



INFORMATION SYSTEMS FOR E-GOVERNMENT

A CASE IN THE HELLENIC MINISTRY OF EDUCATION

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Abstract

The great strides made towards “information society” are a fact beyond contradiction. Many academic, research and governmental institutions have exploited Information and Communications Technologies in order to perform everyday tasks and activities and have therefore developed information management systems. This has led many public and governmental organisations to adopt these new technologies as a means of internal evolution and restructuring and to provide more qualitative services to their citizens. This work describes how the Greek Educational Books Publishing Organisation (GEBPO) employed its electronic system for book production and distribution.

Keywords: Public sector, electronic services, eGovernment, information systems, distribution systems

1. Introduction

e-Government is one of the major targets of the European Union. Many academic, research and governmental institutions are presenting roadmaps for the adoption of electronic means, internet and the web in order to perform everyday activities and tasks¹. Moreover, information dissemination to citizens is one of the main focuses of public and governmental organisations.

This work describes the plan of **Greek Educational Books Publishing Organisation (GEBPO)** to adopt e-Government practices in order to enhance its internal operation, improve the provided services to the public but more significantly to establish a coherent basis for offering electronic services. The Greek Educational Books Publishing Organisation was founded in 1937 and is a Governmental organisation supervised by the Greek Ministry of Education. The objective of GEBPO is the publication and distribution of educational material, particularly books, to all schools in Greece, Cyprus and Greek schools across the world. GEBPO is the only organisation in Greece, responsible for the overall school book production process and is directly connected to the Greek Ministry of Education for any official decision concerning the Greek educational system.

In this paper, we present the **Educational Material Distribution Management System (EMDMS)**; a fully functionally integrated system that supports the processes of ordering, producing and delivering all educational materials to Greek schools. The following section briefly presents GEBRO and the motivation behind and necessity to implement an electronic services system. Section 3 describes the system architecture and the final sections present the system services, the users’ reaction to the system and the positive outcomes received from its use.

1.1. Description of the Organisation

The GEBPO is a Legal Person of Public Law (LPPL). It acts under the surveillance of the Ministry of National Education and Religion. It was founded in 1937 in order to publish and distribute educational material to Greek students.

It operates according to regulations defined by the Ministry of National Education and Religion, is solely financed by and directly accountable to it. The GEBPO is obliged to give the Ministry detailed reports concerning the work development during its production stage but this mainly occurs during the distribution phase to schools. Additionally, when the GEBPO wishes to proceed with development

¹ eGovernment Factsheets of EU Member States <http://europa.eu.int/idabc/en/chapter/203>

work in order to update and improve the services it provides to citizens, it must submit a proposal to the Ministry. This proposal is thoroughly examined before being finally approved and the finances made available to GEBPO for the project.

The GEBPO cooperates with 500 private companies and this number is increasing annually. These companies produce or distribute educational material. The GEBPO distributes material to schools and educational directorates both in Greece and worldwide. Furthermore, the GEBPO is responsible for the publication of the material delivered by the Greek Higher Education Institutes in addition to a significant portion of the publications used by public sector institutes and organisations ([Sirmakessis, and Mayritsakis, 2002a]).

Figure 1 demonstrates the activity of GEBPO and its relations to other private and public entities:

