

DOCUMENTED INFORMATION IN THE INTEGRATED MANAGEMENT SYSTEM

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Abstract. *Implementation of several separate management system standards implies duplication of many activities, including extensive documentation. Past practice has shown that employees have a hostile attitude towards it. Integrating multiple management systems into an integrated management system (IMS) brings various benefits. Integration affects the shortening of the required time, the burden on employees, more efficient use of technical and financial resources, and excludes the need for multiple collection and processing of information, leads to a reduction in the volume of documentation, and frees the system from unnecessary bureaucratization. For the continuous improvement of IMS, it is important that it is supported and/or integrated with other programs. Given the volume of input and output elements during the development and application of IMS, and extensive documentation, information and communication technologies (ICT) can provide significant support to the organization. The development of information and communication technologies, first of all cheap hardware, databases and software, has made it easier, faster and cheaper to collect the desired information and simpler management of a large number of documented information (documentation). In this sense, within this work, the goal is to develop an integrated information system (IIS) that will enable the rapid collection of a large amount of information for the purpose of taking adequate measures to monitor the efficiency of the management system. Based on that, the work established an IMS (QMS+EMS+OHSMS+ FSMS) in a company from the field of mill-bakery production and solutions were given to increase the efficiency of the system by using ICT. Special emphasis is placed on the development and use of documented information in IMS. After that, the obtained model was integrated with the information system. During the management of non-conforming products, the company reacted quickly, and the observed non-conformities were effectively eliminated.*

Key words: *Integrated information system, Integrated management system, Documented information*

Introduction

Implementation of several separate management system standards implies duplication of many activities [1]. The simultaneous and parallel application of several separate management systems puts an additional burden on employees. They often find themselves in a dilemma whether to give priority to production processes or excessive bureaucracy, which is generated in this way [2]. The development and application of integrated management systems has been attracting the attention of scientists and experts in practice in recent years. Standards ISO 9001 (QMS), ISO

14001 (EMS), OHSAS 18001 (OHSMS), ISO 22000 (FSMS), to a greater or lesser extent, directly or indirectly, include the following elements: process control systems, human resources, information, documents, design, production and distribution of products and services, satisfaction of customer needs, which make the standards synergistic and favorable for integration [3]. A large number of works have been published that deal with the integration of management systems and the results of their application in various areas of production [4 - 10].

The integrated management system represents a set of rules and procedures related to the overall vision of the company's development [11]. This allows all fundamental aspects for the success of the organization to be covered in one document. The most important advantage of such a system is the possibility of simultaneous analysis of all business processes. Silvestri et al. [11] list five areas for which the development of an integrated management system has been proposed so far: quality, environment, health and safety at work, ethical issues and corporate social responsibility.

The integration of several standards gives a greater benefit than the individual (separate) application of management standards. The level of this benefit is affected by the extent of integration [10]. The level of integration of the control system can be different. In the best case, integration can encompass the entire organization and all interested parties [12]. In the available literature, no information was found on the research conducted regarding the integration of the food safety management system (FSMS) into a single integrated system with other management systems (QMS+EMS+OHSMS). This is the reason that in this work, in cooperation with representatives of companies dealing with food, a model of an integrated management system (IIS) will be developed, which, in addition to the three mentioned systems, will also include FSMS.

Considering the volume of input and output elements during the development and application of IMS, and extensive documentation, the organization can receive significant support through the application of information and communication technologies (ICT). In order to collect, process and efficiently use a lot of data, organizations become dependent on the application of appropriate software. Different systems can provide different functions for organizations, but the lack of integration between them makes it difficult to interact and collaborate with other processes of the organization. System integration into comprehensive corporate software represents an important stage in the integration and efficient functioning of business and organization management. This integration challenge arises due to the mutual dependence and complexity of data transfer, as well as the relationship between different parts of the organization [13].

