

Optimisation of the measurement and evaluation process through an information system

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Abstrakt

This paper deals with the digitalisation of production documentation and optimisation of measurement and evaluation processes through the DRM information system, its functionality and use. The business environment is constantly changing, shaping and adapting to market requirements. Due to these changes, it is becoming increasingly difficult to think predictively and strategically and identify future opportunities or threats. Among these changes' most recent and significant triggers, we can consider the global pandemic caused by the covid-19 disease, which highlights the essence and nature of IS and digitalisation more than anything else. The importance of information systems is thus to process data from a company's inputs to generate helpful information for managing business operations and processes.

Keywords: information systems, optimisation, digitisation, DRM information system .

1. Introduction

Information systems are now considered an essential element of the overall enterprise system. An enterprise system is a defined set of principles, practices and procedures applied to specific activities to achieve a particular result. It is a whole oriented towards corporate goals, comprising its components. The components of an enterprise system can include everything that inherently contributes to the achievement of the goals and purpose of the business, such as employees, management, transformation activities, processes, directives, instructions, corporate policy, culture, and others. Nowadays, we can also include information systems among the components of an enterprise system.[4]

Along with the economic growth of a company, its size and organisational structure grow, and specific functions and specialised departments are created. The approach of one comprehensive information system is impossible, and it is necessary to specify and adapt information systems to particular departments with the functionality needed with an appeal to maintain the possibility of mutual communication of these IS. Information systems can be divided according to many criteria. The division of the IS of the enterprise from the perspective of production and sales [1]:

- ERP - Enterprise Resource Planning - integrated IS, represents the core of the enterprise information system and includes the integration of production, logistics, finance and human resource management departments.
- SCM - Supply Chain Management - information system for the supply chain management.
- CRM - Customer Relationship Management - information system for customer relationship management.
- MIS - Management Information System - Management Information System.

Classification of business information systems [1]:

- Operational management, streamlining day-to-day operations.
- Tactical management processes semi-structured data and includes management information systems.
- Strategic management, decision support system and management support system.

Implementing IS into a company's core is a complex process requiring human capital, financial resources, and project management essentials. Implementing such systems must be in the hands of sufficiently qualified experts with the organisation's cooperation that specifies the system requirements. Such implementation will result in a functional IS that meets the needs and desired functionality of the organisation. Thus, the primary step in IS implementation is forming a project team. The team should be built so that all the requirements of an influential section are met and all the competencies of the team roles are present. The team's formation depends on the IS implementation procedure chosen. The couple may consist of purely internal company employees, company employees and external experts or purely external resources and hence complete outsourcing of the implementation. Suppose the company does not have sufficient IT background. In that case, the ideal way is to form a team consisting of internal employees and external experts where the experience and knowledge of IS implementation and the knowledge and requirements of the organisation complement each other [2].

2. Method

The DRM information system, digital release management, is used to trace and release production orders in the production process based on the fulfilment of system-defined requirements, collect and store data, create reports and analyses and, last but not least, serve as a means of digitising several processes. DRM is a web-based application for documenting, releasing and archiving the release of the first part and the quality control of the last detail. The main focus is on continuous data management without system downtime and on so-called paperless production. The release of processes and production is regulated by an internal instruction that describes the rules and the correct procedure for releasing a machine or process for the last part of inspection and documenting the release process in the paper and electronically in the DRM application. The application allows transparent and traceable handling of claims while offering the possibility to quickly and easily access and use existing data for further analysis.[5]

The company's DRM information system supports:

1. Data logging and archiving.
2. The approval and release process.
3. Communication.
4. Paperless production.
5. Reporting and analysis.

The main benefits of a DRM information system include digitisation and its multiple aspects, quality improvement by eliminating human error and, last but not least, consideration of sustainable, socially responsible business aspects in the context of the environmental environment by achieving paperless production. The main benefits of the implementation of this system can therefore include:

1. Elimination of human error.
2. Digitisation of the process.
3. Data archiving and processing.
4. Reduction of environmental burden in the form of paperless production.
5. Reduction in the labour intensity of production preparation.

