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Quality Costing in Selected Service Enterprises: A Multivariate Comparative Analysis

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Abstract:

Purpose: *The main objective of the conducted research was to identify the level of quality costs in selected service enterprises, as previous publications on quality costing tended to focus on manufacturing companies. In addition, three research questions relating to a quality cost structure, service process phases and processes were posed.*
Design/Methodology/Approach: *The author invited three business entities to participate in the research project. They were providers of water supply and sewage disposal services, employment agency services and construction services, respectively.The author achieved the objective of the empirical research by exemplifying the procedure of a quality costing model. The triangulation of research techniques (documentation content analysis, observation, quantitative data analysis) played an essential role. The analysis of quantitative data was carried out using multivariate comparative analysis and indicator analysis.*
Findings: *The highest quality costs were identified in the water supply and sewage disposal service provider, almost 10 times less in the company that is a temporary employment agency, and the least in the construction business.*
Practical implications: *The results develop the knowledge about the quality costing in the service enterprises. The main limitation is lack of appropriate legal regulations obliging to maintain a quality costing. The complete voluntary nature of this tool means that companies do not attempt to record quality-related costs and it was hard to find entities which want take part in the research, so author examined only three selected and willing enterprises provides different services. The key of the success of using quality costing is the maturity of the organization.*
Originality/Value: *Prevention costs play the most important role in the service companies participating in the research. The largest proportion of quality costs arises during the service delivery phase. Core processes are responsible for generating the vast majority of quality costs.*

Keywords: *Calculation, ratio analysis, service industry, quality costs, quality cost accounting model.*

JEL codes: *M20, M41.*

Paper type: *Research paper.*

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1. Introduction

Quality costing is a management accounting and quality management tool used mainly by manufacturing enterprises. This is confirmed by numerous examples from the literature (Sojak, 1981; Harrington, 1987; Chopra and Garg 2012; Malik *et al.,* 2016). Balon (2007) examined the implementation of this calculation in the food industry.

The implementation of quality cost accounting in a dairy cooperative is the work of Toruński (2011). Alsada and Kumar (2022) examined the involvement of industrial enterprises in this calculation in Yemen. Its most important models have already been collected, described and presented (Sadkowski 2019). Recent years show that the importance of quality is growing also in service organisations (Sulowska-Banas, 2015; Wierzowiecka, 2015; Sadkowski 2020; Lim *et al*., 2024).

Its implementation and the benefits associated with it are noticed by more and more service sector entities operating in various industries including: water and sewage services, temporary work agencies (Sadkowski, 2020), construction services (Shafiei *et al.,* 2023), hotel services (Ribarić and Čučković, 2020; Milašinović *et al.,* 2024). For service companies, a significant figure is Bank (1992), which in its quality cost model referred to service activities for the first time in history. The development of an account in the 21st century is primarily the introduction of facilitations in its construction in the organisation, as well as the dynamic development of specialised IT solutions (Sadkowski, 2020).

The most important element of this type of accounting is quality costs, which are not disclosed in the vast majority of companies, as this is not required under any legal regulations. Attempts to estimate quality costs in selected business entities show that this is an arduous process requiring the use of appropriate calculation procedures (Harrington, 1987; Sadkowski, 2020; Ribarić Čučković, 2020; Barros *et al.,* 2023). Quality costs are divided into (Sadkowski, 2020):

- prevention costs – incurred to ensure conditions for meeting requirements in connection with the provision of services,
- appraisal costs – incurred to ensure that the requirements in connection with the provision of the service are met,
- external failure costs – occurring when the results of the work do not meet the adopted quality standards, and the error is detected before the service is transferred to the customer,
- internal failure costs – related to irregularities detected after the service is transferred to the customer,
- other quality costs – quality costs that cannot be included in any of the basic groups of quality costs (costs of prevention, evaluation, errors).

Quality cost management is now an integral part of strategic decision making in

companies and is reflected in management accounting practices. Hakem *et al.* (2024) emphasise the importance of quality cost management in improving a company's financial performance. The effective implementation of quality cost accounting can result in a reduction of quality costs.

For organisations striving for excellence, quality cost measurement is a cornerstone of quality management programmes (Hakem *et al.,* 2024). The important role of quality costs as an intermediary between the management accounting system and the financial performance of enterprises is confirmed by the results of research on industrial enterprises listed on the Amman Stock Exchange in Jordan (Alrjoub *et al.,* 2023).