The development of ICT enabled easier, faster and cheaper collection of desired information and simpler management of a large number of documented information (previously used term, documentation). In this sense, within the framework of this work, the goal was set to develop an integrated information system (IIS) that will enable the rapid collection of a large amount of information related to the characteristics of food products, parameters of the production process, all with the aim of taking adequate measures to monitor the effectiveness of the application of safety standards and food quality standards, standards related to the protection of the living and working environment. Special emphasis will be given to the development

and use of documented information in IMS and the procedure for managing non-conforming products. The developed integrated system will enable quick conclusion based on which the representatives of the observed company will be able to react appropriately, including the introduction of preventive and corrective measures, returns and recall of products from the market.

Material and methods

The investigation in this paper was conducted in a company that operates in the field of milling and baking industry. In previous years, the company applied some management systems (QMS, EMS and HACCP), so that the employees have enviable experience in this field. The management of the company expressed its desire to integrate several management systems during the implementation of the FSMS. With the support of experts from the company, a model of an integrated management system was developed through the integration of common requirements. Individual requirements of the standard, which could not be covered by integration, were analyzed separately. The efficiency of the integrated management system is increased by the use of ICT.

Results and discussion

The observed company (Company XY) has established a system for constant monitoring and maintenance of documented information and maintenance of the medium on which it is stored. The documented information of the management system in the company corresponds to the good practice of the company, the rules of the profession and is harmonized with the valid legal regulations. This paper presents part of the data from the documentation of Company XY required by ISO standards, which represent the basis for the application of IS, based on various information and communication technologies, as a tool for implementing an integrated management system for food quality and safety, the environment, and health and protection at work.

Management of documented information (DI)

In accordance with the requirements of the standard, documentation (documented information - DI, the term used in the new version of the standard) in Company XY is organized on three levels: IMS LEVEL, PROCESS LEVEL and WORKPLACE LEVEL. In addition to internally adopted documents during work, this company also included information of emergency origin that is used in the company. Procedures with documented information of an external type are identical to the procedures applied for documented information created in the company.

The highest level of documented information includes documents related to IMS. At the process level, there is documented information required by the standards ISO 9001:2015, ISO 14001:2015, ISO 22000:2018 and ISO 45001:2018. Procedures that

are necessary for efficient planning, implementation and management of processes are documented at this level. Documented IMS information and documented information of individual management systems, which are not covered by integration, are contained here. The third level of documented information includes work instructions and forms. For easier identification and tracking, the documented information is encrypted in a certain way. In all the recording of certain process parameters, forms were created for entering data (earlier only hard copy, and now both hard copy and e-copy). After entering the data in the forms, they became records that are managed in accordance with the appropriate procedure (Figure 1). In addition, in IMS there is the possibility of recording data in free form. Records are made according to the described methodology and are kept within a defined period in accordance with positive regulations and internal decisions of the company.

During the creation and updating of documented information (DI), care was taken to highlight the following data on each DI: (i) identification and description of the information (reference number/ID, title, date, author's name); (ii) the form of the information (language, version, graphic representation) and the medium on which the information is stored (paper, electronic) and (iii) authorization for use. The procedure for creating, approving and distributing new or revised DIs in IMS is defined in the corresponding procedure (Figure 1). In accordance with the appropriate instructions for marking documents, each documented information should contain data related to identification, recording, storage, protection, and distribution of documented information in the IMS. Documented information in Enterprise XY was created for the processes of realization, management, support and improvement. Records are the basic documents that control the assurance and implementation of the management system (QMS, FSMS, EMS and OHAS). All employees, in accordance with their work tasks, keep quality and safety records, the form of which is prescribed in advance.

The integration of several standards gives a greater benefit than the individual (separate) application of management standards. The level of integration of the control system can be different. The level of that benefit is affected by the extent of integration [10]. In the best case, integration can encompass the entire organization and all interested parties [12]. Integrating two or more management systems into an integrated management system (IMS) brings various advantages [14], which is confirmed in this paper. Organizations use IMS to manage processes or activities aimed at meeting the organization's goals, meeting quality, health, food safety, environment, work safety and other identified requirements [14]. Through the Integrated Management System (IMS) in this paper, the elements that are common to all involved systems are connected. Our results agree with the research of several authors [2, 7, 15]. Integration affects the shortening of the required time, the workload of employees, more efficient use of technical and financial resources [2, 7]. IMS is a convenient way to manage the multiple needs and expectations of interested parties [15]. IMS enabled simultaneous implementation of joint tasks and reduction of production costs, reduction of waste and improvement of company reputation, while separate and incompatible implementation of the system results in duplication of tasks and creation of unnecessary bureaucracy [16]. Eliminating excessive

bureaucracy from the process works in the direction of improving the work of employees and encourages teamwork [2].

