Głód, G., Głód, W. Wolniak, R., and Jonek-Kowalska, I. (2025). The quality of IT systems and the competencies and training of employees in the process of implementing a new cost accounting standard in the hospital. *Administratie si Management Public*, 44, 94-113. https://doi.org/10.24818/amp/2025.44-06

The quality of IT systems and the competencies and training of employees in the process of implementing a new cost accounting standard in the hospital

Grzegorz GŁÓD[1], Wojciech GŁÓD[2], Radosław WOLNIAK[3], Izabela JONEK-KOWALSKA[4]

Abstract: The research aimed to evaluate the quality of IT systems supporting cost accounting in Polish hospitals and to elucidate the influence of employee competencies and training on this quality. Drawing on survey data from 52 large and experienced hospitals, descriptive statistics and rank correlation coefficients were employed to analyze the relationships between IT system quality and employee competencies and training support during the implementation of new accounting and management solutions. Findings revealed an average assessment of IT system quality, with integration performing well and user-friendliness for the new cost accounting standard rated poorly. Overall, employee competencies were deemed good, showing promise for effective implementation of the standard. However, training support, especially at the design stage, was rated poorly. The analysis unveiled positive and statistically significant relationships between IT system quality, employee competencies, and training support, albeit with moderate (for competencies) and weak (for training) strengths. The study underscores the necessity of adequately preparing IT systems, ensuring the acquisition of reliable financial data, and providing comprehensive and sustained training support for successful adoption of new accounting and management solutions in hospitals.

[1] Associated Professor, Ph.D., University of Economics in Katowice, Faculty of Economics, Department of Entrepreneurship and Management Innovation, Bogucicka 3a, 40-287 Katowice, Poland, e-mail: grzegorz.glod@ue.katowice.pl, ORCID number. 0000-0001-9699-2427

[2] Associated Professor, Ph.D., University of Economics in Katowice, Faculty of Economics, Department of Entrepreneurship and Management Innovation, Bogucicka 3a, 40-287 Katowice, Poland, e-mail: wojciech.glod@ue.katowice.pl , ORCID number. 0000-0003-1343-7597

[3] Full Professor, Ph.D. eng., Informatics and Economics Department, Faculty of Organization and Management, Silesian University of Technology, Roosevelta 26-28, 41-800 Zabrze, Poland, e-mail: rwolniak@polsl.pl, ORCID number 0000-0003-0317-9811.

[4] Full Professor, Ph.D., Informatics and Economics Department, Faculty of Organization and Management, Silesian University of Technology, Roosevelta 26-28, 41-800 Zabrze, Poland, e-mail: Izabela.Jonek-Kowalska@polsl.pl, ORCID number 0000-0002-4006-4362.

Keywords: cost accounting in hospitals; quality of IT systems in hospitals; competencies of hospital administrative staff; training support in hospitals

JEL: I18; L15; M48

DOI: https://doi.org/10.24818/amp/2025.44-06

Introduction

Cost management in healthcare entities is a particularly difficult task due to the dichotomous objectives of these organizations relating to the protection of human health and life and the need to optimize efficiency in the public sphere (Gapenski and Pink, 2025). Cost accounting is one of the instruments enabling reliable valuation of medical services and providing multi-aspect data on the costs associated with these services (Akhavan et al., 2016). This, in turn, enables rational strategic and operational decision-making and the search for cost reduction opportunities without deterioration of the quality of medical services (Javid et al., 2016; keel et al., 2017; Zerka and Jawab, 2020). Meanwhile, the literature on the subject lacks research on tools supporting the effective allocation of resources in health care, which is also highlighted by Barasa et al. (2017) (Barasa et al., 2017).

Taking into account the above circumstances, this article focuses on the assessment of three key aspects of the implementation of the new cost accounting standard in Polish hospitals (Głód and Głód, 2024). These include (1) IT systems enabling the digitization of accounting and financial solutions; (2) employee competencies necessary to properly handle the new cost accounting, and (3) training support ensuring understanding of the essence of the new cost accounting method and the reliability of its use. In the context of the scope of research presented above, the article's main goal is to assess the quality of the IT system supporting cost accounting and identify the role played by employee competencies and training in shaping this quality.

To achieve this goal, the rest of the article refers to the current research results in the analyzed area and presents the development of work on cost accounting in the Polish health care system. Then, the research methodology was presented, including survey research and the analysis of their results using statistical tools. In the last part of the paper, a discussion was held, the analyzes performed were summarized and recommendations were formulated for improving the cost accounting implementation process in hospitals.

Research on the implementation of new accounting and financial solutions in hospitals emphasizes the importance of using IT systems (Visconti et al., 2020; Henry et al., 2015; Prgomet et al., 2017) due to the complexity of goals, organizational structures and information accompanying the existence of these organizations (Dash et al., 2019). According to many researchers, they are an effective management tool supporting decision-making and improving operational

efficiency (Azevedo et al., 2022; Graban, 2018; Wielicka-Gańczarczyk and Jonek-Kowalska, 2023).

However, the effectiveness of IT systems depends on the competencies and skills of people participating in their design, implementation, and operation. For these reasons, implementing accounting and financial solutions requires employing staff with appropriate knowledge and experience in accounting and finance (Pihlainen et al., 2016; Kakeman et al., 2020; Ahmadi et al., 2015). Nowadays, digital competencies enabling understanding the operation of IT systems and their use are also equally important (Shiferaw et al., 2021; Nazeha et al., 2020; Koch et al., 2019). As pointed out by Kontila et al. (2019) (Konttila et al., 2019) in this context, collegian activities and organizational support at the hospital management level are important.

