IT Application Evaluation at the University Clinical Hospital in Opole: Criteria Selection and Classification

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Abstract: The article concerns the evaluation of the software comprising the hospital information system (HIS) in the University Clinical Hospital in Opole. It proposes an approach based on the evaluation of the impact of a given software on the supported process, as well as presents the method of selecting and determining the significance of the criteria. In order to achieve these goals, the knowledge and expertise of hospital employees, who use the software in their everyday tasks, was used. These are people involved in medical and administrative side of the hospital's operation, with different medical and technical competencies. Therefore, for each of the criteria, questions were formulated to enable them to address technical issues using the commonly understood Likert scale. Tapping into knowledge of hospital staff enabled the authors to take the organisational perspective into account in the evaluation of the HIS. Thus, the presented article is not an evaluation of IT solutions, but an evaluation of the usefulness of a product, such as an IT application, for the organisation. This evaluation leads to decisions regarding the planning of the development of HIS. The study presented in the article was carried out at the University Clinical Hospital in Opole, which is why the detailed results pertain to this organisation. However, an evaluation approach based on the knowledge of employees is universal, as it enables evaluation of the actual adaptation of the software in question to the needs of the users, their skills and the specificity of the hospital's work, rather than the level and advancement of the software. Another important aspect is a proposition of dividing the set of evaluation criteria into two categories. The first one includes criteria for assessing the impact of software on the quality of the associated process. The second concerns the criteria that are important for assessing the impact of software on process efficiency. This enables making decisions regarding the planning of the development of HIS, taking different priorities into account. For example, for software related to medical processes, process quality is more important than efficiency, which in the case of administrative processes loses its importance in favour of efficiency.

Keywords: IT applications, HIS (hospital information system), evaluation, criteria, knowledge acquisition

1. Introduction

There is significant and growing impact of information technology on our everyday life. This issue is hardly visible in one of the significant its aspects, namely healthcare. Because of this, hospitals in Poland and in other countries are faced with the significant challenges connected with the restructuring of their IT systems. The University Clinical Hospital in Opole also faces the same challenge. It is strictly connected with significant capital expenditure and reorganisation. Because of this fact every issue has to be prudently planned in order to prioritise the changes in connection with organisational needs and assure their compliance with strategy of organisation's development. Carrying out such plans necessities evaluation of software currently used by the organisation, taking into consideration its functionality in the short, medium and long terms. In this context the goal of the paper is to show the way in which such evaluation can be done. This process includes among others selection of criteria, the method of obtaining information from users. This applies to the issues of acquiring and processing knowledge.