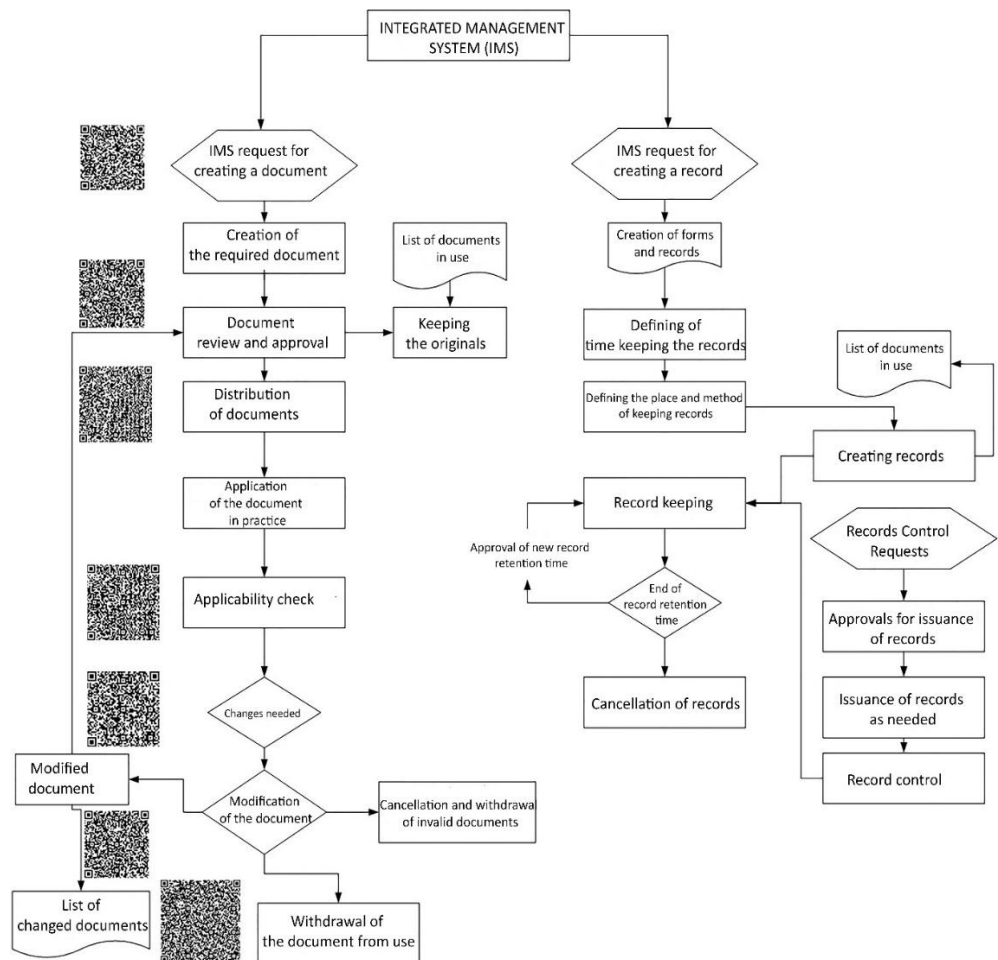


Figure 1. Management of documented information in Company XY

Figure 2 gives an example of connecting databases in which data related to the management of documented information which have been entered. As can see, 9 databases were created with tables that contain data (information) essential for the establishment and maintenance of IMS. The "Documentation" table was designed as the central table to which the others are linked. This table contains information about the name of the document, the applicant for the creation of a certain document, the creator assigned the task of creating the document, the person or several persons who need to check and approve the created document. In this table, there is a field in which information about the approval of the document (whether the document has been approved or not) is entered, with the date of approval of the document, the period of validity of the document, and a list of employees from a certain department to whom

the document has been assigned for its application. At the top of the table is the code (ID) of the document and it represents the primary key for integration.