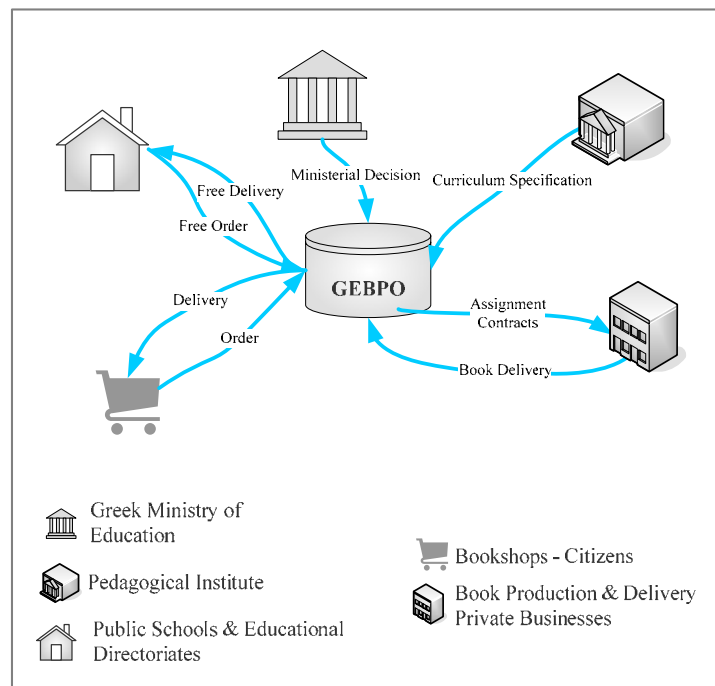


Figure 1 : GEBPO and its interconnections with public and private organisations

As far as Greek public schools and Greek schools abroad are concerned, the Ministry of National Education decides which books will be produced and delivered for each class of each educational level – for example, what books are going to be delivered to students in the first grade. So the Ministry is responsible for defining the annual book list. On the other hand, with regards to the book content, another legal entity, namely the Pedagogical Institute is responsible. The latter is also supervised by the Ministry and reports all the issues related to books' content to it. For example, whether some books must be replaced or modified or updated are questions that have to be considered by the Pedagogical Institute. Thus, the GEBPO receives the content of a book from this source and will remain in contact for any further alterations that are required.

The GEBPO annual budget approaches the 38 million €. The organisation employs 117 people (administrative personnel, graphic designers and graphical arts technicians) and produces approximately 1.200 books with an annual production of 45 million copies. In addition, there are approaching 6.000 deliveries of books and educational material per annum globally.

Two main processes are carried out by GEBPO:

- **Book Production:** The educational material production is a complex process involving many private and public bodies. The phases of this process follow a predefined order starting from the validation of ministerial decisions by the Ministry of Education. The Ministry decides which books should be produced and the GEBPO decides the number of book copies per annum and other important parameters of the process. Following on from this, three major steps are carried out which form the basis of the production procedure. Firstly, the GEBPO graphic designers setup the book layout according to the material provided by the Pedagogical Institute². In the second step, printing contractors receive the printing template which is produced in film form from the GEBPO designers and produce the printouts. The printed books are returned to the organisation and delivered to the “third step contractors”, who carry out the book binding. After the final step the books are stored in GEBPO depositories. It should be noted that the printing and book binding contractors are chosen competitively and this is overseen by the GEBPO. The GEBPO’s Publications Department controls the overall process which involves communicating with the printing and binding contractors and corresponding with the financial directorate to arrange the payments between the GEBPO and the contractors.

- **Book Distribution:** The distribution procedure of the organisation is the second major activity conducted by GEBPO. The books are distributed freely to both domestic and overseas public schools and public directorates of education. The GEBPO also sells books to private schools and bookshops at competitive prices. The distribution includes the following phases:
 - The organisation publishes and delivers the current annual list (described in section 4) of the available books per education sector and level.
 - The schools, the directorates, the bookshops or any other interested party, submits an application ordering material from the annual list.
 - The next stage is the evaluation, cost estimation and approval of the applications by the responsible GEBPO departments.
 - Finally the educational material is delivered and the financial matters are arranged.

The above process involves many heterogeneous parties, whose proper interconnection is of major importance. The motivation regarding the decision of the GEBPO to employ an electronic system for supporting the above tasks is described in the following sections.

2. Motivation

According to the European Union, eGovernment is one of the priorities set by the eEurope 2005 action plan. e-Government is a means of delivering quality public services, reducing waiting times for citizens and raising transparency and accountability levels in services [Information Society, 2005].