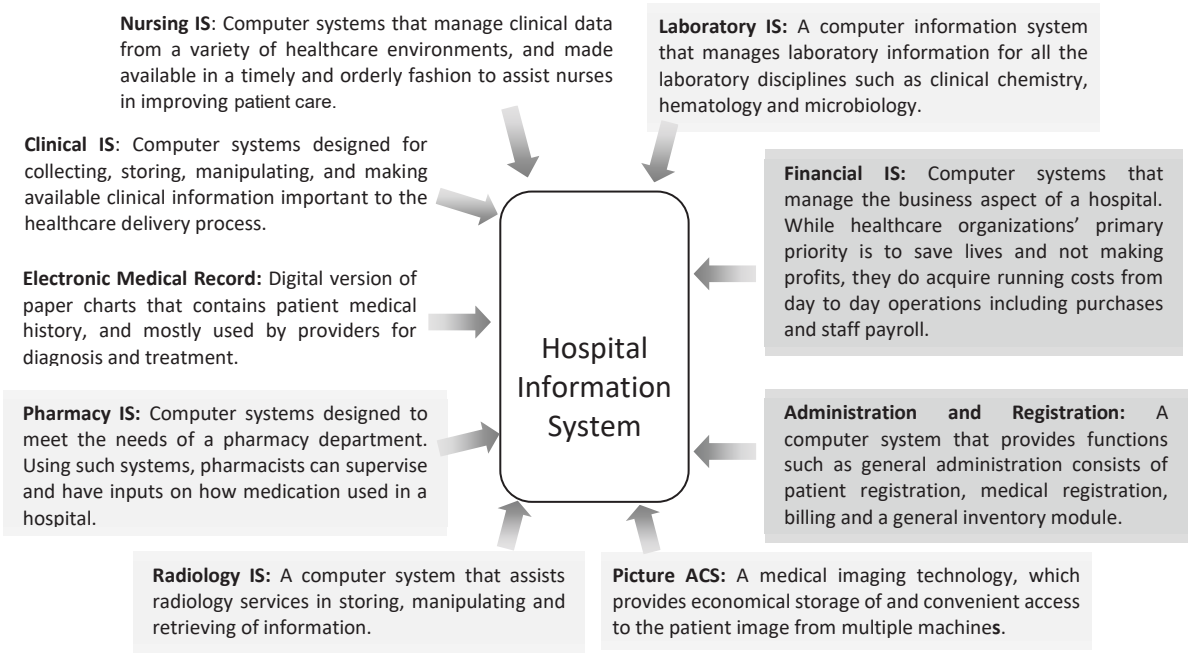
IT applications support numerous functional areas of the hospital such as patients' management, or realization of medical procedure. Because of this the procedure of their evaluation must take into consideration their diversity, but also the main tasks expected from computer systems support such as quality and productivity improvement. This requires acquiring and analysing knowledge from various areas of the functioning of the hospital. Knowledge refers to the ways that information can be made useful to support a specific task or make a decision (Stair, Reynolds 2010). This is all the more difficult, since it concerns mostly tacit knowledge, which includes, among others, the impact of IT systems on the processes carried out by the hospital. In order to make rational decisions regarding the implementation, maintenance, improvement and removal of elements of the hospital IT system, this knowledge should be systematically collected, collated and analysed.

The aim of the article is to present the procedure of acquiring knowledge enabling the selection and determining the significance of criteria for the evaluation of software comprising the HIS (Hospital Information System) at

the University Clinical Hospital in Opole (UCHiO). In order to carry out the study, the authors tapped into the knowledge of hospital staff acquired during brainstorming sessions and using questionnaires. As a result of the conducted research, 12 criteria divided into two groups were identified. The first group includes criteria for assessing the software used in order to assess its impact on the quality of the supported process. The second group of criteria concerns the impact of the application on the efficiency of the process. For each criterion, questions have been identified to facilitate the acquisition of knowledge from hospital staff who use specific software solutions in their daily tasks. Questionnaires were also prepared to determine the relevance of the criteria within the different software classes of the HIS. These classes were enumerated in the following section of the article, which also covers issues pertaining to the growth of the importance of HIS in the activities of hospitals. The third section of the article explains the research methodology. The following sections – fourth and fifth – present the results of the study carried out at the UCHiO. The fourth section presents a set of criteria and questions, which were developed to tap into the knowledge of hospital staff in order to assess the various elements of HIS, while section five presents the results of a study on the relevance of the criteria. The summary points out the contribution of the study to the theory and practice of healthcare management and the significance of the presented issues in the broadly understood field of HIS development planning in hospital operations.

2. Issues pertaining to hospital information systems

Technological and medical progress and social changes are making hospitals more and more complex. The introduction of information systems (IS) significantly impacts the management of patient care, since it opens up new opportunities for accessing information and thus for more efficient use of staff and equipment. This in turn results in the efforts of hospital managers to develop effective hospital information systems (HIS). The Hospital Information System (HIS) is a computer system aimed at providing a paperless environment that covers all aspects of the hospital's operation such as clinical, administrative, and financial systems (Nilashi, et al 2016). The aim of the HIS is to achieve the best possible support of patient care and administration by electronic data processing. The key task of HIS is to use computer equipment and transmission to record, store, process and make information relating to the patient's medical service, as well as administrative and financial data available to authorised users. The information should be available at the place and time where they are needed and in the format in which they are expected (Haux et al 2004). While developing an effectively functioning HIS, one should remember to integrate its various elements, as shown in fig.1.