In addition to the "Documentation" table, the "Request for the production of documents" table was created. This table contains fields for entering the following data: name of the document, name of applicant for creation, name of the person to whom the task of creating a document or execution of another task is assigned, the date when the task for creation was assigned and the deadline for creating the document. The table with the names of workers entrusted with certain tasks is linked to the previous table. In addition, the table contains fields with the basic data of each worker, and the workplace to which the workers are assigned. In order to avoid duplication of work tasks, the table with the names of workers is linked with the applicant field and the person in charge of creating the document.

After designing the request for creating a document, the following data is transferred to the next table ("Work tasks"): information related to the record of the document creation task, information about the task submitter and the task implementer, and information about the controller who will check the execution of the tasks (creation of the document). This table contains a field in which to enter information regarding the approval of the document (approved or not) and the date of approval. The "Creation of the requested document" table was designed for easier record keeping and subsequent simpler withdrawal of the document. In that table there are fields in which the following information is entered: the name of the document, the date of its completion, the name of the worker who created the document. When sending this information, the document itself is attached. The table is filled automatically from previously created tables.

In order for the responsible person to be able to approve the documents, the table "Review and approval of the document" was designed. The table contains the basic information required for verification: the date of approval, the person who approved the document, the attached document with possible comments for modification, information on whether the document was approved or not, and the verifier's electronic signature.

In the tables "Workplaces" and "Sector" are given the data on the basis of which workers and tasks are distributed by workplace. This information is necessary when assigning work tasks to a specific person in a specific sector of the company. These tasks refer to the person in charge of creating the document, the person responsible for its verification or the person who needs to apply the created document in their work. The table "Jobs" contains information about all workplaces in the company: the name of the workplace, the sector in which the workplace is located, and a description of that workplace. In the "Sector" table, data on the name of the sector and a description of the jobs that are carried out in the specified sector are entered. The sector code, which is located at the top of the table, is linked to the Sector column in the "Jobs" table, which makes it easier to choose the sector when entering information about workplaces.

Bases designed in this way can be connected to each other. It is possible to link databases with tasks and information on the procedure for creating records, data on the measurements carried out, the movement of materials (from raw materials, through processing to distribution), and monitoring of the specified execution

deadlines. In the specific case, the linking of databases refers to the linking of documented information from the beginning to the end of the supply chain: from the field with sown wheat to consumers who consume finished products (bread and other bakery products).

Management of non-conforming products

Considering the volume of documentation of the integrated management system and the number of data included in the IMS, the Chapter Results describe only the documents related to the management of non-conforming products (Figure 3), which is considered to be a good example for illustrating the application of information and communication technologies (ICT)). ICT in the presented and other parts of the IMS represent a tool for more efficient functioning of the IMS.