Moreover, any organizational change requires information and training of employees (Hornstain, 2015; Da Silva Nunes et al., 2019; Hospodkova et al., 2021). The knowledge and experience accumulated so far may turn out to be insufficient to understand the philosophy of operation of the new systems. It is worth involving employees at the stage of designing new solutions, and certainly preparing them well for their implementation (Bashir and Long, 2015). In accounting and finance, training on the principles of preparing analyzes and reports, which are a synthetic basis for making management decisions, is also important.

Considering the arguments presented above and previous literature studies justifying their importance, research on the assessment of the implementation of the new cost accounting standard in Polish hospitals focused on the quality of IT systems, employee competencies and training support as factors conditioning its effective implementation.

Before starting the research constituting this article's main axis of considerations, it is worth presenting the most important stages of implementing cost accounting in Polish hospitals. Thus, work on unifying the standard of cost accounting used in Polish hospitals has been ongoing for over 20 years. The first attempts in this regard were made in 1998, just after the transformation of the economic system from a centrally planned to a market one. Initially, the main focus was on cost classification, separating cost centers and developing cost drivers. The guidelines also presented assumptions related to the valuation of medical procedures (Regulation, 1998).

Activities to modify the proposed cost accounting solutions were continued in 2014–2015. Then, issues such as the cost of patient treatment, the cost of readiness to provide services, and the cost of unused resources were detailed. Moreover, according to the adopted recommendations in management accounting, two related systems were to function: a financial and accounting system and a controlling module (Regulation, 2015). However, the developed guidelines turned out to be difficult to implement in practice and were ultimately abandoned.

Work on the new cost accounting standard (which is the subject of considerations and research in this article) was resumed in 2019. The main assumptions of the new cost accounting standard include, first of all, the unification of generic accounts and cost centers. The records of used medical materials costs, medical and non-medical

services and remuneration costs have been detailed. An important change is the clear indication of the account numbers of cost centers in accordance with the classification of the departmental codes of the Ministry of Health. Another new solution is the method of using division keys for common costs in the medical and auxiliary parts. An important change in the new cost calculation is the clearly defined components of management costs and a uniform method of calculating the sales costs of a given medicinal product (Głód and Głód, 2024). The final effect of introducing the new cost accounting standard is also the presentation of the method of calculating the cost of the procedure and person-day (Regulation, 2020). The new guidelines apply to all healthcare providers who have concluded an agreement to provide healthcare services.

As already mentioned, the rest of the article focused on assessing the process of implementing the new cost accounting standard in Polish hospitals and three key determinants of this implementation. The originality of the analyzes presented in this area results from the following:

- Supplementing knowledge in the field of interactions between IT and accounting systems and human resources in healthcare organizations;
- A holistic view of the process of implementing new organizational solutions in hospitals;
- Conducting a practical assessment of the quality and role of IT systems, staff competencies and training support in the process of implementing new accounting and financial solutions in hospitals;
- Developing recommendations for improving cost management in health care, with particular emphasis on developing economies.

1. Methods

Principles of measuring the quality of IT systems and employee competencies and training support.

During the analyses, a survey was used for employees of Polish hospitals' financial departments. The main goal of the research was to assess the quality of the IT system supporting cost accounting and to identify the role played by employee competencies and training in shaping this quality. Taking into account the main goal formulated in this way, the following research hypotheses were verified during the research:

H1: There is a direct relationship between the level of employee competencies and the quality of the IT system supporting the new standard of cost accounting,

H2: There is a positive relationship between the level of training support in the process of implementing new cost accounting solutions and the quality of the IT system.

The above hypotheses result from the assumption of a positive impact of employee competencies and training on the understanding and ability to use accounting IT systems, and thus on the positive assessment and willingness to co-create the

implemented solutions. These assumptions were made based on the literature studies presented in the previous section.
The implementation of the main goal and verification of the hypotheses required the operationalization of three key variables included in the research, i.e.:

- Quality of the accounting IT system (Q_{IT});
- Competencies of financial department employees (C);
- Training support in the process of implementing accounting IT systems (T_S).

Thus, in assessing the quality of the IT system, the criteria regarding the capabilities (Q_1) and adequacy of data (Q_2) provided for the purposes of cost accounting were taken into account, which is a key condition for its effective operation. Moreover, this assessment also took into account the functionality of the system, which is usually determined by the integration of various IT solutions (Q_3) and the friendliness of IT systems for end users (Q_4). A high assessment of these features encourages the use of accounting IT systems and strengthens the sense of their implementation. All criteria for assessing the quality of IT systems in the surveyed hospitals, along with the survey questions used to identify them, are given in Table 1.

Table 1. Criteria for assessing the quality of the IT system in the hospital and survey questions used to identify them

Marking	Description	Survey questions
Q_1	The ability of the IT system to provide data needed to implement cost accounting.	Existing information technology is able to provide the necessary data for the new cost accounting standard.
Q_2	Accuracy and timeliness of data provided by the IT system.	The IT system typically provides data that is accurate and up-to-date.
Q_3	Integration of IT systems in various domains.	Our IT systems in various domain areas (financial and accounting module; costs module; HR and payroll module; warehouse management module, medical statistics module, pharmacy module, etc.) are integrated.
Q_4	User-friendliness of the IT system.	IT systems offer user-friendly query options for various audiences.

Source: Author's own research

The respondents assessed the individual criteria for assessing the quality of the IT system on a scale from 1 to 5, where: 1 – definitely yes; 2 – yes; 3 – hard to say; 4 – no; 5 – definitely no.

Then, the criteria presented in Table 1 were aggregated using the following synthetic indicator of the quality of the IT system:

$$Q_{IT} = \frac{\sum_{i=1}^{n} Q_i}{n} \quad (1)$$

where:
Q_i – the value of individual quality criteria from Q_1 to Q_4;
n – number of criteria from 1 to 4.