Source: Adapted from (Masrom, Rahimly 2015)

Figure 1: Hospital Information Systems Integration Model

Information systems applications have contributed to better health service management and delivery of care by creating an environment conducive to increased access and quality of patient care and by supporting the knowledge base required for clinical and administrative decision making. The functioning of the hospital is

therefore highly dependent on its HIS and allows it to meet the requirements of patients and other stakeholders (Sołtysik-Piorunkiewicz 2014).

One of the most important challenges faced by healthcare, in addition to reducing medical errors and innovation, is improving process quality and reducing costs (El Morr, Subercaze, 2010). The reality of Polish hospitals is all the more difficult, because they have been struggling with a shortage of medical staff for several years (Nieszporska, 2017). Information technology (IT) has the potential to improve the quality, safety, and efficiency of hospital processes. Moreover, in the healthcare sector, one can see a departure from the reactive, doctor-centred model of care to one that is more patient-centred and that consistently delivers accessible, high-quality and safe care to all. The implementation and use of IT solution in healthcare includes various challenging organisational aspects in terms of the structure of healthcare organisations, tasks, people policies, incentives, and information and decision processes (Lluch 2011)

One of the limitations of the pace of implementation of IT technology in the hospital information system (HIS) is the accompanying financial risk and the need for radical organisational changes (Cresswell et al 2014). There is also a fear of choosing solutions characterised by poor usability, functionality and performance that may even introduce new threats to patient safety, such as inputting a wrong dosage of a drug or making a diagnosis based on wrong premises (Koppel, 2005). What is more, hospital IT systems should be better adapted to the skills and requirements of their users. Among others, Martikainen et al (2012) claim that it is difficult to find the previous patient records because the search functions in the ICT systems and their usability are poor. Physicians and other healthcare professionals have difficulties in finding the relevant data on time, they do not know what kind of data to search for, and they are critical towards ICT in general. Therefore, when assessing HIS, it is important to make an effort to understand and include the wide range of stakeholders who use them (Dagroso et al 2007).

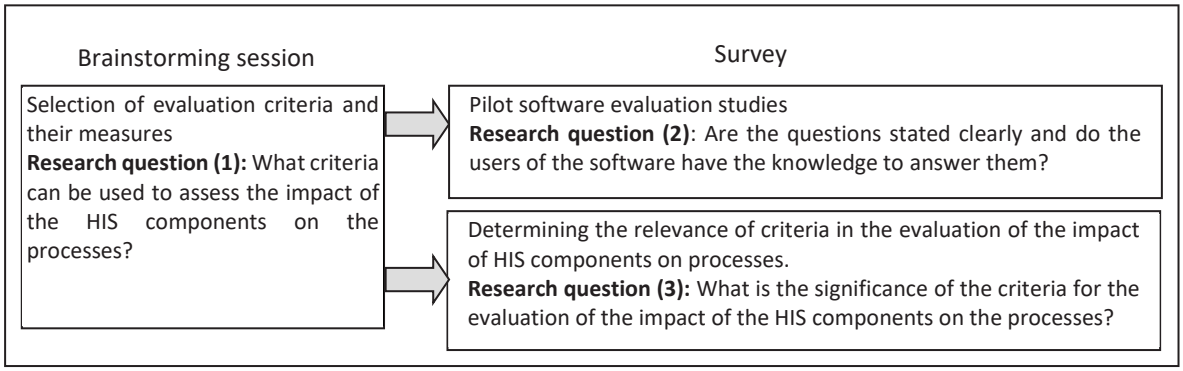
Hospital managers face the challenge of selecting HIS applications that meet the needs of a multidimensional and multifaceted organisation, taking into account the needs of patients and various types of specialists. This, in turn, requires working out an approach to knowledge management regarding the vision of future objectives of technological changes and the organisation's potential to implement IT solutions. KM is described as the process of creating, sustaining, applying, sharing, and renewing knowledge of an organization to improve performance and value creation (Grimaldi et al 2012). The most important problem in creating an effective knowledge management system in a hospital is communication and understanding problems between ICT professionals and healthcare professionals (Martikainen et al 2012). Hospitals are structurally complex organisations. Due to that fact, as well as the diversity of processes and organisational culture, effective implementation of a knowledge management system is not easy, as shown by various studies (Hyun-Sook 2017) (Yan et al 2018). Therefore, hospital organisations need to understand organisational structure, culture, and systems to successfully implement KM solutions.