² It is a public institute responsible for defining the pedagogical strategy of the Greek Ministry of Education.

e-Government is defined as the use of information and communication technologies (ICT) in public administration combined with organisational modifications and new capabilities development³. The objective is to improve public services, reinforce democratic processes and support public policies.

According to the EU plan eGovernment [Online Availability of Public Services, 2005,] can be recognised in terms of three major sections:

- In terms of **services to citizens**, e-Government not only makes it easier to obtain information from public administration but also greatly facilitates time consuming procedures for the general public and reduces waiting times. Beyond that, eGovernment fosters direct communication between citizens and policy-makers.
- As regards to **services to businesses**, provision of higher quality electronic services by public administrations leads to increased productivity and competitiveness, by reducing the cost of the public service itself as well as transaction costs to businesses (time and effort).
- In the case of **services among authorities**, e-Government can provide ways that strengthen cooperation between national, regional and local government and Community institutions.

As previously mentioned in Section 1 (Figure 1), GEBPO communicates and cooperates with various types of entities including private businesses, other governmental institutions and public schools.

The GEBPO's vision is to use information and communication technologies to improve the quality and accessibility of the services provided. Implementing an electronic management and administration system results in several positive outcomes for all parties involved. Such practices can reduce the costs of the organisation's operation, facilitate the transactions between GEBPO and other public bodies or private businesses, maintain records of GEBPO activities and, last but not least, offer the potential of uncomplicated extensibility to the organisation services.

3. System Architecture

As previously mentioned, the Book Distribution procedure involves, on the one hand, the public schools and the education directorates and, on the other hand, the GEBPO divisions which perform the applications evaluation, the budget estimation, the approval of the applications, the delivery of the ordered material and finally the arrangement of financial matters between GEBPO and the destinations⁴. The system has been designed and implemented for use by the general public and end users rather than specialists ([Orman, 1989]).

The subsystem implemented to support the above tasks is the **Educational Material Distribution Management System (EMDMS)** and was designed in order to successfully and easily integrate all the concerned units and activities ([Sirmakessis, and Mayritsakis, 2002c.]). The system consists of two basic structural pieces according to Figure 2:

³ The European Union On-Line <http://europa.eu.int/scadplus/leg/en/lvb/l24226.htm>

⁴ The bodies interested in educational material such as, schools, education directorates, bookshops, e.t.c.

- The **Web Component**, includes the modules that support the destinations. The destinations use the system to submit their order. The web component consists of the:
 - EMDM database
 - Web Server
 - Web Application
- The **Distribution Management Component**, supports the GEBPO employees in carrying out the application evaluation, cost estimation, approval, deliveries and financial arrangements. This component belongs to the internal GEBPO management system and for this reason is protected with firewalls in order to prevent any malfunctions.. The modules of this component are :
 - GEBPO database
 - General System Server Application
 - Client Application (GEBPO employee workstation)

The **Educational Material Distribution Management System (EMDM)** utilises the existing architectural approach which was used for the development of the Publications Department management system ([Sirmakessis, and Mayritsakis, 2002b]).

As depicted in Figure 2, there is a basic distinction in the system usage area defined by the solid, black row. The lower part of the figure represents the **GEBPO Intranet**. In the intranet all the administrative procedures are carried out, as far as the EMDM system is concerned, along with the rest of the GEBPO subsystems ([Sirmakessis, and Mayritsakis, 2002c]). The administration of the GEBPO system is performed by the employees of the organisation through the intranet who use the already installed client application used by the Publications Department.