In measuring **employee competencies (C)** two dimensions were used. The first of them, of a strategic nature, referred to the education (C_1) and experience of the entity manager (C_2) and reflected the ability to understand, enforce and control the principles of operation of the IT system in cost accounting. The second operational dimension allowed for the assessment of education (C_3) and experience of employees (C_4) of the analysis and cost department. In this way, a holistic picture of employee competencies was obtained, taking into account both the important and inspiring role of the leader, as well as the knowledge and skills of employees directly involved in operating the IT system. The list of all competency criteria that are also survey questions is included in Table 2.

Table 2. Criteria for assessing employee competencies

Marking	Description/survey question
C_1	Level of education in the area of finance and accounting of the entity manager
C_2	Level of professional experience in the area of finance and accounting of the entity manager
C_3	Education level of employees of the analysis and cost department
C_4	The level of professional experience of employees of the analysis and cost department in cost accounting

Source: Author's own research

Individual criteria were rated by respondents on a scale from 1 to 5, with the following ratings: 1 – very low; 2 – low; 3 – average; 4 – high; 5 – very high.
Then, similarly to the assessment of the quality of the IT system, the assessment of staff competencies was aggregated into the following synthetic indicator:

$$C = \frac{\sum_{i=1}^{n} C_i}{n} \tag{2}$$

where:
C_i – the value of individual quality criteria from C_1 to C_4;
n – number of criteria from 1 to 4.

In the **assessment of training support (T_S)** – the third analyzed variable – three aspects relating to the subsequent stages of IT activation of cost accounting in the hospital were taken into account, i.e.: design, implementation, and preparation of analyses. Obtaining training support at each of the above-mentioned stages is very important because it allows you to learn and co-create the principles of the system, understand its operation, and recognize the need and decision-making usefulness of the information obtained through its use.
The list of all training criteria that are also survey questions is included in Table 3.

Table 3. Training support assessment criteria

Marking	Description/survey question
T_{S1}	Appropriate training was conducted in the design of the new cost accounting standard.
T_{S2}	Appropriate training was conducted on the implementation of the new cost accounting standard.
T_{S3}	Appropriate training was conducted on using the appropriate analysis system resulting from the new cost accounting standard.

Source: Author's own research

The respondents assessed the individual criteria for training support on a scale from 1 to 5, where: 1 – definitely yes; 2 – yes; 3 – hard to say; 4 – no; 5 – definitely no. Subsequently, the assessment of training support was aggregated into the following synthetic indicator:

$$T_S = \frac{\sum_{i=1}^{n} T_{Si}}{n} \tag{3}$$

where:
T_{Si} – the value of individual competency criteria from T_{S1} to T_{S3};
n – number of criteria from 1 to 3.

Research sample characteristics

The survey questionnaire was completed by representatives of 52 hospitals where the new cost accounting standard was implemented. Most of them were large entities employing over 500 employees. They were also characterized by a long period of operation, in many cases exceeding 50 years. The structure of the research sample in terms of the number of full-time positions and duration of operation is 48%
The selection of the sample was purposeful. Nevertheless, both the number, size and experience of the surveyed hospitals guarantee an advanced level of knowledge about the principles and systems of health care functioning in Poland.

2. Results

Assessment of the quality of IT systems in the context of cost accounting implementation

In accordance with the research concept presented in Figure 1, the first stage involved an assessment of IT systems in the surveyed hospitals. The values of descriptive statistics for individual criteria included in the assessment of this variable and the synthetic Q_{IT} index are presented in Table 4. Additionally, Figure 1 includes a histogram illustrating the distribution of holistic assessments of the quality of IT systems in the surveyed entities.

Table 4. Descriptive statistics for assessing the quality of IT systems

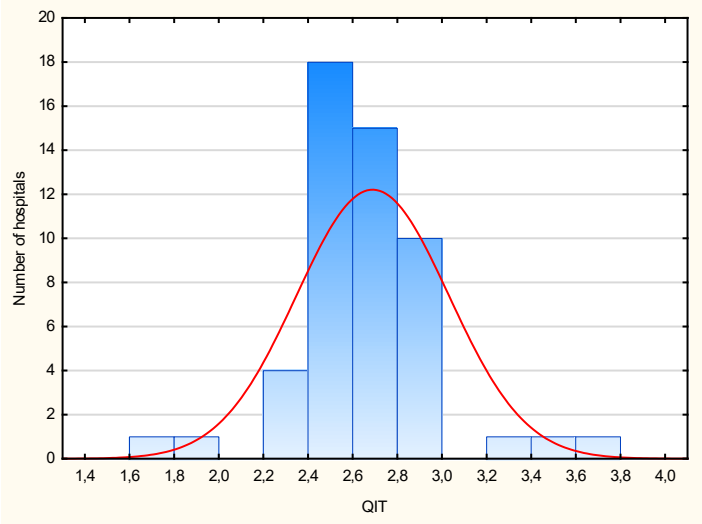
Marking	Description	Descriptive statistics				
		$\bar{x}$ (x)	D(x)	Min(x)	Max(x)	s(x)
Q_1	The ability of the IT system to provide data needed to implement cost accounting.	2.87	3.00	1.00	4.00	0.63
Q_2	Accuracy and timeliness of data provided by the IT system.	2.71	3.00	2.00	4.00	0.57
Q_3	Integration of IT systems in various domains.	3.02	3.00	2.00	4.00	0.46
Q_4	User-friendliness of the IT system.	2.13	2.00	1.00	4.00	0.60
O_{IT}	Synthetic assessment of the quality of IT systems.	2.68	2.50	1.75	3.75	0.34

Source: Author's own research

According to the data in Table 4, the respondents assessed the degree of integration of IT systems in the surveyed hospitals as the highest (Q_3) (the highest average), which could well indicate the technical background for the implementation of new information solutions, including the new cost accounting standard. Nevertheless, it should be remembered that the value of the obtained average (3.02), although it is the highest among the analyzed criteria, still indicates a quite low (average) assessment of the degree of integration of IT systems. However, due to the lowest value of the standard deviation, the respondents are quite consistent in their assessments of this criterion, and therefore the situation in many surveyed hospitals is similar.