3. Research methodology

The article is based on a case study conducted in March 2019 at the UCHiO – the best hospital in the region, which ranked 23rd in the 2018 Hospital Ranking among all the Polish hospitals. It has more than 400 beds in different wards and offers specialist inpatient and outpatient care. The hospital is developing very dynamically due to numerous factors, in part thanks to the opening of medical studies in Opole in 2016. The implemented changes require the review and development of HIS components in order to better support the processes and enable the use of knowledge in educational processes. The study constitutes an initial phase of a project, which comprises planning the long-term development of HIS in UCHiO. The study structure is shown in fig. 2.

The study, which serves as a basis for this article, concerned the issue of assessing the software in terms of its impact on the processes carried out in the organisation. It was divided into three stages. The first one concerned the definition of a set of criteria enabling the evaluation of software used at the UCHiO. It was carried out during two 30-minute brainstorming sessions, attended by IT department employees and the director of the UCHiO, as well as scientists from the Opole University of Technology. During the first one, criteria were proposed, along with some questions corresponding to the aforementioned criteria. During the second one, the participants limited the set of criteria and questions in order to make the evaluation relevant to the strategic objectives of the hospital. The idea of the first stage of the study was to establish a set of criteria and reference points universal enough to be used in the evaluation of software performing various functions – in the administrative and clinical areas of the hospital.

Case study: evaluation of HIS elements based on supporting processes at the UCHiO. Research question: to what extent does the existing software support the processes carried out at the UCHiO?



Source: Own elaboration

Figure 2: Structure of the study concerning the selection of criteria for the evaluation of HIS components at the UCHiO

The second stage of the study comprised a pilot survey carried out using a Google form. A decision to use the Likert scale with options: strongly disagree, disagree, neither agree nor disagree, agree, strongly agree for the majority of questions was made by the authors, who expanded the set of available responses to include the option "not applicable", in order to ensure that knowledge is gathered only from people who have the required expertise. Questions at which the respondent indicates a lack of knowledge will be ignored in the evaluation. The aim of the second stage was to determine whether the questions had been formulated clearly and whether their respondents had sufficient knowledge to answer them. The questionnaire was filled in by 10 people from different areas of the hospital, covering different elements of HIS.

The third step concerned defining the weights of the criteria and the relevance of the evaluation points within the criteria. It was carried out on the basis of a questionnaire prepared using a Google form. Two questionnaires – 'basic' and 'extended' – were used in the study. The basic one concerned only the indication of the ranking of criteria separately in the evaluation of the impact of software on the quality and the impact of software on the efficiency of the processes. The extended questionnaire, on the other hand, included the allocation of weights for reference points within each questionnaire, which was discussed in more detail in Section 5 of the article. The basic version of the questionnaire was filled in by 27 people, of which 12 also filled in the extended version. This represents about 30% of the target number of respondents for the HIS components selected for the study.