Focusing on the processes before implementing this system, we observed significant waste in material and human resources and their capacities. Unique production documentation was printed for each production order, including drawings, inspection manuals, inspection cards and release letters. This documentation travelled through the entire transformation process with the contract and had to be archived at the end as it was an audited process. Such archiving requires large premises with significant capacity and increased human resource requirements. The implementation also ensured the elimination of human error, as the measured data is electronically recorded in the system, which decides to release the contract for the following process based on the normative values. Unlike paper-based release, there can now be no situation where an employee enters values that fall outside the prescribed tolerances and releases such an order for further processing, either through error or inattention. The DRM IS will automatically evaluate the measured values outside the tolerances and alert the employee. Further, necessary steps (release with reservation or approval by the supervisor) are required for the release. In addition, the system allows the archived data to be manipulated. Different filters based on other keys are available, making the system suitable for creating analyses and reports that aid decision-making.[6]

For the proper functioning of the IS DRM, it was necessary to treat all operations that required release with a control manual or control plan. Such a document is handled by the quality planner of the segment and is assigned to the individual work operations via SAP under the key ZQ. The paper contains information on test parameters, tolerance values, means of measurement, measurement frequencies, sample sizes and necessary documentation. This document is then automatically converted from SAP to DRM; based on it, the operator performs a parts inspection. The values are then entered into the DRM system, which decides on the release or alerts the operator to deviations. The documentation may also include an error summary card, which records the parameters checked and their results, but this is in non-digital, paper form. The DRM also records which operator released, which operates under the employee's unique personal number.

3. Results

The questionnaire was administered to a selected segment of the industrial enterprise. The chosen part belongs to the components produced for the automotive market. The main products of the piece include bearings. The element has a range of technologies from turning, drilling, and heat treatment to grinding of height, surface and bore, honing and subsequent assembly with packaging. IS DRM was implemented on the segment. Thus, active users have been working with it for some time, so the piece was selected for questionnaire processing. The questionnaire was directed only to IS DRM users with user rights and was processed at the turning, hardening and grinding technology centres. 34 out of 52 setters responsible for releasing parts in this IS participated in the questionnaire, representing 65% of the total number of setters on the segment. Most of them also took the opportunity to comment on the system. The HOS8 questionnaire is an analytical method for evaluating an information system. It is processed before the actual implementation of the IS, and the result of this analysis is a report on the IS balance and summary status. This method of IS DRM analysis was chosen because it can provide summary information on the level of even an already implemented IS and valuable data for further development. A total of 8 investigated areas are evaluated: hardware, software, Edgware, peopleware, Dataware, customers, suppliers, and IS management. [3]

Within the methodology of analysing IS DRM by this method, the importance of this IS for the company has been determined to a value of $v = 0$ out of the possible values -1, 0 and 1, where v = the importance of the IS for the company. This value indicates that the IS under study is essential to the company's operation. Still, its short-term failure will not significantly affect the company's operations, profitability, or customer satisfaction. Subsequently, the company's competent persons answered the questionnaire, and the investigated areas were rated based on a conversion table. This resulted in an average rating for each size ranging from 1 to 5, a description of the scores achieved for the examined regions is available in Table 1.

Table 1. Significance of the values of the investigated areas of HOS 8

Nominal value - ui	Status of study areas
5	Very high level of the study area
4	High level of the study area.
3	Middle level of the study area.
2	Low level of the study area.
1	Very low level of the study area.

Table 2. Evaluation of the HOS 8 questionnaire domains [3]

<i>Area</i>	<i>Shortcut</i>	<i>Rating</i>
Hardware	HW	3
Software	SW	4
Orgware	OW	4
Peopleware	PW	3
Dataware	DW	4
Customers	CU	3
Suppliers	SU	4
IS management	MA	4

Based on the analysis results, the aggregate status of the DRM IS is 3, referring to Table 2; this is a medium level of IS. The medium IS level is satisfactory for an IS with normal importance, and its importance $v = 0$. A higher aggregate status level could indicate inefficient spending. Based on the HOS 8 analysis, the balance of the examined IS was also found. Only two adjacent values of 3 and 4 in the studied areas, and one of them, 4, prevails. The DRM IS is therefore balanced. A graphical representation of the evaluation of the HOS 8 analysis is shown in Figure 1.