The ability of the IT system to provide data needed to implement cost accounting (Q_1) was ranked second in the assessment of the qualitative criteria of IT systems, obtaining an average of 2.87 and a dominant score of 3.0. Such values, on the one hand, prove that there is a reliable basis for obtaining financial data within existing IT solutions, but on the other hand, they clearly indicate the need to expand and supplement IT systems with additional information. A rating below average does not guarantee trouble-free and immediate implementation of new cost accounting standards. The question also remains open about the impossibility of obtaining certain data due to the insufficient degree of integration of IT systems (see the rather low score for criterion Q_3).

Figure 1. Histogram for assessing the quality of IT systems in the surveyed hospitals



Source: Author's own research

Interestingly, however, that due to the highest value of the standard deviation and the range, the ability of the IT system to provide the data needed to implement cost accounting (Q_1) may vary quite significantly in individual entities. This implies the need for an individual approach to assessing the possibility of implementing new cost accounting solutions.

Unfortunately, the respondents also assessed the accuracy and timeliness of the data provided by the IT system (Q_2) quite poorly (average 2.71). This means that data obtained as part of existing IT solutions would require additional verification, because the reliability of the data used is a key condition for the effective implementation of cost accounting and the correct valuation of medical services.

The lowest rated qualitative criterion of IT systems was the friendliness of the IT system interface. The values of the average of 2.13 and dominant of 2.00 indicate a very poor perception of this aspect, which may have a negative impact on the effectiveness and efficiency of IT systems operation by financial and accounting departments. An unfriendly, and therefore perceived as "hostile" IT interface may not only discourage current activities, but also inhibit the implementation of any new cost accounting standards.

Assessment of employee competencies in the context of cost accounting implementation

In the second stage of the research, hospital employees' accounting and financial competencies were assessed, which constitute significant support in implementing the new cost accounting standard. Table 5 and Figure 2 present the value of descriptive statistics for employee competencies, taking into account the management and operational levels.

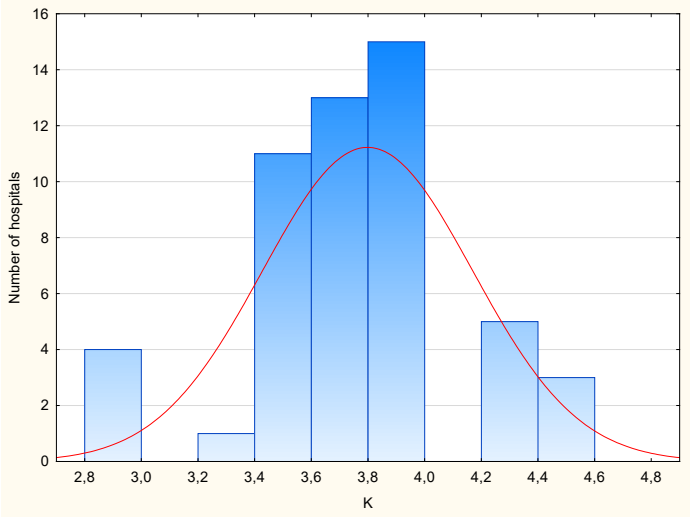
Table 5. Descriptive statistics for assessing employee competencies

Marking	Description	Descriptive statistics				
		$\bar{x}$ (x)	D(x)	Min(x)	Max(x)	s(x)
C_1	Level of education in the area of finance and accounting of the entity manager	3.79	4.00	2.00	5.00	0.67
C_2	Level of professional experience in the area of finance and accounting of the entity manager	3.85	4.00	2.00	5.00	0.61
C_3	Education level of employees of the analysis and cost department	3.81	4.00	3.00	5.00	0.56
C_4	The level of professional experience of employees of the analysis and cost department in cost accounting	3.73	4.00	2.00	5.00	0.63
C	Synthetic assessment of employee competencies	3.79	4.00	3.00	4.50	0.37

Source: Author's own research

According to the above data, in most of the hospitals surveyed, both the competencies and education of employees at both levels surveyed were rated as good (dominant 4.0; arithmetic mean above 3.7). The obtained individual assessments translated into a holistic assessment of the accounting and financial competencies of the employees of the surveyed hospitals amounting to 3.79 (dominant 4.0).

Figure 2. Statistics for assessing employee competencies



Source: Author's own research

In the context of the above results, it can be concluded that the employees of the surveyed hospitals are well prepared to implement the new cost accounting standard in terms of content. They have a good level of knowledge and experience in accounting and finance, which, as it was emphasized, significantly affects not only the understanding of the principles of operation of this standard, but also strengthens the will to implement and use it in everyday practice.
It is also worth adding that in the case of entity managers, experience was rated higher than education. In the case of analysis department employees, experience was valued lower than education, which is most likely due to the shorter work experience of operational employees.
The differences indicated above are also visible in the values of the range and standard deviation, which are the highest depending on the education of entity managers and the experience of analysis department employees. This means that the surveyed group includes directors who have no knowledge of accounting and finance and employees with very little analytical experience in this area. Therefore, the identified competency gaps may interfere with the implementation of the new cost accounting standard in a certain (less competent) group of hospitals. The histogram in Figure 5 shows that this group in the study sample consists of 5 hospitals, i.e., approximately 10% of the entities.