4. Defining the criteria for the evaluation of the HIS components

Healthcare Information Technology (HIT) is seen in Poland and worldwide as a way to improve quality and costs measures of medical services in all entities that provided such services (Chluski, 2016), (Jha et al, 2008). During the evaluation of the software on the basis of its impact on the processes, it was decided to distinguish two groups of criteria. The first one concerns the quality of the process, while the second one concerns its efficiency, understood as the ratio of the results achieved through the use of the HIS component to the expenditures related to the maintenance of said software. Table 1 presents selected criteria for software evaluation in terms of their impact on the quality of processes. Table 2, on the other hand, indicates the criteria that relate to the impact of software on the efficiency of the supported processes. The criteria presented in the tables most often refer to several issues, which is why they were linked to various questions, enabling the authors of the study to obtain knowledge from the users of a given type of software. Due to the multiplicity and variety of HIS system components used at the UCHiO, we decided to conduct a survey using a Google form, with the title of the survey indicating which HIS component is being evaluated. Both tables show the scale of response used to assess the impact of software on the process against a specific criterion.

Table 1: Criteria for assessing the impact of a given software component on the quality of the process along with survey questions and the scale of responses

Criterion for assessing the impact of software on the quality of the process.	Questions aimed at gaining knowledge about the impact of software on the quality of the process.	Scale of responses.
Security of information used in the process (C1)	Q1.1. Oprogramowanie zapewnia poufność danych i informacji o pacjencie.	Likert scale + "not applicable" option
	Q1.2. The strength of the user authentication mechanisms used in the software is satisfactory.	Likert scale + "not applicable" option
	Q1.3. The application guarantees that the data have not been changed or deleted in an unauthorised manner.	Likert scale + "not applicable" option
	Q1.4. Data backup is automatic and disaster recovery is prompt and fast.	Likert scale + "not applicable" option
Is the application easy to use? (C2)	Q2.1. How long did it take you to familiarise yourself with the system at a basic level?	Estimated number of hours: natural number
	Q2.2. The graphic design of the application is clear.	Likert scale + "not applicable" option
	Q2.3. The application offers efficient help mechanisms.	Likert scale + "not applicable" option
	Q2.4. The use of the application significantly shortens the time required to carry out the process.	Likert scale + "not applicable" option
	Q 2.5. How many language versions of the application are available?	Natural number
	Q2.6. Number of necessary consultations with IT specialist or another employee on a monthly basis.	Natural number
Resistance to human errors (C3)	Q3.1. The application has efficient prompts and auto-completion mechanisms.	Likert scale + "not applicable" option
	Q3.2. The application identifies and signals uncommon values.	Likert scale + "not applicable" option
	Q3.3. The application eliminates the occurrence of deficiencies in documentation.	Likert scale + "not applicable" option
Reliability and efficiency (C4)	Q4.1. For how many hours is the application not available per month?	Number of hours: real number
	Q4.2. The application provides access to various statistics on failure rates.	Likert scale + "not applicable" option
	Q4.3. The speed of the application is satisfactory regardless of the load.	Likert scale + "not applicable" option
After-sales service (C5)	Q5.1. The level and availability of training courses is satisfactory.	Likert scale + "not applicable" option
	Q5.2. Average service time in case of failure.	Estimated time in hours
	Q5.3. The software vendor ensures the configuration of new hardware in a short time.	Likert scale + "not applicable" option
	Q5.4. The supplier has a good and well-established position in the market.	Likert scale + "not applicable" option
Integration (C6)	Q6.1. The application works correctly with other IT systems in the hospital.	Likert scale + "not applicable" option
	Q6.2. The logic of the application corresponds to the process carried out in reality.	Likert scale + "not applicable" option
	Q6.3. The software fully cooperates with the devices used in the process.	Likert scale + "not applicable" option

Source: Own elaboration

Table 2: Criteria for assessing the impact of a given software component on the efficiency of the process along with survey questions and the scale of responses

Criterion for assessing the impact of software on the efficiency of the process.	Questions aimed at gaining knowledge about the impact of software on the efficiency of the process.	Scale of responses.
Simplification of preparing documentation (C7)	Q7.1. The application offers ready-made text blocks and templates.	Likert scale + "not applicable" option

