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Analysis of information and *information flow in technological processes.* Method of transmitting information unaltered

N Anton[1, *], A Nedelcu[1]

[1] Transilvania University of Brasov, Faculty of Technological Engineering and Industrial Management, Eroilor Street No. 29, Romania

Email: anton_nicolae_07@yahoo.com

Abstract. Decision makers in an organization's top management use a multitude of information to substantiate decisions. Execution staff also needs a multitude of inside information about the development of the production process, the way the tasks and objectives are met, the situation of the material and energy resources stocks, the functioning of the machines and the installations, the degree of fulfilment and the quality level of production, etc. The organization's information system can be defined by all the data, information, flow and information circuits, information handling procedures and their means of application. All this information is processed and directed to potential users in order to be used to achieve the company's goals. Incidentally, this information can be distorted by other factors such as: illegible printing, loss of information on computer's magnetic supports due to wear, viruses or miscellaneous defects. Within the information system, it may often happen that we have to deal with the transmission of more information, from design to production and vice versa, for the conformation of the finished product.

1. Introduction

Along with the technological advancement of recent years and due to the electronic environment of transmitting, storing and managing information, the issue of the security of the organization's information system is becoming more common. In order to maintain the highest level of security, as hardware and software products evolve constantly but with certain vulnerabilities that can be exploited by some people by counter-engineering or reverse engineering, a growing amount of data and information requires adequate protection and a higher level of security in terms of access to information, and also a permanent adaptation of the user training process as a whole to the particularities of the information and production systems within the company.

2. Information flow. Method of transmitting information

Information entering the organization is recorded, processed, and stored in a database. All employees, need to have access to that information, so they have to be planned, organized, managed, thus a management information system (MIS) is needed. The studied organization produces subassemblies for the finished bearing product. They can be divided into three distinct categories: bearing rings (bearing shirts), cages and rollers.

For a more in-depth study of an informational flow, we will look at the Production department and the QS department.

In order to have an accurate picture of the flow of information between the two chosen departments, we start from the fact that the information system in the organization was very well established by

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realizing the SAP system as an informational base. The structure of the SAP system allows access to any type of information by calling different system functions, even if the name of the entity (SAS command) is unknown, but elements of the command structure are known. The information flow between the two departments in terms of the frequency of information transmission is a permanent flow because information is transmitted via computer systems several times a day. From the point of view of the direction of the information flow, the information flow is horizontal.

Within these departments there also is another type of information flow and informational circuit established between the production department and the line control, flow that is permanent and horizontal, and between the line control and the Laboratory of measuring technique with the same characteristics. The informational circuit between the line control and the production department is internal from the organizational point of view with a horizontal trajectory and in the relation with the Laboratory of measuring technique is of the same type (internal, horizontal).

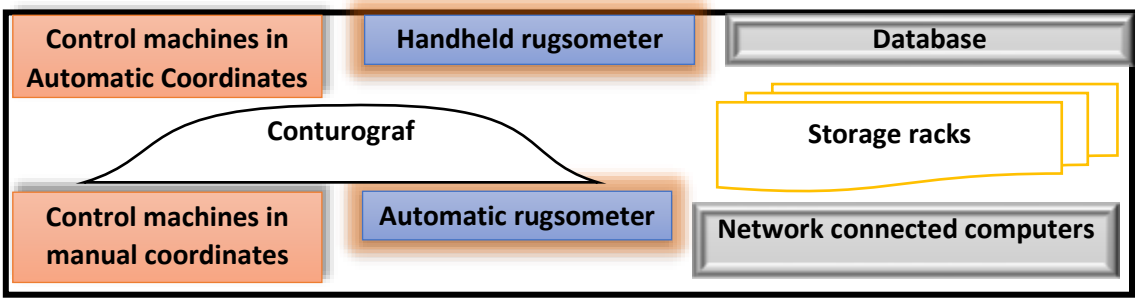

Figure 1. Equipment chart Laboratory of measurement technique

The information transmitted between the Production Department and the Laboratory of measurement technique is expressed in written form being horizontal and, from the point of view of their usefulness, they are of control and regulation. Between the line control and the Laboratory, the information can be orally or written, being horizontally, and is used for evaluation and reporting. Inside the Laboratory, orders are received with information to evaluate some features of the product with the help of the equipment. The result of these assessments is sent to the Production Department and Line Control. All these evaluations are done in the Laboratory, stored in an archive consisting of an electronic database to which other departments have access, such as accounting, production, etc.