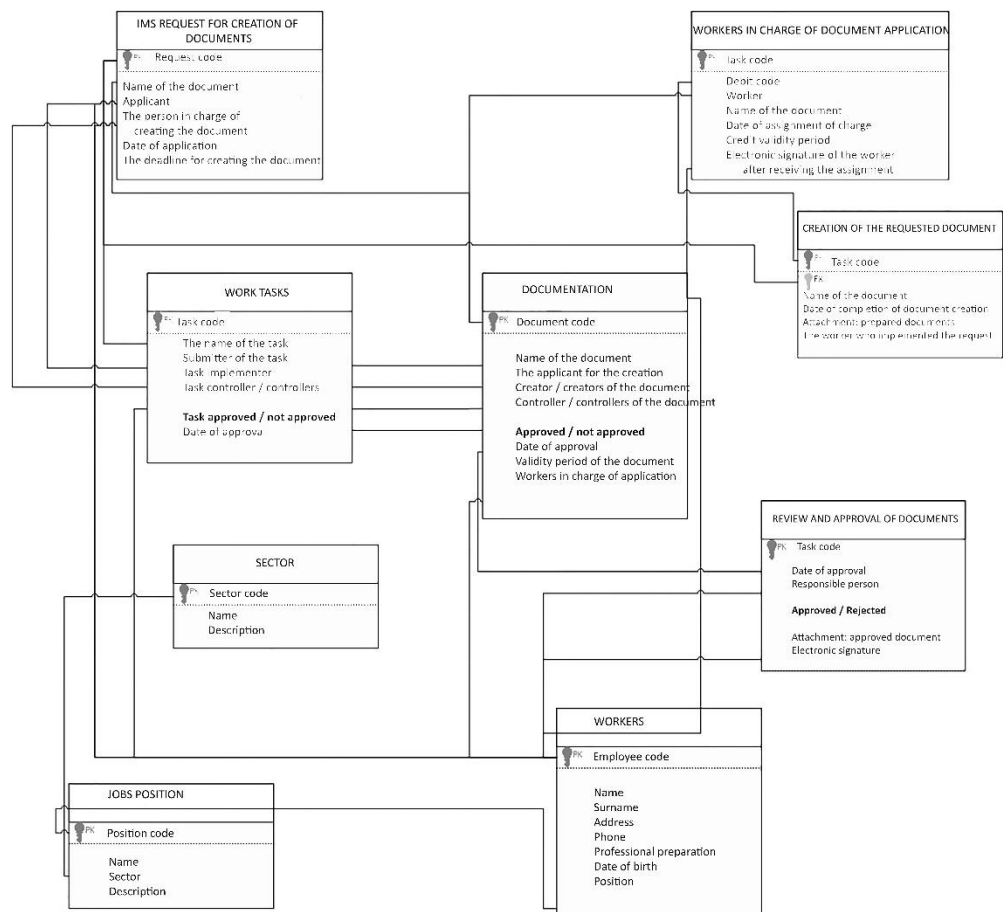


Figure 2. Example of connecting databases

By looking at the results of previously published research, Nunhes et al. (2019) and Nives et al. (2017) [17, 18] were observed that there are differences in the suitability of some documents to be integrated into IMS. The elements and functions that are most often integrated include manuals, policies, goals, structure and responsibilities, tasks of top management, work instructions, control of documents and records, training, internal communication, response in emergency situations, quality indicators, management of non-compliance, control monitoring and measuring equipment, preventive and corrective measures, internal and external verification, etc. Several authors proposed procedures and tools for the integration of different management systems [11, 19]. Some elements of the management system are easier and some more difficult to integrate, which is why, in our opinion, the guidelines proposed by ISO [20] should be used during integration. The examples described in this paper confirm the stated theoretical assumptions.