Criterion for assessing the impact of software on the efficiency of the process.	Questions aimed at gaining knowledge about the impact of software on the efficiency of the process.	Scale of responses.
	Q7.2. The application enables sharing patient data among medical personnel (reduction of data duplication).	Likert scale + "not applicable" option
	Q7.3. The application significantly speeds up the creation of standard documentation.	Likert scale + "not applicable" option
	Q7.4. The software enables effective use of a speech recognition system.	Likert scale + "not applicable" option
Convenient access to information (C8)	Q8.1. The software increases the readability of the documentation (also applies to redundancy of information).	Likert scale + "not applicable" option
	Q8.2. The software offers simplified patient identification, for example using biometrics.	Likert scale + "not applicable" option
	Q8.3. The software can be used via tablets or smartphones.	Likert scale + "not applicable" option
	Q8.4. The software enables visualising data, for example in the form of charts and tables.	Likert scale + "not applicable" option
Monitoring process costs (C9)	Q9.1. The software enables checking equipment utilisation.	Likert scale + "not applicable" option
	Q9.2. The software enables determining the use of materials in specific time periods and based on specific tasks	Likert scale + "not applicable" option
	Q9.3. The software has functions supporting the management of process costs, for example by signalling irregularities during the process or repeated tasks.	Likert scale + "not applicable" option
	Q9.4. The software enables statistical data analysis.	Likert scale + "not applicable" option
Readiness for providing e-services (C10)	Q10.1. The software enables sharing and sending electronic documentation.	Likert scale + "not applicable" option
	Q10.2. The software efficiently works with e-registration in the scope of planning and scheduling of tasks.	Likert scale + "not applicable" option
	Q10.3. The software allows for the remote placement of orders and collecting results.	Likert scale + "not applicable" option
Cost of operating the software (C11)	Q11.1. What is the annual cost of the license?	Real number
	Q11.2. What is the annual cost of software failures?	Estimated value: real number
	Q11.3. What is the annual cost of maintenance services?	Estimated value: real number
Availability of analytical functions and smart search (C12)	Q12.1. The software makes it easy to create reports.	Likert scale + "not applicable" option
	Q12.2. The software offers the option for advanced search and filtering information.	Likert scale + "not applicable" option
	Q12.3. The software offers ranking functions.	Likert scale + "not applicable" option
	Q12.4. The software has automatic process analysis functions to identify bottlenecks and unusual events.	Likert scale + "not applicable" option

Source: Own elaboration

5. Determining the weights of the criteria adopted for the evaluation of the HIS components at the UCHiO

When assessing the impact of HIS components on the processes carried out by the hospital, one should pay attention to their different specificity related to their functionality. In Section 3 of the article, we distinguished three separate groups of applications – supporting basic medical processes (1), supporting peripheral medical processes such as laboratory diagnostics, pharmacy, radiology (2) and supporting administrative and financial processes (3). In the initial phase of the study it was assumed that a reliable evaluation may require taking into account the differences between them. For this reason, Tables 3 and 4 compile the results separately for each software category.

The knowledge of the significance of specific criteria in the evaluation was acquired from employees with different technical competencies among all users. Therefore, in the basic questionnaires, users were asked to rank the criteria within the group on the impact of software on quality and separately within the group on the impact of applications on process efficiency. They ranked the choices by writing in "1" for the criterion they considered the most important and "6" for the least important one. Some respondents ranked some criteria ex aequo. The weight for the criteria was calculated using the sum of s_k points for each criterion (C_k) in the group calculated according to the formula:

$$s_k = \sum_{m=1}^{6} (6 - m) * l_{k,m} ,$$

where:
k – criterion number (1..6) for the group of criteria for assessing the impact of software on the quality of the process and (7..12) for the group of criteria for assessing the impact of software on the efficiency of the process.
m – a number indicating the place in the ranking assigned by the respondents;
$l_{k,m}$ – number of respondents, who indicated *m* rank for criterion C_k, for example the number of people, who ranked criterion C_9, namely the monitoring of process costs as the most important, assigning it rank 1.