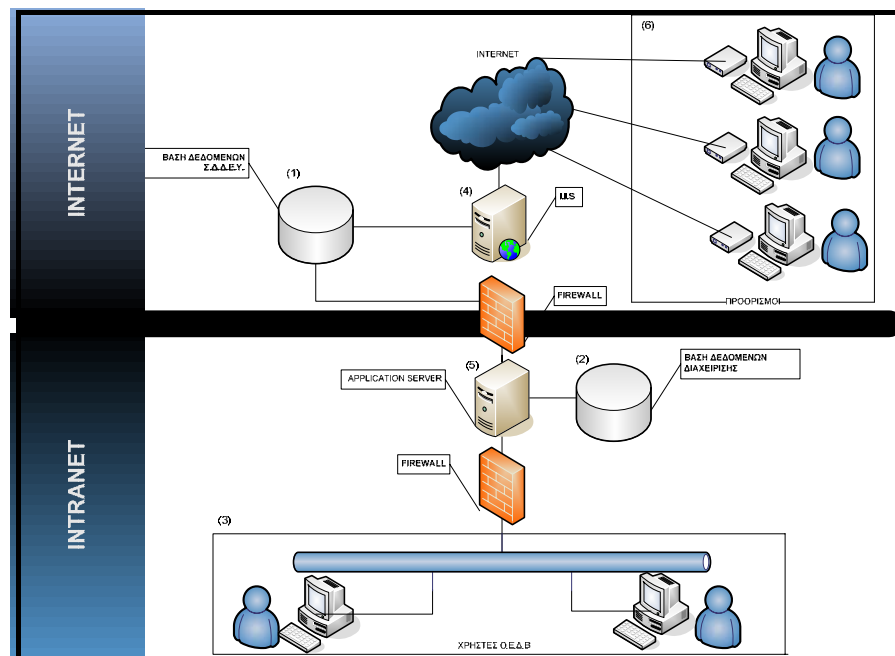


Figure 2 : System architecture

In the upper part of the architectural diagram we can view the **Web Part** of the system where the interactive web application is running. The destinations interact with the EMDM system over the Internet. Due to the nature of the Internet, which provides limited functionality and a general lack of security, the crucial decision was to transfer the administrative functions of the EMDM to the organisation intranet, thus maximizing the security levels and eliminating the occurrence of any fault actions. Moreover, it is much easier for the employees of the organisation to readily correct any faulty destinations.

All the critical information concerning the EMDM system is stored in GEBPO database ([Greenberg, 1998]). This includes information concerning the management operations of EMDM, namely the book data and destinations' data. In the EMDM database all the information concerning the **annual book lists** is stored (see section 4), as well as the **book orders** and **announcements** published by GEBPO to provide information regarding administrative issues to the various destinations. Consequently, two separate sections have access to this database; the web server which carries out all communications with the destinations and the Publications Department management system server which handles all the management operations of the EMDM.

The Free Distributions Department⁵ employees have access to both the system databases via GEBPO local intranet work stations. This has been designed in such a way that the designated GEBPO users have access to data associated with the management operations of the Free Distributions Department and to data stemming from the Publications Department with regards to the books published by the GEBPO.

The web server deals with the requests sent by the web application. This server is only connected to the EMDM system database. All operations performed in this database are actions performed by the various destinations. More specifically, the possible services provided to the destinations are a view of new announcements, modifications of personal data and creation and management of annual book orders.

In Figure 2, the firewall set between internet and intranet, located in the black row, is of significant importance. The insertion of the firewall ensures that there is only limited access to the Publications Department management system server as well as the GEBPO database.

The user's authentication in the web system is carried out by means of providing credentials (login and password). The login names are associated with the destinations according to their geographical position and educational level (primary schools, high schools, etc). The system supports four users, identifiable through their passwords. All have equal access and operational rights to the destinations account within the web system.

4. System Services

The EMDM electronic system was developed to serve the overall material distribution system, from the destinations orders to the management and fulfilment of these orders by the GEBPO personnel. Subsequently the services provided by the system, were designed and developed to simulate the operations carried out by the corresponding interested parties. The system services are described in the following sections.

⁵ The Department is responsible for serving the destinations applications.

4.1. Annual Book Lists Management

An EMDM administrator is responsible for creating the annual book lists. These lists contain the books published by the organisation in the current school year. The destinations formulate their orders according to these lists. The books chosen and added to the list are selected by the GEBPO database, inserted by Publications Department personnel using forms such as that presented in Figure 3.