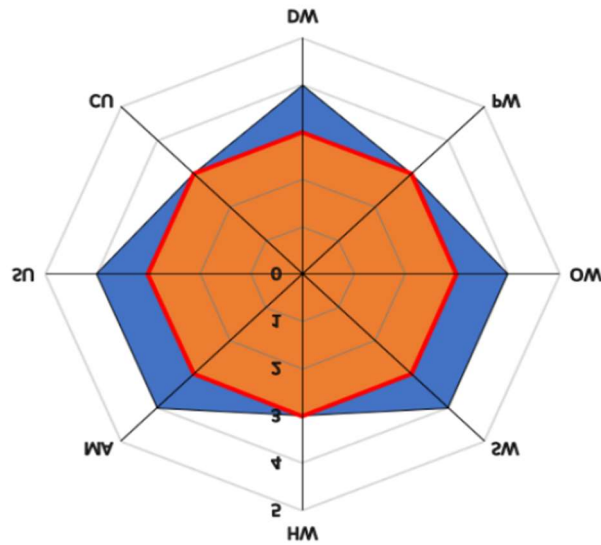


Figure 1. Graphical representation of the evaluation of IS DRM analysis using the HOS 8 method [3]

The analysis of IS DRM by the HOS 8 method was performed on a selected segment of an industrial enterprise. The relevance of IS DRM to the enterprise was set at the level $v = 0$, representing this IS as important but not tribal to the operation of the enterprise. Based on this significance value, the IS DRM should have an aggregate status of 3, representing a medium level of the areas under study. As a result of the HOS 8 analysis, the aggregate rate of the IS was set to 3, and we can also consider the DRM IS balanced. The lowest rating, 3, was achieved by IS DRM in the examined areas of HW, PW and CU. HW represents the physical equipment of the IS and its reliability, PW represents the users of the IS about the development of their capabilities, their support in using the IS and their perception of its importance, and CU, where the subject of the examination is what the IS is supposed to provide to customers and how this area is managed.

4. Discussion

Based on the evaluation of the HOS 8 questionnaire and its results in the investigated areas of PW and CU, it is proposed to optimise the process of training IS DRM users by dividing the training process into five stages and changing the methodology of the activity itself.

- Stage 1 - preparatory stage.
In the pre-implementation phase, hold a kick-off meeting with the department where the IS is to be implemented. It is necessary to familiarise both parties with the initial information and define the requirements and conditions. This stage also includes preparing the actual training in the form of HW, SW, system treatment, granting permissions to new users or even the treatment of the production contract required for the activity.
- Stage 2 - the training itself.
The actual training will occur directly in production during the morning shift at the specific centres of the new IS DRM users. Such production is equipped with IPC and industrial personal computers. Thus, the training will be on a particular machine in the show. The employees will operate the IPC with the DRM information system active, assisted by the trainer. They will thus have the opportunity to test the information system immediately and react to its operation or be active during the training.

- Stage 3 - Scrolling.
The information and knowledge acquired during this stage are rolled and passed on between work shifts. Data selling takes place with the assistance of competent persons, and it is possible to contact the persons responsible for DRM implementation at any time to consult discrepancies. If necessary, an individual or group training session will be arranged for the 2nd or 3rd shift, respectively, one week after their rotation.
- Stage 4 - evaluation and resolution of critical situations.
In Stage 4, the training that has taken place is evaluated and commented on. They are considered by new users of IS DRM, who, in addition to the possibility of evaluating and commenting on the training itself, also have the opportunity to comment on the IS DRM itself with time after the training. Stage 4 is also intended for solving critical situations during the training, e.g. for specific reasons the staff was not trained, HW, SW not working, long-term sick leave, etc.
- Stage 5 - Process setup and continuous improvement.

5. Conclusion

The proposed improvements are evaluated based on many factors. One of the most important indicators is the economic evaluation. In addition, proposed improvements can also be assessed in the context of the benefits or gains to the industrial enterprises - their processes and employees. As this is an IS that is implemented globally in several industrial companies and their subsidiaries, the big positive is that the proposed improvements can be applied globally. The flow of data when deviations are detected works from the individual subsidiaries towards the headquarters responsible for implementation, while the flow of actions from the seats also goes back to all relevant companies. The great benefit of this system is the prevention of the creation and elimination of deviations in the IS DRM globally. If a deviation and error arises in one company and needs to be addressed systemically, it is dealt with centrally. If the variation is relevant for other enterprises, the application of the central department's solution is directed to all of them, and thus the creation of deviations is prevented.

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