The weights of the criteria used to assess the quality and the weight of the criteria regarding efficiency were calculated separately according to the following formulas.

$$w_{k\_quality} = \frac{s_k}{\sum_{k=1}^{6} s_k} ,$$

$$w_{k\_effectiv} = \frac{s_k}{\sum_{k=7}^{12} s_k} ,$$

where:
$w_{k\_quality}$-the weight of a k-criterion pertaining to quality
$w_{k\_effectiv}$- the weight of the k-criterion pertaining to efficiency

The users' knowledge regarding the significance of the questions for the evaluation of the software in relation to a given criterion was also collected. This extended questionnaire was provided only to the respondents who declared having knowledge enabling them to answer the questions asked. They concerned the percentage significance of the question for the evaluation of software according to a specific criterion. The significance of questions Q1.1-Q12.4. in the evaluation of criteria C1-C12 was determined as an average of the indications given in the questionnaires. Only those who declared their willingness to do so shared their knowledge in the extended questionnaires. The weights of the criteria and the relevance of the questions within each of them are shown in Tables 3 and 4.

Table 3: The weights of the criteria and the significance of the reference points used in the evaluation of the impact on the quality of: basic medical processes (1), peripheral medical processes (2) as well as administrative and financial processes (3)

Criterion	Weight (1)	Reference points (1)		Weight (2)	Reference points (2)		Weight (3)	Reference points (3)	
Security of information used in the process (C1)	0,26	Q1.1.	0,4	0,18	Q1.1.	0,4	0,14	Q1.1.	0,4
		Q1.2.	0,2		Q1.2.	0,2		Q1.2.	0,2
		Q1.3.	0,3		Q1.3	0,3		Q1.3	0,3

Criterion	Weight (1)	Reference points (1)		Weight (2)	Reference points (2)		Weight (3)	Reference points (3)	
		Q1.4.	0,1		Q1.4.	0,1		Q1.3.	0,1
Ease of use (C2)	0,21	Q2.1.	0,2	0,15	Q2.1.	0,2	0,20	Q2.1.	0,2
		Q2.2.	0,2		Q2.2.	0,2		Q2.2.	0,2
		Q2.3.	0,1		Q2.3.	0,1		Q2.3.	0,1
		Q2.4.	0,2		Q2.4.	0,2		Q2.4.	0,2
		Q2.5.	0,1		Q2.5.	0,1		Q2.5.	0,1
		Q2.6.	0,2		Q2.6.	0,2		Q2.6.	0,2
Resistance to human errors (C3)	0,17	Q3.1	0,3	0,13	Q3.1	0,3	0,16	Q3.1	0,4
		Q3.2	0,4		Q3.2	0,4		Q3.2	0,4
		Q3.3	0,4		Q3.3	0,4		Q3.3	0,3
Reliability and efficiency (C4)	0,17	Q4.1	0,3	0,12	Q4.1	0,3	0,16	Q4.1	0,3
		Q4.2	0,4		Q4.2	0,4		Q4.2	0,4
		Q4.3	0,4		Q4.3	0,4		Q4.3	0,4
After-sales service (C5)	0,06	Q5.1	0,3	0,20	Q5.1	0,2	0,15	Q5.1	0,2
		Q5.2	0,3		Q5.2	0,2		Q5.2	0,4
		Q5.3	0,2		Q5.3	0,4		Q5.3	0,1
		Q5.4	0,2		Q5.4	0,2		Q5.4	0,3
Integration (C6)	0,13	Q6.1	0,4	0,22	Q6.1	0,4	0,17	Q6.1	0,4
		Q6.2	0,2		Q6.2	0,1		Q6.2	0,4
		Q6.3	0,4		Q6.3	0,5		Q6.3	0,2

Source: Own elaboration

Table 4: The weights of the criteria and the significance of the reference points used in the evaluation of the impact on the efficiency of: basic medical processes (1), peripheral medical processes (2) as well as administrative and financial processes (3)