Assessment of training support in the cost accounting implementation process

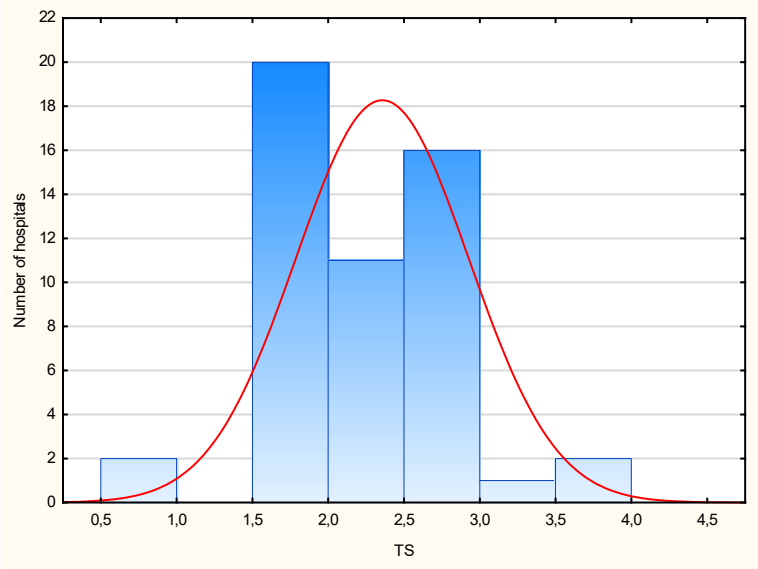
The third stage of research focused on another element determining the effective implementation of the new cost accounting standard, which is employee training. Descriptive statistics for training support taking into account 3 phases of implementation of new accounting solutions and a holistic evaluation of training are presented in Table 6 and Figure 3.

Table 6. Descriptive statistics for training support

Marking	Description	Descriptive statistics				
		$\bar{x}$ (x)	D(x)	Min(x)	Max(x)	s(x)
T_{S1}	Project management training	2.19	3.00	1.00	4.00	0.91
T_{S2}	Implementation training	2.54	3.00	1.00	4.00	0.67
T_{S3}	Analysis training	2.31	2.00	1.00	4.00	0.70
T_S	Training support synthetic assessment	2.35	2.00	1.00	4.00	0.57

Source: Author's own research

Figure. 3 Training support assessment histogram



Source: Author's own research

The data presented above show that training support was rated below average. The holistic assessment of this element was very low – with the arithmetic mean of 2.35 and the dominant of 2.00. Importantly, for twenty-two hospitals, overall training support was rated as very low. Only in two surveyed hospitals was the assessment of this element at a high level, and in none of the hospitals was it at a very high level. The lowest score was given to training at the stage of designing new accounting and financial solutions (arithmetic mean 2.19). Meanwhile, the lack or low involvement of employees in organizational changes may result in a poorer adaptation of new solutions to the needs and expectations of their users and recipients. It may also significantly reduce the effectiveness of the new cost accounting standard. It is worth adding, however, that the evaluation of project training has the largest range and standard deviation, which means that in some entities they were conducted at a good level.

The respondents also gave a low score to analysis training (arithmetic mean 2.31; dominant 2.00), which suggests a lack of sufficient support after the implementation of the new cost accounting standard. This is quite a typical organizational problem, because the period of intensive training and contacts with the implementing entity usually falls on the stage of launching new systems (the highest rating for training support). After this stage, the frequency and scope of support naturally decrease. Meanwhile, the novelty and high complexity of the proposed solutions may cause difficulties in their use and, ultimately, even discourage their use. For these reasons, extending post-implementation training support is always worthwhile.

Competencies and training support vs the quality of IT systems

During the research, the relationship between the holistic indicator of the quality of system functioning (Q_{IT}) and staff competencies (C) and staff training support (T_S) was analyzed. For this purpose, Spearman's rank correlation index (r) was used, and the classification according to J. Guilford (1965) was used to interpret the correlation coefficient.

- $|r|=0$ - no correlation;
- $0.0<|r|\leq 0.1$ – slight correlation;
- $0.1<|r|\leq 0.3$ – poor correlation;
- $0.3<|r|\leq 0.5$ – average correlation;
- $0.5<|r|\leq 0.7$ – high correlation;
- $0.7<|r|\leq 0.9$ – very high correlation;
- $0.9<|r|< 1.0$ – almost full correlation;
- $|r|= 1$ – full correlation.

For the calculations, the level of statistical significance was $\alpha = 0.05$. The obtained results allowed to verify two research hypotheses formulated in the methodological part.

The obtained results indicate that there is a statistically significant positive correlation at the average level between the quality of IT systems and the level of employee competencies. In this case, the rank correlation coefficient is 0.38. This means that the increase in the level of employee competencies is accompanied by an increase in the quality of IT systems. The research results therefore confirm the first of the research hypotheses (H_1), which states the following: There is a direct relationship between the level of employee competencies and the quality of the IT system supporting the new standard of cost accounting,

The observed relationship is substantively rational, but it seems that the correlation of these variables should be stronger. The mediocrity of the observed relationship from a mathematical point of view results from the relatively low assessment of the quality of IT systems, which does not directly correspond to the high assessment of employee competencies. In the management context, it may also be the result of a low level and scope of training, which negatively affects the knowledge of the operation of both IT systems and the new cost accounting standard.

Given the above conclusion, the Spearman's rank correlation coefficient was also calculated for the relationship between the quality of IT systems and training support in the process of cost accounting implementation in the surveyed hospitals. Its value turned out to be statistically significant and amounted to 0.27, which, according to Guilford's classification, means a positive relationship between the studied variables, but of weak strength. This allows us to confirm the second of the research hypotheses, which states the following: There is a positive relationship between the level of training support in the process of implementing new cost accounting solutions and the quality of the IT system.

The identified relationship implies that an increase in the quality of IT systems accompanies an increase in the scope of training support. It is, therefore, likely that

increasing the intensity, frequency and duration of training related to the new cost accounting standard could contribute to a better understanding and operation of IT systems. Currently, the potential of the observed relationship is poorly utilized.

