output does not correspond to the objectives established within the system represented by the economic organization.

Control - management is the control component of an organizational system, which targets the functions of the enterprise so that the performance of the system achieves organizational objectives such as profitability, market share or social responsibility.

Environment - any economic organization is an open, adaptable system that shares inputs and outputs with other systems in its environment.

An organization must maintain appropriate relations with other economic, political and social systems in its environment. The group of systems includes several factors such as customers, suppliers, competitors, shareholders, labor unions, financial institutions, government agencies and communities, each having its own objectives relative to the organization in question. Information systems are those that facilitate the interaction between the organization seen as a system and each of the listed factors. On the other hand, considering the definition of a cybernetic system characterized by the existence of at least two subsystems between which there is self-regulation through reverse connection and analyzing this for the economic information system we can find that it has a cybernetic character.

The character of a cybernetic system is reinforced by the fact that the economic information system has its own objectives, methods, techniques and resources. At the level of the economic information system, at least two interdependent subsystems can be identified, which ensure the stability of the entire system: the managerial (management) information subsystem and the operational (driven) information subsystem (Bernhardt, Liu, and Serfes, 2023; Otter 2022).

Within the information process, the phases of economic information formation are carried out: collection of data resulting from the direct productive process of the economic system, their verification and transmission for the actual processing (regardless of the technical means), formation of economic information and its archiving. Part of the phases of the information process (for example, collection of data from primary records) is carried out within the operational (driven) subsystem of the economic system.

It can be appreciated that the subsystem in which the information process takes place together with part of the operational subsystem forms the driven subsystem of the cybernetic information system. The main role of the managed information subsystem is to provide information for the management of the entire economic system, for the functioning of the information system and for maintaining it within predetermined limits.

3. Transforming data used in economic applications

Another element of the information system is the management process of the system, which is based on specific management methods, similar to the management of the economic system as a whole. The managerial information subsystem has a special role, receiving information and requirements on the one hand, and on the other hand, transmitting decisions. The information

requirements it receives are intended to maintain and ensure full agreement between the economic system and the information system that characterizes it. The requirements are of the type of creating new information, abandoning information that is no longer necessary for managing the economic system, improving some methodologies for calculating indicators, etc.

The dynamic nature of the economic system necessarily determines a dynamic nature of the economic information system. Initially, variations in the behavior of the economic system may represent disturbances for the information system, but, due to its existence as a cybernetic system, the information system can adapt and function in full agreement with the economic system.

In conclusion, the cybernetic nature of the economic information system results from the fact that it has the capacity for self-regulation, so that it reflects and is always in accordance with the economic system that it describes, characterizes and serves. In this context, one can define both the information system in general and the economic information system (Aydinonat, 2023; Mansell, and Steinmueller, 2022).

The information system is a technical-organizational ensemble for designing and obtaining the information necessary to substantiate decisions for the management of a certain field of activity.

Nowadays, the information system is detached from the enterprise and even goes outside it, making direct connections with banks, suppliers and providing management with data on the movements of the competition. The management of the modern enterprise is no longer satisfied with operational information, but wants forecasts, wants to predict the future movements of the competition and the future evolution of the market, taking into account what is happening at present. Therefore, even if we do not design decision support systems, modern information systems must go outside the perimeter of the enterprise.

The achievement of good economic efficiency by enterprises is conditioned by the existence of scientific management based on a good knowledge of economic laws, operative and accurate knowledge of supply and demand on the domestic and foreign markets, of the dynamics of commodity prices, of technological trends as well as of the way of using the resources at their disposal. Starting from the fact that, on the one hand, mathematical models represent the scientific component of an information system, and on the other hand, taking into account the facilities offered by the use of information and communication technology as a component of the information system, the latter constitutes a true instrument in the scientific management of economic activity (Bernhardt, Liu, and Serfes, 2023; Mansell, and Steinmueller, 2022).

Here are some of the arguments brought in favor of managing economic organizations using information systems:

The information system offers the possibility of simulating economic processes and phenomena both at the microeconomic and macroeconomic levels. Mathematical models regarding the forecast of economic development can be developed and implemented, different plan variants can be developed and then the optimal variant can be chosen.

At the microeconomic level, with the help of IS, the available resources are harmoniously correlated with the proposed objectives. (Ex: planning of overhauls and major repairs, scheduling of ordering and monitoring of production, inventory management).

Through IS, the possibility of implementing the principle of selection and information by exception is provided. By applying this principle, decision-makers are relieved of a series of data that are often "suffocating" and cannot be used properly. Ex: In procurement, we have a nomenclature of raw materials and supplies with many positions - the idea is to highlight only products that deviate from the normal state (stocks outside the lower and upper alarm limits) in order to avoid stock shortages or immobilization of circulating assets like over-normative stocks.