Περιγραφή	Βιβλία	Συνολική Χρονιά	Δημοσιεύτη	Ημε/ία Δημοσίευσης
<input type="checkbox"/> ΕΠΙΒΛΙΑ 2005-2006	1236	2005-2006	v	Mar. 2 2006 8:33AM
<input type="checkbox"/> ΕΠΙΒΛΙΑ 2006-2007	1211	2006-2007	v	Mar. 2 2006 9:37AM

Figure 3 : Annual list management form

After a list has been created, the administrator publishes it through the system and makes it available to the destinations. The administrator can alter a previously published list and add or remove books from it.

4.2. Destination Management

Apart from the annual book lists, the administrator manages the destinations registered within the system. The administrator can add, modify and remove destinations from the system. When a new registration is performed, all the geographical information about the new destination is added to the system. This information consists of the country, the region, the prefecture and the city of the new destination. Destinations can be grouped and managed according to their geographical information. Alternatively, destinations can be grouped according to their educational level (primary schools, high schools, technical schools, etc). Figure 4 presents the destinations management form.

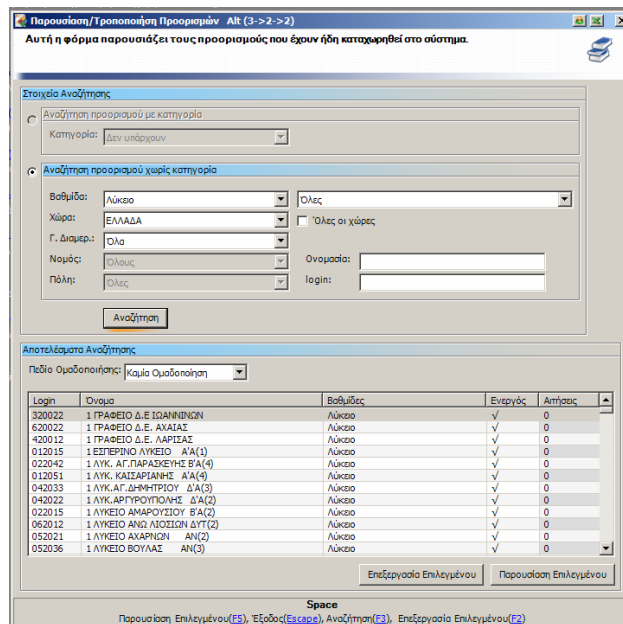


Figure 4 : Destination management form

Additionally, the administrator has the right to modify and process supplementary components which characterize and describe a destination. Such components are related to the destination's past orders, the current phase of the destination's orders and the number of books required by the destination.

Furthermore, destinations themselves should enter the number of students per class in the system. In particular they should enter the precise number of students from the past school year and the predetermined number of students for the new school year. This information is very important and is used by the system in order to estimate the book requirements for the destination.

4.3. Orders Management

The destinations submit their book orders via the internet application depicted in Figure 5.

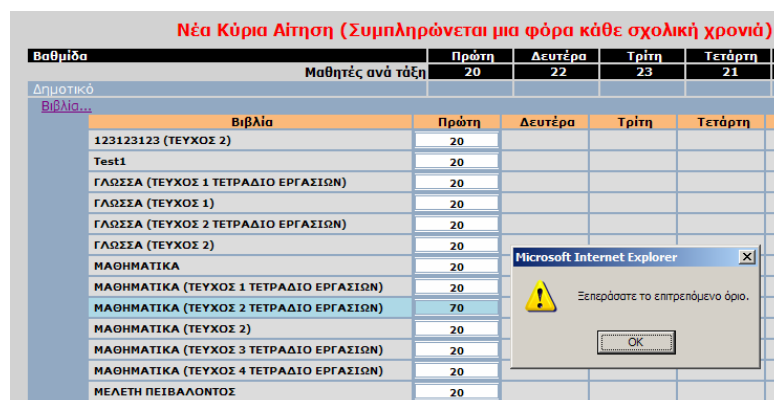


Figure 5 : Order management (Destination)

However, in some instances an order is required to be made by the organisation's employers. For this reason the system administrator has the right to make book orders on behalf of a specific destination. This process is quite simple since the number of

books in the order is decided by the students per class number for the destination. The client form used to manage the destination orders is presented in Figure 6.