3. Discussion

The research shows that one of the key areas requiring attention is ensuring the user-friendliness of the IT systems interface. The user-friendliness of the interface was rated very low by respondents. This suggests that users, i.e., healthcare professionals, may encounter difficulties in using these systems. To improve the efficiency and effectiveness of IT systems, it is necessary to understand the needs of users and design IT solutions in such a way (Visconti et al., 2020; Henry et al., 2015; Prgomet et al., 2017; Dash et al., 2019) that they are more intuitive and enable efficient performance of daily operations.

Another area requiring improvement and improvement in the future is the accuracy and timeliness of data provided by IT systems. Given the healthcare context, the availability of accurate and current data is crucial for making medical decisions and managing costs. Hospitals must therefore take steps to update and expand existing databases. These activities are necessary for the effective implementation of the new cost accounting standard, and thus for the universalization of the valuation of medical services (Azevedo et al., 2020; Graban, 2018).

Therefore, in the process of implementing a new cost accounting standard, hospitals must adapt their IT systems so that they are able to collect and process data in accordance with the new requirements (Kurisu et al., 2022). This means not only improving data quality, but also adapting systems to new procedures and reports (Jovanović et al. 2019). Gallardo-Vazquez and Arimany-Serrat (2020) also draw attention to this need, examining the determinants of effective analysis of financial and non-financial data in hospitals.

Notably, the study results also indicate significant discrepancies in the assessment of the quality of IT systems between the surveyed hospitals. This suggests that each hospital has its own unique challenges and needs in improving the quality of IT systems. Therefore, it is important for each facility to carefully analyze the test results and adapt corrective actions to individual needs. This approach is also recommended by Kludacz-Alessandri (2020) and Binh and Thuy (2019), who studied the diversity of IT systems in healthcare.

Interestingly, the results of the research show an exceptionally high level of staff competency in Polish hospitals. This does not support the conclusions obtained by Navarro-Martinez et al. (2023), who observed a low level of digital competencies among the administration of medical facilities. This means that staff in Polish hospitals are well prepared to implement new digitized accounting solutions. This is very important because hospitals operate on large budgets that must be carefully managed (Wang et al., 2023). Educated and knowledgeable financial staff can help

prepare, monitor, and control the hospital budget. This helps avoid overspending, inefficiencies, and financial deficits (Jabri, 2023).
However, although the results regarding the level of employee competencies are good, further improvement is always possible (especially since the self-assessment may be overestimated). Hospitals can use research results to plan training, improve processes and procedures, and continuously develop staff to maintain or increase competency levels (Shiferaw et al., 2021; Nazeha et al., 2020; Koch et al., 2019; Konttila et al., 2019). This is particularly important in the context of very low training support ratings in implementing the new cost accounting standard.
General accounting competencies and a good level of digital skills of staff will not guarantee the effective implementation of new solutions without comprehensive and detailed training. Only well-trained employees are able to carefully analyze hospital operating costs and identify areas where savings can be made without affecting the quality of medical care (Malmmose and Lydersen, 2021). These employees must therefore understand the need, sense, and operating philosophy of the new cost accounting standard, and this requires spending time to provide the necessary knowledge and practice the desired skills during regular meetings and training (Hornstain, 2015; Da Silva Nines et al., 2019; Hospodkova et al., 2021; Bashir and Long, 2015).

4. Conclusions

During the research, the quality of three components determining the effective implementation and operation of the new cost accounting standard in Polish hospitals was assessed. These included: IT systems, employee competencies (managerial and operational) and training support in individual phases of launching a new solution.
Thus, the quality of IT systems in Polish hospitals was assessed by the respondents as average. In the individual criteria of this assessment, the best result was the integration of systems, and the worst was the user-friendliness of the interface for the new cost accounting standard. According to the respondents, in the current infrastructure conditions, these systems are also an ineffective tool for obtaining reliable data for the purposes of calculating the value of medical services in the new cost accounting standard.
Employee competencies, assessed overall as good, promise much better for the effective implementation of the new cost accounting standard. This assessment concerned both managers and people employed in analytical departments. However, in approximately 10% of the surveyed entities, the level of education and accounting and financial experience of employees at managerial and operational levels was rated poorly, which would certainly require remedial action.
The respondents rated the quality of training support the worst. Training at the design stage appeared particularly poor. Meanwhile, the lack of employee participation and involvement in the process of organizational change may have a negative impact on the effectiveness of the implementation of the new cost accounting standard and the

willingness to use it. Problems may also be generated by poorly assessed post-implementation support affecting the quality, completeness, and reliability of the analyzes prepared.

During the analyses, the relationship between the quality of IT systems in hospitals and the competencies of employees and training support in the new cost accounting standard was also assessed. The relationships identified in this respect are positive and statistically significant, but they are characterized by average (for competencies) and low (for training) strength. Nevertheless, the obtained results suggest that an increase in employee competencies and training support may contribute to a better understanding and functioning of IT systems used in the implementation of the new cost accounting standard.

In the context of the conclusions obtained and the urgent need to standardize and make cost accounting used in Polish hospitals more reliable, the following recommendations can be formulated:

- Identification and correction of qualitative and quantitative discrepancies in the data necessary for the full and effective use of the new cost accounting.
- Identification of the needs of IT system users aimed at improving the interface for the new cost accounting standard and making it more user-friendly.
- Supplementing the competencies of managers and employees of analysis departments in the field of finance and accounting in those hospitals where they are less than average, i.e., insufficient (approximately 10% of the surveyed entities).
- Significant strengthening of training support (rated lowest), in particular the scope of training at the design and analysis stage.
- Taking into account the needs, expectations and feedback from employees involved in operating IT systems in hospitals.