The author has identified a research gap related to the lack of publications on the calculation and analysis of quality costs in service organisations. The purpose of this article is to attempt to identify the level of quality costs in a few selected service companies. In relation to the empirical study, the author has posed the following research questions:

- *Q1: Which categories of quality costs dominate in their structure in the surveyed entities?*
- *Q2: In which phase of the service process do the highest quality costs occur in the surveyed entities?*
- *Q3: Which processes of the surveyed entities generate the most quality costs?*

The article is organised according to the following order. The first part is a review of the literature on the issue of quality cost accounting. The research methodology along with a description of the research procedure and the criteria for the selection of enterprises to participate in the research are presented in the second part.

This is followed by a presentation of the research results (estimates of quality costs in the subsequent phases of the service process, a process matrix of quality costs and a quality cost ratio analysis). The last part contains conclusions drawn from the results of the conducted research and a summary.

2. Literature Review

2.1 Quality Costing

Quality costing is playing an increasingly important role in optimising the costs of companies' operations. It allows for the identification, measurement, recording, analysis, interpretation and evaluation of quality costs. It is widely used especially in manufacturing organisations (Sojak, 1981; Harrington, 1987; Polak, 2003; Balon, 2007; Kraska and Stadnicka, 2010; Toruński, 2011; Chopra and Garg, 2012; Malik *et al.,* 2016, Velkoska andTomov, 2023; Barros *et al.,* 2023).

Quality costs are regulated by the procedure RKJ/1/2019 (Sadkowski. 2020). The most important stages include:

1. Identification of quality costs in the processes implemented.
2. Recording quality costs in the unit's accounting system.
3. Preparation of monthly balances of quality cost accounts.
4. Analysis of quality costs (vertical and horizontal analysis, indicator analysis).
5. Preparation of a quality cost matrix and a quality cost process budget.
6. Assessment of the effectiveness of the management system.

The issue of quality costing is taken up by many authors, both in Poland and abroad. Among international publications, those authored by scholars from the United States predominate, alongside contributions from countries such as the United Kingdom and India. This trend may reflect a stronger emphasis on regulatory frameworks within these contexts, which in turn fosters the development of quality cultures within organizations (Walston *et al*., 2025).

The concept of quality costs was introduced into the business and academic literature by Juran (1962), who referred to them as "gold in the mine", an instrument for measuring quality. Among Polish authors, it is worth noting Malinowska (2021), who identifies quality costs in catering businesses.

Chmielewski and Malinowska (2023) highlight the role of quality costs as a determinant of company value. They affect the operating profit margin, causing it to fall in the short term, while in the long term they can raise it and consequently increase a company's cash flows and overall value. Biadacz (2021) indicates the importance of quality costing as a way of ensuring an organisation's reasonable influence on the process of shaping and managing quality.

Problems with identifying quality costs in enterprises are the subject of research conducted by Walaszczyk and Jędrzejczyk (2016). Ciechan-Kujawa (2005) uses a broader approach in her research on quality costing. She identifies the places where quality costs arise in an organisation and the key elements of quality costing. In her opinion, what plays an important role is the sources of information on costs and quality cost analyses.

Quality costing is also the subject of numerous publications in other countries. Quality costing as an important element of economic analysis supporting organisational management and process efficiency improvement is pointed out by Rehacek (2018). Quality cost calculation is described by Wood (2012), who also focuses on practical applications of cost estimation procedures. A new concept of quality costs related to responsible decisions for sustainable, intelligent and inclusive development of a socio-economic community is proposed by Tomov and Velkoska (2022).

In a survey of automotive cluster actors conducted by Velkoska and Tomov (2023),

entrepreneurs emphasise the real need to implement quality costing, which is the consequence of applying quality management standards. Furthermore, they point to the lack of knowledge of quality costs among employees and managers as the greatest difficulty, while the greatest benefit is the increase in competitiveness. Quality costing as one of the contemporary accounting methods is described by Rogošić (2021).

Murumkar, Teli, and Loni (2018) examine the benefits of implementing a quality cost accounting system. They are achievable through cost reduction.

The majority of players in the textile industry do not use any quality cost accounting systems, while they are convinced that it is necessary to manage quality costs, as they can represent a significant part of overall business costs. In the era of Industry 4.0, which requires technological development and maintaining competitiveness, quality costing plays an important role as an indicator of organisational performance allowing enterprises to translate operational issues into a financial dimension (Barros *et al.,* 2023).