The periodic provision of such predetermined reports in the form of syntheses in the database is the component of the information system, which is also called the "management alert system", as it is intended to specifically warn managers about the existence or possibility of existence of problems or opportunities. Management of the information system can be represented graphically as in the figure below:

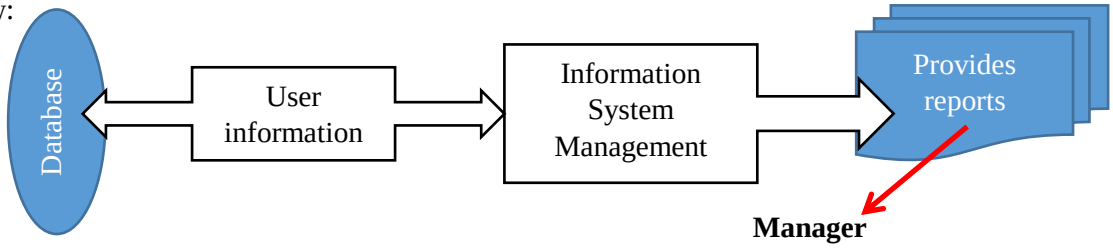

Figure 2. The role of information system management

2.1 Information system deficiencies

Even though the informational system between the two departments appears to be well established, this has shortcomings, primarily in distorting the information generated by the difference in professional training between operators in the Laboratory of measurement technique and other employees or line controllers. This information may also be distorted by other factors such as illegible writing, malfunction

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of copy machines (not seeing paper information correctly), and loss of information on computer magnetic supports due to wear, viruses, or mechanical defects. Filtration deficiencies often occur that change the content of the information, intentionally or not. Within the information system the description of the information system sequences must be accompanied by graphic representations. For the material reception activity the horizontal graphic representation is shown in the figure below:

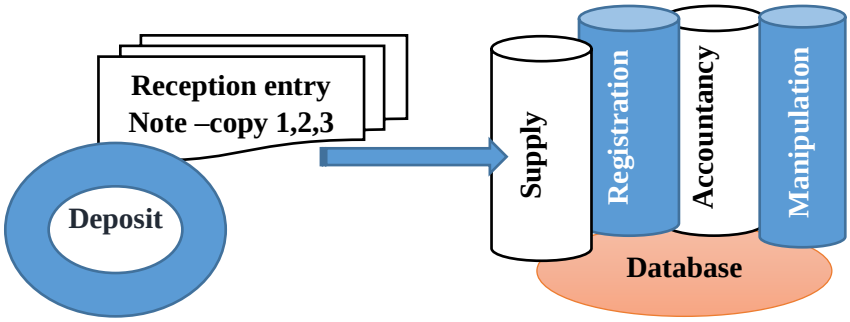

Figure 3. Horizontal graphic representation of the material reception information system.

As a result of studies conducted within organizations on the information system, it has been found that there are some typical, relatively frequent deficiencies due to errors in its design and / or operation. These typical deficiencies are: **Distortion** - consists in the partial or total unintentional modification of the content of some information during collection and transmission from the transmitter to the receiver; **Filtering** - consists in partial or total intentional modification of the content of information during the collection, recording, processing and transmission from the transmitter to the receiver; **Redundancy** - consists of the collection, recording, processing and re-transmission of data and information; **Overloading communication channels** - consists of collecting, processing and transmitting unnecessary data and / or information by means of communications [1].