The research presented in the publication expands knowledge about management in the health care sector, in particular the relationship between human resources management and the functioning of IT systems. In detail, they provide knowledge about the determinants of the process of implementing new accounting solutions in hospitals. The proposed approach and the conclusions obtained are also in line with the ongoing digitization of management solutions and the need to look for ways to integrate human resources effectively with IT systems, which may – but should not - be marginalized in healthcare institutions. A measurable effect of using research results may also be an increase in the efficiency of operations in the public health care sector as a result of improved management effectiveness and the implementation of a new cost accounting standard.

The results obtained, conclusions, and recommendations are valuable and useful in practice; however, the conducted research has certain methodological limitations. The first is a non-representative research sample and limiting the research only to Poland. To justify this approach, it is worth emphasizing that the study ultimately involved 52 large and experienced hospitals, which may constitute a sufficient research representation because the conclusions were not drawn only on the basis of

a few case studies. The second research limitation results from the subjectivity of the assessment accompanying all survey research.
Due to the above, in further analyzes it would be necessary to expand the scope of research and look for opportunities to objectify the assessment of the quality of all components examined in the article. It would also be worth undertaking research aimed at optimizing and integrating the competencies of accounting teams with IT teams. An important research trend would also be to assess the impact of the new cost accounting standard on the reliability of the valuation of medical services and, in a broader context, on the efficiency of hospitals.

Authors Contributions

The authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

Conflict of Interest Statement

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Acknowledgment

The article was financed by statutory research of the Department of Economics and Computer Science (BK-264/ROZ1/2024; 13/010/BK_24/0081) and pro-quality grants from Radosław Wolniak (RGJ:13/010/RGJ24/0079) and Izabela Jonek - Kowalska (RGJ:13/010/RGJ24/0080).

References

Ahmadi, H., Nilashi, M., and Ibrahim, O. (2015). Organizational decision to adopt hospital information system: An empirical investigation in the case of Malaysian public hospitals. *International Journal of Medical Informatics*, 84, 166-188. https://doi.org/10.1016/j.ijmedinf.2014.12.004

Akhavan, S., Ward, L., and Bozic, K. J. (2016). Time-driven Activity-based Costing More Accurately Reflects Costs in Arthroplasty Surgery. *Clinical Orthopaedics and Related Research*, 474, 8-15. https://doi.org/10.1007/s11999-015-4214-0

Azevedo, J., Duarte, J., and Santos, M.F. (2022). Implementing a business intelligence cost accounting solution in a healthcare setting. *Procedia Computer Science*, 198, 329-334. https://doi.org/10.1016/j.procs.2021.12.249

Barasa, E.W., Molyneux, S., English, M., and Cleary, S. (2017). Hospitals as complex adaptive systems: A case study of factors influencing priority setting practices at the hospital level in Kenya. *Social Science & Medicine*, 174, 104-112. https://doi.org/10.1016/j.socscimed.2016.12.026.

Bashir, N., Long, C.S. (2015). The relationship between training and organizational commitment among academicians in Malaysia. *Journal of Management Development*, 34(10), 1227-1245. https://doi.org/10.1108/JMD-01-2015-0008.

Binh, T.Q., Thuy, V.T.T. (2019). Factors affecting the public hospital's cost management accounting system. *Academy of Accounting and Financial Studies Journal*, 23(3).

Da Silva Nunes, R., De Linhares Jacobsen, A., and Dos Santos Cardoso, R. (2019). Lean manufacturing in a hospital product manufacturer: Implementation and evaluation in the perception of managers. *Revista de Administração da Universidade Federal de Santa Maria*, 12(1), 88-106.

Dash, S., Shakyawar, S.K., Sharma, M., et al. (2019). Big data in healthcare: Management, analysis and future prospects. *Journal of Big Data*, 6(54). https://doi.org/10.1186/s40537-019-0217-0

Gallardo-Vázquez, D., Arimany-Serrat, N. (2020). Social responsibility, communication and financial data of hospitals: A structural modelling approach in a sustainability scope. *Sustainability*, 12(12), 4857. https://doi.org/10.3390/su12124857

Gapenski, L.C., Pink, G.H. (2015). *Understanding healthcare financial management.* Health Administration Press; AUPHA.

Głód, G., Głód, W. (2024). Jak sprawdza się nowy standard rachunku kosztów? *OSOZ Polska*, 5, 10-12.

Głód, G., Głód, W. (2024). Project management of the implementation of a cost accounting standard in Polish hospitals. *Ekonomia i Prawo. Economics and Law*, 23(1).

Graban, M. (2018). Lean Hospitals: Improving Quality, Patient Safety, and Employee Engagement. *Taylor & Francis Group*.

Guilford, J.P. (1965). Fundamental Statistics in Psychology and Education. *McGraw-Hill*.

Henry, J., Pylypchuk, Y., Searcy, T., and Patel, V. (2015). Adoption of Electronic Health Record Systems among U.S. Non-Federal Acute Care Hospitals: 2008-2015. *ONC Data Brief*, 35, 1-7.

Hornstain, H.A. (2015). The integration of project management and organizational change management is now a necessity. *International Journal of Project Management*, 33(2), 291-298. https://doi.org/10.1016/j.ijproman.2014.08.005.

Hospodková, P., Berežná, J., Barták, M., Rogalewicz, V., Severová, L., and Svoboda, R. (2021). Change Management and Digital Innovations in Hospitals of Five European Countries. *Healthcare*, 9, 1508. https://doi.org/10.3390/healthcare9111508.

Jabri, F.A. (2023). Healthcare professionals' core competencies, quality of care and patient safety [Doctoral dissertation, Department of Nursing Science, University of Eastern Finland]. Retrieved from https://erepo.uef.fi/bitstream/handle/123456789/29294/urn_isbn_978-952-61-4777-2.pdf?sequence=1.