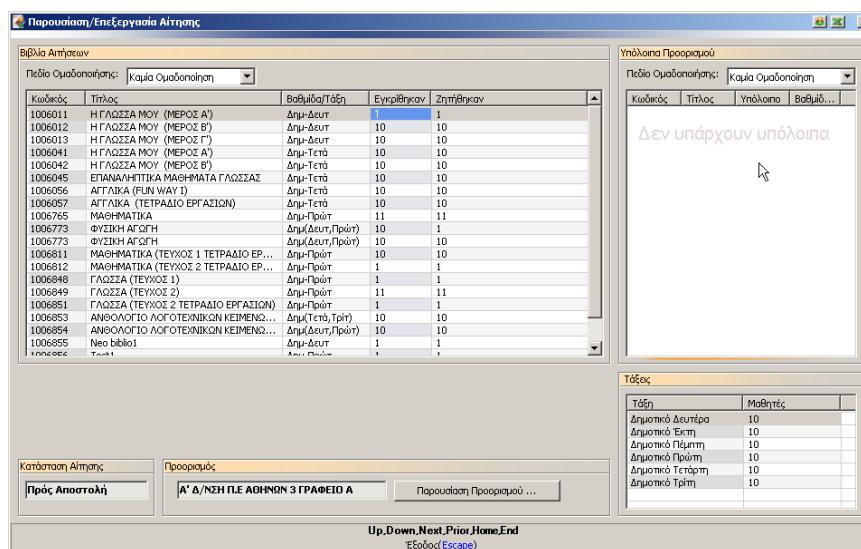


Figure 6 : Order management form (GEBPO)

Because of the enormous number of submitted orders involved, some categorization is necessary as this simplifies the procedure for the management. Orders can be grouped in many ways according to a destination's educational level or location, but the most interesting and helpful grouping for the GEBPO employees is that performed according to their status. Thus, the administrator views the orders in the following groups:

- Pending Approval; as the applications waiting to be evaluated and approved by the GEBPO personnel
- To be consigned; as the applications waiting to be sent
- Sent; the orders already sent to the destinations
- Completed; as the orders sent and crosschecked.

However, the most important feature is that the destination is also given the above status categorisation (through the web application) for its orders thus enabling the overall procedure to be monitored. Another important function of the system is the presentation of destinations that have not yet submitted any orders. This option gives the administrator the opportunity to notify the destinations in order to prevent and resolve difficult circumstances.

4.4. Statistical Data Provision

Another very important feature of the system is the presentation of statistical information concerning the destinations orders. In this way, it is possible for the users to view statistical presentations concerning the number of books ordered per destination or per geographical region or per educational level and also about the students in different classes. By evaluating various parameters, as shown in Figure 7, such as educational level, country destination name and so on, the system is able to provide users with statistical data according to their inquiry.

Figure 7 : Statistical data enquiry form

4.5. Announcements Management

The system administrator can create announcements and publish them by means of the EMDM system. The administrator of the system can direct the applications to specific destinations or to groups of destinations. For this reason the system allows the destinations to be grouped in a variety of ways in order to simplify the administrator's job.

5. Users' Reaction

The adoption of an information system was crucial for the evolution of GEBPO towards eGovernment. The enhancement of the overall Organisation operation following the implementation of the system is quite apparent. All the positive outcomes associated with the improvements have been applied to all the departments, sectors and processes of the organisation. More specifically in the case of the Educational Material Distribution Management System the performance indicators reveal a major acceleration of the executed tasks.

