

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
ОДЕСЬКА НАЦІОНАЛЬНА АКАДЕМІЯ ХАРЧОВИХ ТЕХНОЛОГІЙ

**ХІ МІЖНАРОДНА
НАУКОВО-ПРАКТИЧНА
КОНФЕРЕНЦІЯ**

**ІНФОРМАЦІЙНІ ТЕХНОЛОГІЇ І
АВТОМАТИЗАЦІЯ – 2018**

Збірник доповідей

Частина I

Одеса,
4-5 жовтня 2018

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PROBLEMS OF OPTIMAL CONTROL OF THE DOCUMENT CIRCULATION IN A HIGHER
EDUCATION INSTITUTION

Problems connected with the document circulations in higher education institutions are investigated. Automation is indicated as one of the most effective ways to solve these problems. There are no automated control systems aimed to optimal control of the document circulation. The document circulation is studied as technological process and special information technology. Proper analysis of the documentation flow of orders for the expulsion of students is done as an example. It is proved that full automation is impossible. It is proved also that control of the document circulation and the documentation flow must be not only technological (by signals), but also organizational (by directives).

Document circulation is an activity on the conduct of the movement of documents at the enterprise (office, institution). For every single document such movement takes place from the moment of document's creation or the moment of its receipt from the other organization to the moment, when appropriate actions are completed: sending the document to other organizations and/or sending it to the archive.

There are lots of problems connected with the document circulations in higher education institutions. These problems can be divided into three main groups:

- 1) receipt of documents by performers after the required period;
- 2) contradictions between different documents;

3) duplication of documents. These problems are typical for the document circulation in any large organization or big enterprise (not only in a college or a university).

One of the ways to solve problems of the document circulation is to automate this process. There are automated control systems (ACS) aimed to control document circulation, but these systems do not meet present-day requirements. Improvement of ACS for the document management requires not only the implantation of modern information technologies and computer facilities. It is necessary to improve or to change completely organizational, mathematical, information and software support of the ACS. It should be noted that the problem of optimal control of the document circulation has never been considered.

Effective control of the document circulation needs adequate model of this process. In turn, the modelling of the document circulation requires to analyze carefully the document circulation as a control object. Such analysis is the main purpose of this work.

Analyzing the document circulation as a control object it is possible to consider:

- 1) single document (order, directive, etc.);
- 2) flow of documentation (workflow);
- 3) technological documental process as a whole.

Firstly let us consider flow of documentation as a control object.

There are:

- input documentation flows;
- internal documentation flows;
- output documentation flows.

Let us consider as an example the documentation flow of orders for the expulsion of students. To prepare these orders it is necessary to collect test results and to analyze these data, to form lists of students for expulsion, to make projects of orders, to coordinate orders with various managers and structures, to issue already agreed orders and to send out orders to the appropriate executors. Every operation looks rather simple, but combining of different operations leads to the mentioned above difficulties. It is typical for most of the different documentation flows (not only for the documentation flow of orders for the expulsion of students).

It is also clear that errors in processing of the documentation flow of orders for the expulsion of students can be rather significant, since they affect the fate of people. Some of these errors can be defined as critical errors. Such (critical) mistakes must be avoided at all costs.

Proper analysis of the documentation flow of orders for the expulsion of students as technological process makes it possible to highlight control parameters and managed parameters. Orders for the expul-

sion of students are typical one (precisely for universities, colleges and faculties). So mentioned above analysis can be extended to other types of orders in higher education institutions.

The control objective is to minimize the time for movement of orders from initiators to executors, but without increase in the number of critical errors. Achieving of this objective requires not only technological actions and technical novations (using modern computers and devices, Internet or intranet technologies and cloud computing), but also making organizational arrangements.

So control of the document circulation and the documentation flow is not only technological control, but it is closely linked with the organizational management. This is exactly the case when one can speak not about purely technological control, but about organizational and technological control (management). Furthermore, it is very difficult (and sometimes impossible or meaningless) to conduct technological control of the document circulation without preliminary organizational decisions or activities.

Technological control is carried out by signals, while organizational control (management) is carried out by directives and orders. By the way such organizational control also must be optimized.

It is also obvious that control systems aimed to control document circulations or documentation flows in higher education institutions (and in other big organizations) can be only automated systems, but can never be automatic systems. Full automation of the document circulations control is impossibility. The reason of that is connected with strong influence of human factor on the process of the document circulation.

The process of document circulation itself can be considered as a special information technology (technology of accumulation, processing, storage and transmission of information). A feature of the implementation of any information technology (especially in the transmission of information, i.e. communication, and processing of information) is the presence of a creative element.

The following conclusions can therefore be drawn from the foregoing.

- There are no automated control systems aimed to optimal control of the document circulation, because the problem of optimization for the document circulation has never been considered (surprisingly!). There are ACS for control of the document circulation, but these systems are not effective enough, because they are obsolete (at least morally).

- Problems connected with the document circulations in higher education institutions are similar to such problems in any big office or organization. But ways of solving these problems in a higher education institution are more or less specific, because they are connected with the features of educational process.

- Effective control of the document circulation needs adequate model of this process. By the way mathematical model of the document circulation must be rather simple (because connections between input parameters and output parameters are not complicated for such processes).

- The objective of control of the document circulations is to minimize the time for movement of documents from their initiators to direct executors. But such a reduction in time cannot be achieved by increasing of the number of errors.

- Control of the document circulation and the documentation flow must be not only technological, but also organizational. Organizational control (organizational management) almost always precedes technological one, but they are closely related. Appearance and implementation of technical innovations and new classes of software very often lead to the necessity of organizational changes.

- The process of the document circulations (either in higher education institutions or in other organizations) cannot be automated fully.

- The process of document circulation can be considered and studied as a special information technology. Therefore, all the laws of information technology are also valid for the document circulation. Since the implementation of information technology is impossible without the essential participation of a human being, then, as indicated above, a document circulation cannot be automated fully.

XI МІЖНАРОДНА НАУКОВО-ПРАКТИЧНА КОНФЕРЕНЦІЯ

ІНФОРМАЦІЙНІ ТЕХНОЛОГІЇ І АВТОМАТИЗАЦІЯ – 2018

ОДЕСА
4 – 5 ЖОВТНЯ, 2018

Збірник включає доповіді учасників XI Міжнародної науково-практичної конференції «Інформаційні технології і автоматизація – 2018»

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НТТБ ОНАХТ