Criterion	Weight (1)	Reference points (1)		Weight (2)	Reference points (2)		Weight (3)	Reference points (3)	
Simplification of preparing documentation (C7)	0,28	Q7.1.	0,2	0,26	Q7.1.	0,4	0,23	Q7.1.	0,2
		Q7.2.	0,4		Q7.2.	0,4		Q7.2.	0,3
		Q7.3.	0,3		Q7.3.	0,1		Q7.3.	0,4
		Q7.4.	0,1		Q7.4.	0,1		Q7.4.	0,1
Convenient access to information (C8)	0,28	Q8.1.	0,3	0,23	Q8.1.	0,4	0,23	Q8.1.	0,3
		Q8.2.	0,3		Q8.2.	0,3		Q8.2.	0,1
		Q8.3.	0,2		Q8.3.	0,1		Q8.3.	0,1
		Q8.4.	0,2		Q8.4.	0,2		Q8.4.	0,5
Monitoring process costs (C9)	0,1	Q9.1	0,2	0,08	Q9.1	0,4	0,22	Q9.1	0,2
		Q9.2	0,2		Q9.2	0,2		Q9.2	0,3
		Q9.3	0,2		Q9.3	0,2		Q9.3	0,3
		Q9.4	0,4		Q9.4	0,2		Q9.4	0,2
Readiness for providing e-services (C10)	0,05	Q10.1	0,2	0,16	Q10.1	0,3	0,09	Q10.1	0,3
		Q10.2	0,2		Q10.2	0,3		Q10.2	0,4
		Q10.3	0,6		Q10.3	0,4		Q10.3	0,3
Cost of operating the software (C11)	0,1	Q11.1	0,2	0,11	Q11.1	0,2	0,14	Q11.1	0,5
		Q11.2	0,5		Q11.2	0,5		Q11.2	0,2
		Q11.3	0,3		Q11.3	0,3		Q11.3	0,3
Availability of analytical functions and smart search (C12)	0,18	Q12.1	0,3	0,15	Q12.1	0,4	0,10	Q12.1	0,4
		Q12.2	0,4		Q12.2	0,3		Q12.2	0,1
		Q12.3	0,1		Q12.3	0,1		Q12.3	0,3
		Q12.3	0,2		Q12.3	0,2		Q12.3	0,2

Source: Own elaboration

6. Conclusions

HIS is becoming an increasingly important factor in the performance of hospitals' tasks. What is more, the dynamic development of IT solutions indicates that the development of HIS should be planned in advance with due care. This requires determining whether the current software supports the processes in a satisfactory manner, as well as identifying its strengths and weaknesses.

The contribution of this article to the theory of healthcare management is drawing attention to the issues of acquiring knowledge to carry out the evaluation of HIS. The key issue for the authors was that both the selection of criteria and the determination of their significance should be based on the experience of the staff who use a given type of software on a daily basis. Such an approach, in contrast to external audit (carried out by a consulting company or another third party), enables the hospital to refer to the competencies and procedures existing in the organisation. It is difficult to claim that a system is good, if it is poorly evaluated by its users. The importance of the organisational context in the evaluation of HIS results from the complexity of entities such as hospitals, as well as their specificity. They differ to such an extent that the use of a universal evaluation template can lead to misguided decisions. The approach based on using employee knowledge in the evaluation of HIS has its limitations, due to the lack of an outside view of the organisation's needs. However, this can be compensated for by the participation of external experts. In the research conducted at the UCHiO, this concerned the stage of establishing a set of criteria for evaluation, in which the authors of the publication took an active part. Nothing stands in the way of extending this participation to subsequent stages. For practitioners carrying out such evaluations, it may be valuable to use the Likert scale to evaluate most criteria; however, with the awareness of its limitation in terms of the precision of indications. This approach made it easier to obtain knowledge from staff with less knowledge about technical issues, such as physicians, nurses and technicians, as well as administrative staff. What is more, such an approach also raises their awareness of the impact of software on their tasks and of the links between various components of the HIS system. Additionally, the knowledge gained from this group of employees has become a guideline for IT specialists allowing them to focus their search for new technological solutions that can be applied in existing systems. Thus, the use of employees' knowledge in software evaluation increases their knowledge about this issue.

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