Before the installation of the information system, all tasks were carried out in the traditional manner. The most important procedure of the Educational Material Distribution Department was completed manually throughout the entire process. This included the manual completion of paper forms for the educational material orders made by schools and educational directorates and which then had to be posted or faxed them to GEBPO. The employees of the GEBPO received, processed, assessed and finally approved or not the applications individually. These specific tasks were rather time-consuming and very complex. The employers checked how many books the destinations had ordered and approved the order according to the declared number of the destination's students. What is more, the destinations had to notify the GEBPO of the books remaining from the previous year in order for this number to be taken

into account during the assessment phase. The manual order procedure is depicted in the following figure along with the likely errors.

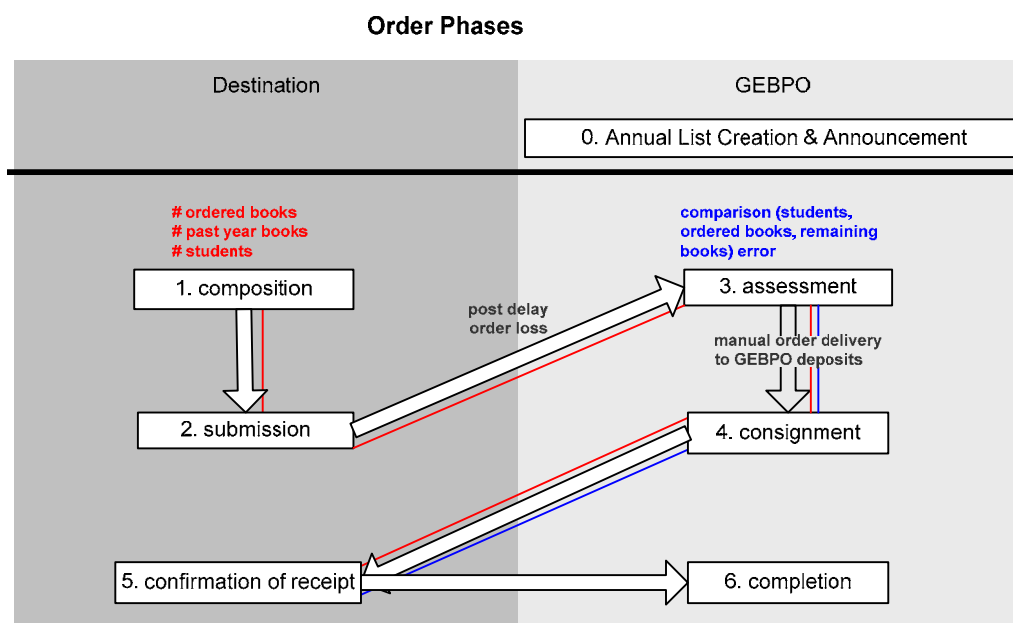


Figure 8 : Order Phases

As depicted in Figure 8 it is possible for both the destination and the GEBPO personnel to potentially delay the overall process. If the destination mistypes either the number of books required, or the book resources, or the number of students (red error) there is no way that these errors can be controlled or corrected. As a result the error (red line) reaches phases 2, 3 and 4 without there being the possibility of correction. After the order has been received by the destination (phase 5) and the error recognised it must then return to phase 1 unless the destination has realised its error before the end of the process and has managed to have it corrected. These types of errors are now completely prevented by the system as it will notify the user in the case of an incorrect input (Figure 5), thus avoiding any duplication of work as was the case previously (resubmission – reassessment – re-consignment).

Another potential error, namely the loss of mail or a fax, which meant that no notification was received by either the GEBPO or the destination, is also avoided. This caused extreme delays as the only acceptable solution to this problem involved the GEBPO employees verifying which destinations had or had not successfully received their books which was only possible after the majority of destinations had been served by the GEBPO. This problem has been eliminated through the use of the system since every task is carried out electronically (and thus, instantly) and, additionally, the destination receives feedback about the exact phase of its order (Section 4.3).