3. Identification of criteria for optimization of information flows

Optimizing information flows as a process or as a product is subject to the same rules based on value and cost. In this regard, many authors link the value of information to four main factors, namely: quality, speed, quantity and relevance in managerial ability in decision-making. **Information quality** - to assess the quality of a specific information, managers need to be able to compare the given facts with reality. **Deadline for delivery of information** - or a control to be effective, corrective measures are needed before a deviation from the standard plan takes place. **Quantitative information sufficiency** - a message cannot be considered either of a proper quality or opportune as long as it does not contain enough information. **Relevance of information** - at the same time, the information that the manager receives must be relevant to the responsibility and work tasks.

Compared to the foregoing, it should be noted that there are technical indicators on which one can appreciate the benefits of an information system. Among these include: **accuracy**, **complexity**, **opportunity**, **frequency of elaboration**, appropriate content, appropriate presentation, integrating capacity in the information system, utility. The utility is realized by what the system performs, and the performance through the way the utility is fulfilled. [2]

Accuracy. It can be appreciated by two indicators:

- the ratio (number of fair answers) / (total number of responses) given to that specific event; is a useful indicator for expert systems;
- the precision of the data at one's disposal, as measured by the relationship:

$$P_C = \frac{N_{ai}}{N_{tmax}} \quad (1)$$

where:

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- P_C - the precision coefficient; N_{ai} - the amount of actual information; N_{tmax} - the maximum amount of information possible under the given conditions (which corresponds to the highest degree of detail possible during the available time).

Complexity. It is about the quality of containing elements of knowledge that allow for a more complete picture of the event.

Opportunity. It can be regarded as the rate of information that fell within the available disposal time relative to the total amount of information transferred.

An empirical evaluation of the usefulness of the information can be done on the basis of the ratio between the number of useful and unnecessary information. The following steps are set: > 0.5: essentially information; interval 0,1 - 0,5: normal weight of useful information; and < 0,1: Informational void.

The "usefulness ratio coefficient" (RC_{an}) can provide a qualitative appreciation of the information

$$RC_{an} = \frac{N_e * \lambda_e}{N_i * \lambda_i} \quad (2)$$

where:

N_i, N_e amounts of information that come in or out of a compartment; λ_i, λ_e - the corresponding value in the money terms of the information unit.

As regards the itineraries of data and information from the place where the data are collected to the recipients of the information, the circuits must be considered as having the following characteristics: to be as short as possible, to be rational, economical and the intermediate processing volume unknown by the end-user is minimal. The optimization of information flows is achieved by bringing the indicators or parameters of the mentioned evaluation models to levels that provide maximum efficiency to the information system. [3]

4. Critical analysis of the existing situation by determining weaknesses, strengths and their evaluation according to the quality criteria of the information system.

4.1. Determination of the quality characteristics of the analysed information system

The purpose of this stage is to determine the internal and external characteristics of the quality, the quality analysis methodology, the quality indicators and to determine the work necessary to improve the quality of the information system, requiring organizational, technical, technological and methodological assurance.

To describe the characteristics of the quality of the information system, the following processes must be covered:

- Selection and argumentation of the initial set of data that reflects the general peculiarities and stages of the informational system's life cycle, that influence certain quality characteristics of the system;
- Selection, establishment and confirmation of concrete parameters and scales for measuring the characteristics and attributes of the quality of the information system for their subsequent estimation and comparison of the requirements of the specifications in the process of qualification tests or certification at certain stages of the life cycle of the information system.

4.2. Collecting information about the existing information system

Various methods can be used to accomplish this step, among which the most common ones are: Interviews with persons involved in the company's activity; Consultation of records; Studying documents circulated within and outside the firm; Studying the documentation governing the conception, operation and control of the information system;

We have chosen the method of interviews and for their realization we have developed two questionnaires, one for managers from any level within the organization and one for the persons involved

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in the informational-decisional activity. Information on the situation at the unit was collected on September 25, 2018, at the company's headquarters.