Javid, M., Hadian, M., Ghaderi, H., Ghaffari, S., and Salehi, M. (2016). Application of the Activity-Based Costing Method for Unit-Cost Calculation in a Hospital. *Global Journal of Health Science*, 8(1), 165-172. https://doi.org/10.5539/gjhs.v8n1p165.

Jovanović, T., Dražić-Lutilsky, I., and Vašiček, D. (2019). Implementation of cost accounting as the economic pillar of management accounting systems in public hospitals–the case of Slovenia and Croatia. *Economic Research-Ekonomska Istrazivanja*, 32(1), 3754-3772.

Kakemam, E., Liang, Z., Janati, A., Arab-Zozani, M., Mohaghegh, B., and Gholizadeh, M. (2020). Leadership and Management Competencies for Hospital Managers: A Systematic Review and Best-Fit Framework Synthesis. *Journal of Healthcare Leadership*, 12, 59-68. https://doi.org/doi: 10.2147/JHL.S265825.

Keel, G., Savage, C., Rafiq, M., and Mazzocato, P. (2017). Time-driven activity-based costing in health care: A systematic review of the literature. *Health Policy*, 121(7), 755-763. https://doi.org/10.1016/j.healthpol.2017.04.013

Kludacz-Alessandri, M. (2020). The relationship between cost system functionality, management accounting practices, and hospital performance. *Foundations of Management*, 12(1), 223-236. https://doi.org/10.1186/s12913-021-06807-4.

Koch, C., Hansen, G.K., & Jacobsen, K. (2019). Missed opportunities: Two case studies of digitalization of FM in hospitals. *Facilities*, 37(7/8), 381-394. https://doi.org/10.1108/F-01-2018-0014.

Konttila, J., Siira, H., Kyngäs, H., Lahtinen, M., Elo, S., Kääriäinen, M., and Mikkonen, K. (2019). Healthcare professionals' competence in digitalisation: A systematic review. *Journal of Clinical Nursing*, 28(5-6), 745-761. https://doi.org/10.1111/jocn.14710.

Kurisu, C., Shima, Y., and Yasukata, K. (2022). The use of accounting information in cost management: A study of Japanese general hospitals. In *Management Accounting For Healthcare*, pp. 3-34. https://doi.org/10.1142/9789811237164_0001.

Malmmose, M., Lydersen, J.P. (2021). From centralized DRG costing to decentralized TDABC: assessing the feasibility of hospital cost accounting for decision-making in Denmark. *BMC Health Services Research*, 21(1), 835. https://doi.org/10.1186/s12913-021-06807-4.

Navarro-Martínez, O., Igual-García, J., and Traver-Salcedo, V. (2023). Bridging the educational gap in terms of digital competences between healthcare institutions' demands and professionals' needs. *BMC Nursing*, 22(1), 144. https://doi.org/10.1186/s12912-023-01284-y.

Nazeha, N., Pavagadhi, D., Kyaw, B.M., Car, J., Jimenez, G., and Tudor Car, L. (2020). A Digitally Competent Health Workforce: Scoping Review of Educational Frameworks. *Journal of Medical Internet Research*, 22(11), e22706. https://doi.org/doi: 10.2196/22706.

Pihlainen, V., Kivinen, T., and Lammintakanen, J. (2016). Management and leadership competence in hospitals: A systematic literature review. *Leadership in Health Services*, 29(1), 95-110. https://doi.org/10.1108/LHS-11-2014-0072.

Prgomet, M., Li, L., Niazkhani, Z., Georgiou, A., and Westbrook, J. (2017). Impact of commercial computerized provider order entry (CPOE) and clinical decision support systems (CDSSs) on medication errors, length of stay, and mortality in intensive care units: A systematic review and meta-analysis. *Journal of the American Medical Informatics Association*, 24(2), 413-422. https://doi.org/10.1093/jamia/ocw145.

Regulation of the Minister of Health and Social Welfare of 22 December 1998 on detailed rules of cost accounting in public healthcare units (*Journal of Laws 1998*, No. 164, item 1194).

Regulation of the Minister of Health of 26 October 2020 on recommendations regarding the cost accounting standard at healthcare providers (*Journal of Laws 2020*, item 2045).

Regulation of the Minister of Health of 8 July 2015 on recommendations for the cost accounting standard at healthcare providers (*Journal of Laws 2015*, item 1126).

Shiferaw, K.B., Tilahun, B.C., and Endehabtu, B.F. (2021). Healthcare providers' digital competency: A cross-sectional survey in a low-income country setting. *BMC Health Services Research*, 20, 1021. https://doi.org/10.1186/s12913-020-05848-5

Visconti, R.M., Larocca, A., and Marconi, M. (2020). Accessibility to First-Mile health services: A time-cost model for rural Uganda. *Social Science & Medicine*, 265, 113410. https://doi.org/10.1016/j.socscimed.2020.113410.

Wang, H., Xiang, X., and Dong, L. (2023). Exploring a competency framework for the chief financial officer of a hospital: a qualitative study from China. *BMC Health Services Research*, 23, 692. https://doi.org/10.1186/s12913-023-09711-1.

Wielicka-Gańczarczyk, K., Jonek-Kowalska, I. (2023). Involvement of Local Authorities in the Protection of Residents' Health in the Light of the Smart City Concept on the Example of Polish Cities. *Smart Cities*, 6, 744-763. https://doi.org/10.3390/smartcities6020036.

Zerka, A., Jawab, Z. (2020). Calculation of the costs of health care services for road accident victims in TDABC: A systematic review of the literature. 2020 IEEE *13th International Colloquium of Logistics and Supply Chain Management* (LOGISTIQUA), 1–7. https://doi.org/10.1109/LOGISTIQUA49782.2020.9353894.