For the transformation of data in economic applications, the objects are described in the following example:

```
Sub_1 (ByVal sender As System.Object, ByVal e _
As System.EventArgs) Handles Button7.Click
    'Evenimentul click al butonului "Write in file"
    If Obj1.RadioButton1.Checked = True Then 'fisier secvential
        If Obj1.RadioButton3.Checked = True Then 'creare fisier
           Dim nrF As Integer = FreeFile()
           FileOpen(nrF,"d:\work1\fis1.txt", OpenMode.Output)
           PrintLine(nrF, "Text in file")
           PrintLine(nrF, "at date:", TAB(20), CDate(Today()))
           PrintLine(nrF, New String(CChar("_"), 35))
           PrintLine(nrF, "Name", TAB(20), "Age")
           PrintLine(nrF, New String(CChar("_"), 35))
             For I = 0 To Obj1.nuObj1.Items.Count - 1
      PrintLine(nrF, Obj1.nuObj1.Items.Item(I), TAB(20),
     _ Obj1.age.Items.Item(I))
        Next i
         FileClose(nrF)
    End If
If Obj1.RadioButton4.Checked = True Then 'add records
     Dim nrF As Integer = FreeFile()
      FileOpen(nrF, "d:\work1\fis1.txt", OpenMode.Append)
   For i = 0 To Obj1.naObj1.Items.Count - 1
    PrintLine(nrF, Obj1.naObj1.Items.Item(I), TAB(20), _
```

```
    Obj1.varsta.Items.Item(I))
   Next i
   FileClose(nrF)
End If
        End If
If Obj1.RadioButton2.Checked = True Then 'file random
If Obj1.RadioButton3.Checked = True Then 'create file
  Dim nrF As Integer = FreeFile()
    FileOpen(nrF, "d:\work1\fis2.txt", OpenMode.Output)
    FileClose(nrF)
    FileOpen(nrF, "d:\work1\fis2.txt", OpenMode.Random)
     Dim write As person
      For i3 = 0 To Obj1.naObj1.Items.Count - 1
          write.rNr = I3 + 1
          write.rName = Obj1.naObj1.Items.Item(I3)
          write.rAge = Obj1.varsta.Items.Item(I3)
           FilePut(nrF, write, i3 + 1)
            Next i3
              FileClose(nrF)
End If
If Obj1.RadioButton4.Checked = True Then 'add records
    Dim nrF As Integer = FreeFile()
 FileOpen(nrF, "d:\work1\fis2.txt", OpenMode.Random)
    Dim i4 As Integer = 1
    Dim write As New person
      Do While Not (EOF(nrF))
        FileGet(nrF, scrie, i4)
          i4 = i4 + 1
      Loop
  For i3 = 0 To Obj1.naObj1.Items.Count - 1
    write.rNr = i4 + i3
    write.rNume = Obj1.naObj1.Items.Item(I3)
    write.rAge = Obj1.age.Items.Item(I3)
       FilePut(nrF, scrie, I4 + I3)
    Next i3
      FileClose(nrF)
  End If
 End If
End Sub

Private Sub Button5_Click(ByVal sender As System.Object, ByVal
e _
As System.EventArgs) Handles Button4.Click
  Obj1.Hide()
  Form2.ListModif.Items.Clear()
  Form2.ListBox1.Items.Clear()
  Form2.ListBox2.Items.Clear()

  If Obj1.RadioButton1.Checked = True Then
    Dim nrF As Integer = FreeFile()
    FileOpen(nrF, "d:\work1\fis1.txt", OpenMode.Input)
     Do While Not (EOF(nrF))
```

```
        a1 = LineInput(nrF)
        Form2.ListModif.Items.Add(A1)
     Loop
       FileClose(nrF)
        Form3.Show()
  End If
   If Obj1.RadioButton2.Checked = True Then
    Form2.ListModif.Items.Clear()
    Dim nrF As Integer = FreeFile()
FileOpen(nrF, "d:\work1\fis2.txt", OpenMode.Random)
Dim i4 As Integer = 1
Dim write As New person
 Do While Not (EOF(nrF))
   FileGet(nrF, write, i4)
   Form2.ListBox1.Items.Add(write.rNr)
   Form2.ListModif.Items.Add(write.rName)
   Form2.ListBox2.Items.Add(scrie.rAge)
    i4 = i4 + 1
    Loop
      FileClose(nrF)
      Form2.Show()
End If
End Sub

Private Sub Button1_Click(ByVal sender As System.Object, ByVal
e _ As System.EventArgs) Handles Button1.Click
 If Len(Trim(Obj1.TextBox2.Text)) > 0 Then
   Obj1.nuObj1.Items.Add(Obj1.TextBox1.Text)
   Obj1.age.Items.Add(Obj1.TextBox2.Text)
   Obj1.TextBox2.Text = ""
   Obj1.TextBox1.Text = ""
 End If
   Obj1.TextBox1.Focus()
 End Sub
```

The information system ensures the implementation of a multitude of mathematical models and as a result of this aspect will increase economic efficiency at the level of the reference unit. In the field of foreign trade, models can be implemented regarding the prospection of the foreign market, the correlation of the export load with the domestic manufacturing production, the calculation of economic efficiency for each commercial transaction, the choice of the optimal offer (Bernhardt, Liu, and Serfes, 2023; Otter, 2023).

4. Conclusions

By implementing the information system, the anachronism regarding the use of labor is removed. Much of the time of technical and civil service personnel is used for routine activities such as ascertaining, recording, centralizing data

on economic processes and phenomena, leaving too little time for control, analysis, forecasting and command-decision activities. Thanks to the use of the information system, decision-makers will have more time to analyze data and make appropriate decisions. At the micro and macroeconomic level, the design of information systems must take into account the use of databases, mathematical models, obtaining final situations with the character of preventive signaling of deviations from the normal state, all of which represent a scientific form of management. This conception changes the entire information system, transforming it from a passive instrument for observing, recording and analyzing economic phenomena and processes that have already occurred, into an active instrument for forecasting, commanding and controlling them. (camp; Otter, 2023). Dedicated tools used within information systems can manage many types of data, but preparing them and grouping them into objects makes it possible to use them flexibly in modules dedicated to economic flows.

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