Another commonly occurring error took place in the assessment phase, where the GEBPO personnel had to compare the number of books ordered with the student numbers and also refer to the previous year's book resources and make a decision regarding the approved book numbers for the destination. Furthermore, a percentage of the number of books was required to be added per order, a number which was calculated manually by GEBPO users. If the employee makes a mistake (Figure 8 : Order Phases, blue error) again no error control was available which resulted in the consignment containing the incorrect number of books to the destination (blue line,

phase 5) and the repetition of some phases. The most successful points for the new information system have proved to be the error control and the acceleration of the task completion. Firstly, the suggested number of books is given to the employee by the system complete with explanations (Figure 6). The user is freed of all the comparisons and the necessary calculations. The only requirement is the approval of the order, which is clearly a much faster and simpler process. Additionally, if changes are required to the suggested book numbers for any reason, the system controls the new input and the only approval required is from the financial directorate. All these calculations and the data transactions and operations among departments are conducted by the system.

Another manual procedure which caused delays to the order completion involved the transfer of the approved orders from the Educational Material Distribution Department to the GEBPO depositories, which are located elsewhere. It was somewhat inconvenient for personnel to send the approved applications one by one, so groups of approved applications were sent to the depositories for consignment. This resulted in the delay of the orders which had been approved first. By using the information system, the order is sent to a subsystem for consignment as soon as it is approved. The system also provides geographical categorisation of the orders per destination, a task previously completed by the GEBPO.

Last but not least the annual list creation and announcement (Figure 8, phase 0) has been greatly simplified and accelerated. The creation of the list is carried out by the Educational Material Distribution Department personnel by selecting books by means of a click. The book details are available in the system and the users are able to access them at anytime. The new books, along with their details, are automatically added to the potential annual list. Finally, the annual list announcement is sent to the destinations instantly by pressing a button (Figure 3). As soon as the web application is updated, a destination can submit an order. Previously the time from the creation and publication of the annual lists to the submission of the orders was at least two weeks (including the post services for the list announcement and the order submission).

What is more, the system provides another important service as the system administrator is able to monitor the entire ordering procedure. The latter feature has proved itself to be essential as it has prevented many faults from occurring and, in addition, the system is able to be restored to its correct function in the event of a fault. In specific terms during 2004-2005 in which the GEBPO was using the information system, the order errors leading to order re-consignments were reduced to 5, whereas on average, in the previous years, re-consignments approached 80.

6. Conclusions & Future Work

The adoption of information systems and electronic services has proved to be very worthwhile for the institutions employing such practices over the years⁶. The processing time is minimised, the quality of services significantly improves, the financial management is more easily accomplished and the overall functioning conditions of an organisation are ameliorated.

As noted in [Sundgren, 2005] the areas that require more attention and effort include the usability, cooperation between public administrations, quality and

⁶ e-Government Good Practice Framework <http://www.egov-goodpractice.org/>

security. This main focus of this work aims was on the cooperation of public organisations in order to provide a means of eliminating bureaucracy in the Greek public sector.

The first objective involved the optimization of security, quality and usability of the GEBPO support systems. This was to ensure that the public would be able to readily adopt the electronic services and developed a positive attitude towards them. The next stage involves the extension of the system services to a wider range of recipients. Presently, the system services are mainly provided to citizens and public education entities, whereas according to the prerequisites of the EU plan of services it should also be extended to include businesses and public authorities.

On-line education material is another service that should be provided but it cannot substitute for the traditional printed publications. This would mean radical changes in the Greek educational system and would cause changes to be made to the teaching process. One of the next steps for the GEBPO is the creation of a portal with an embedded electronic library, which will contain all the books' contents electronically and thus give users the chance to view or download them.

The steps given consist of the application of knowledge and experience for other interested public organizations. This is a prerequisite for the further interconnection of the public sector administrations and their interoperation with the business sector for the provision of seamless services to citizens.

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