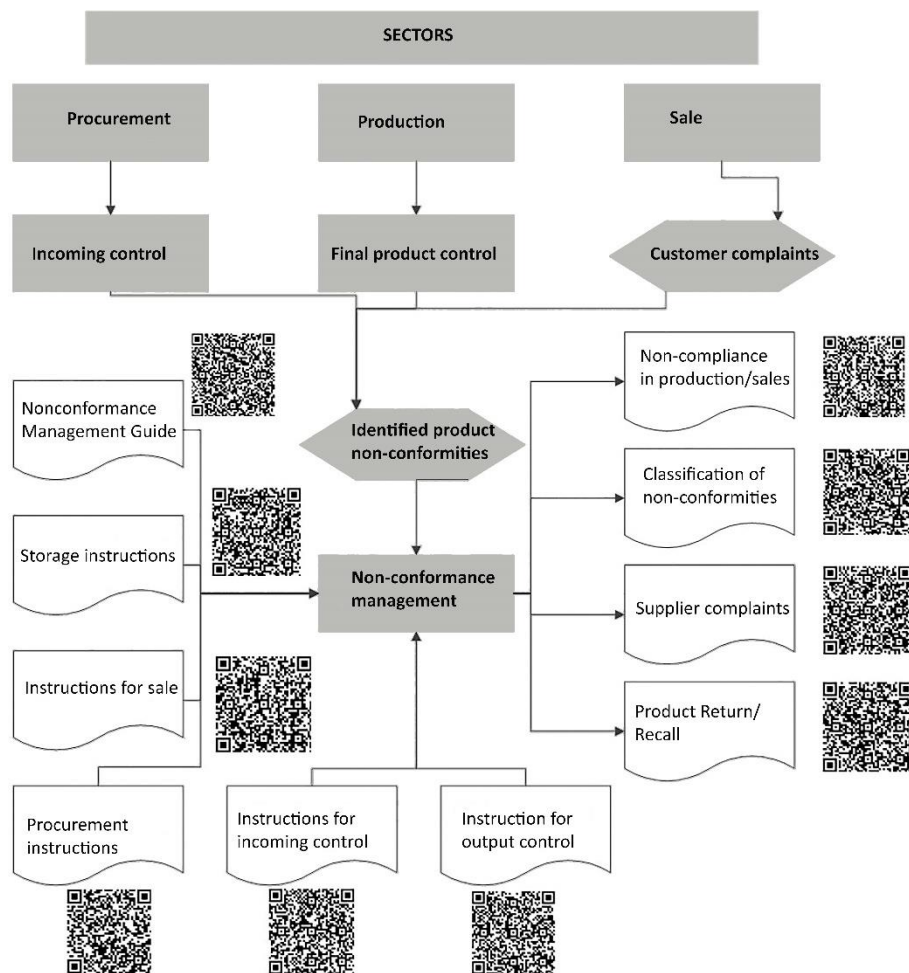


Figure 3. Procedure for managing non-conforming products

Conclusion

Integrating FSMS with other management systems in the company from the mill-bakery industry improved the organization and management system in the company. In addition, the use of ICT has accelerated the performance of various work activities and facilitated the implementation of an integrated management system. During the management of non-conforming products in IMS supported by ICT, the company reacted more quickly and effectively solved the observed non-conformities.

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DOKUMENTOVANE INFORMACIJE U SISTEMU INTEGRISANOG UPRAVLJANJA

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Sažetak. Implementacija nekoliko odvojenih standarda sistema upravljanja podrazumijeva dupliranje mnogih aktivnosti, uključujući i potrebu za obimnom dokumentacijom. Dosadašnja praksa je pokazala da zaposleni često imaju neprijateljski stav prema tome. Integrisanje više sistema upravljanja u integrisani sistem upravljanja (IMS) donosi različite prednosti. Integrisanje utiče na skraćanje potrebnog vremena, opterećenje zaposlenih, efikasnije korišćenje tehničkih i finansijskih resursa, te isključuje potrebu za višestrukim prikupljanjem i obradom informacija, vodi ka smanjenju obima dokumentacije i sistem oslobađa od nepotrebne birokratizacije. Za kontinuirano poboljšanje IMS-a važno je da on bude podržan i / ili integrisan sa drugim programima. S obzirom na obim ulaznih i izlaznih elemenata tokom razvoja i primjene IMS, te obimnu dokumentaciju, značajnu podršku organizaciji mogu pružiti informaciono-komunikacione tehnologije (ICT). Razvoj ICT prije svega jeftinih hardvera, baza i softvera omogućio je lakše, brže i jeftinije prikupljanje željenih informacija i jednostavnije upravljanje velikim brojem dokumentovanih informacija (dokumentacije). U tom smislu u okviru ovog rada postavljen je cilj da se razvije integrisani informacioni sistem (IIS) koji će omogućiti brzo prikupljanje velikog broja informacija u svrhu preduzimanja adekvatnih mjera za praćenje efikasnosti sistema upravljanja. Polazeći od toga, u radu je uspostavljen IMS (QMS+EMS+OHSMS+ FSMS) u preduzeću iz oblasti mlinsko-pekarske proizvodnje i data su rješenja za povećanje efikasnosti sistema upotrebom ICT-a. Poseban akcenat dat je na razvoj i korišćenje dokumentovanih informacija u IMS i postupak upravljanja neusaglašenim proizvodima. Nakon toga, dobijeni model je integrisan sa informacionim sistemom. Tokom upravljanja neusaglašenim proizvodima u ovom slučaju preduzeće je reagovalo brzo, a uočene neusaglašenosti su efikasno otklonjene.

Glavne riječi: Integrisani informacioni sistem, Integrisani sistem upravljanja, Dokumentovane informacije