4.3. Quality characteristics of the quality of the information system

The questionnaires were drafted following the characteristics of the quality of the information system as listed below in Table 1, with the aim of clarifying the aspects related to: Rigorous control of information sources, Degree of degradation of information during traffic, Equipment for information processing, Level of training of information managers, Level of completeness of information, Level of accuracy of managers decisions, Methods for storing information, Design and structure of databases and the perspective of their computerization, Orientation towards qualified staff with computer literacy, Growth of performance decisions, Definition of the beneficiaries of information and their access to information.

Table 1. Quality characteristics of the quality of the information system

Quality characteristics	Measure unit	Value Range
Utility		
Clarity:		
the concept of an informational system and its applicability capabilities		
clarity and completeness of documentation / procedures for the application or implementation of the information system	-	1-very poor; 2-weak; 3-good; 4-very good
Simplicity of use:		
ease of management of functions; comfort of operation	-	1-very poor; 2-weak; 3-good; 4-very good
Studying		
the difficulty of studying the applications of the information system	man-hour-machine	1 – 1000
the duration of the study	hour	1 – 1000
the volume of the operating documentation	pages	1 – 1000
Attractiveness:		
subjective estimates or expert estimates	-	1-very poor; 2-weak; 3-good; 4-very good
Maintainability	-	1-very poor; 2-weak; 3-good; 4-very good
The ability to be modified:		
workload for preparing changes	man-hour-machine	1–1000
Stability:		
resistance to adverse events resulting from technical and / or technological changes	-	1-very poor; 2-weak; 3-good; 4-very good
Coexistence - Correspondence:		
standardization with the operational environment and equipment / work machine	-	1-very poor; 2-weak; 3-good; 4-very good

The final result of the analysis of the existing situation at the organizational level is reflected in Table 2.

Table 2. Critical analysis of the existing situation

Weaknesses and strengths	**Assessment level**	**Coefficient of importance**	**Weighted Coefficient**
Sources of information are not rigorously controlled	1	0.1	0.1
Degradation of information during traffic	3	0.05	0.15
Insufficient equipment for processing information	3	0.1	0.3
Insufficiently trained information managers	2	0.1	0.2

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Sometimes incomplete or erroneous information	1	0.05	0.05
Decisions on wage policy are sometimes wrong	2	0.05	0.1
Outdated methods for storing information	1	0.05	0.05
There are concerns about designing and structuring databases where computerization is in some areas or perspectives towards computerization	4	0.1	0.4
There is an orientation towards a young person with computer literacy	3	0.2	0.6
Growth of performance decisions	3	0.1	0.3
Beneficiaries of the information are well-defined, their access to information being limited	2	0.1	0.2
Total	**25**	**1**	**2.45**

Value Range: 1-very poor**; 2**-weak**; 3**-good**; 4**-very good

Based on the calculations above, we obtained 2.45 score, which is in the range of two (weak) and 3 (good) leading to a high power information at the organizational level. For this, it is only suggested to improve the existing information system. The transition to the new improved information system can be done through a pilot system, parallel to the old information system or through progressive passage.[4]

5. Conclusions

We can conclude: a) There is an independent strategy decision-making information; b) The information system allows managers to timely identify the chances and risks due to the company's strategy; c) The manager knows and gives consideration to the fair processing of information for the decision making; d) Employees of the enterprise are not involved in the improvement of the information system; e)Information does not reach employees in a timely manner; f) Upgrading all computers in terms of hardware and software given the fact that some equipment is obsolete and information base (SAP) is bushy requiring advanced knowledge of operating and also advanced knowledge of English or German, since it is not completely translated into Romanian.

Improving the information system means restoring the order of information flow within the organization's information processing system. The step-by-step approach to improving the information system will bring you the best results.

In the future, the success of applying new concepts and managerial means will be conditioned by the existence of an information system in continuous improvement.

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