A modern approach to quality cost management assumes the integration of quality cost accounting with environmental protection costs, which seems to be a right step in the face of the implementation of the "green economy" aimed at protecting the environment (Szczerbak and Wikarczyk, 2023).

Environmental accounting and quality costs are increasingly reflected in practical research. The importance of quality costs that support ensuring the safety of people's lives is raised by the case of Deepwater Horizon, an offshore drilling platform whose explosion caused an ecological disaster.

Analysis of quality costs for this example shows that ensuring sustainable development is only possible when quality costs are placed in the center (Kestane and Yukcu, 2023).

The use of quality cost accounting is also helpful in planning and assessing the effectiveness of continuous improvement processes at the operational and strategic level (Herzog and Grabowska, 2021).

An example of the evolution of quality cost accounting over the years is the hybrid model of this accounting. It is based on activity-based costing and life-cycle costing and allows estimating quality costs at all stages of the product life cycle (Syreyshchikova *et al.,* 2021).

3. Methodology

The main objective of the conducted research was to identify the level of quality costs in selected service companies. A key element of quality costing is quality costs, the estimation of which requires the adoption of an appropriate research method and

procedure. The process of estimating quality costs was divided into four stages.

In the first stage, a process map of the surveyed companies was analysed. This constituted a basis for the initial identification of potential quality costs in the processes carried out by the participating organisations and their inclusion in the quality cost estimation form (Table 1).

Table 1. *A quality cost estimation form*

Name of process	Name of cost	Type of cost	Amount of cost in period	Source document	Additional information
Process no. 1	Cost no. 1				
	Cost no. 2				
	Cost no. n				
Process no. 2	Cost no. 1				
	Cost no. 2				
	Cost no. n				
Process no. n	Cost no. 1				
	Cost no. 2				
	Cost no. n				

Source: *Sadkowski W., Jedynak P., Quality management and accounting in service industries. A new model of quality cost calculation, Routledge 2022.*

The revealed quality cost items required actions aimed at their estimation and allocation to an appropriate cost category. The success of this process was made possible through cooperation with the accounting, controlling and quality departments of the surveyed enterprises.

The second stage consisted in the use of the prepared quality cost estimation form to arrange and assign the identified cost items to the appropriate phases of the service process, i.e., the planning phase, the procurement phase, the service delivery phase and the sales phase, based on the developed model of the structure of these costs. In the third stage, a quality cost matrix was developed. To create it, the author used the financial data on quality costs obtained in the form of their estimates.

The quality cost matrix provides information on the amount of incurred costs, their structure and the share of individual quality cost categories in a company's core, management and auxiliary processes, respectively. The information obtained made it possible to indicate the surveyed organisations' operational areas incurring the highest quality costs and requiring optimisation measures.

The last stage comprised a quality cost ratio analysis for the most important thirteen metrics of these costs. The results of this analysis provided information on the relationships occurring between individual quality cost categories, as well as profit and loss account items.

The major part of the research was carried out in the selected service companies that

had to meet the following criteria: possession of a quality management system and ISO certificates, provision of a wide variety of services and maintenance of a comprehensive bookkeeping system. The research was conducted in three service companies, which did not agree to have their names disclosed.

Therefore, to identify them, the author assigned them with letters A, B and C, respectively. Company A provides water supply and sewage disposal services; company B is a temporary employment agency and company C is a building contractor. The author used multivariate comparative analysis and ratio analysis to analyse the obtained quantitative data. All values in the research were given in euro at the average EUR/PLN exchange rate of 4.6529 as at 20 September 2023 (NBP, 2023). The time horizon adopted for the purpose of quality cost estimates was one year. The obtained results are summarised and presented in the next part of this article.

4. Research Results and Discussion

The identified items of potential quality costs of the surveyed companies were discussed with the accounting, controlling and quality departments. One of the results of cooperation with the selected enterprises was the development of a quality cost estimation form. It was used to arrange such costs in the adequate phases of the process in a model of their structure.

The highest quality costs in the planning phase were identified in company B (more than EUR 748,000) and the lowest in company C (slightly over EUR 75,500). Prevention costs and assessment costs play a dominant role in this phase. The most significant items of prevention costs are ensuring an efficient organisation of the quality team, training employees responsible for quality, implementation costs for obtaining quality certificates and other costs.

Assessment costs are dominated by the item "other", and in each of the surveyed companies costs of maintaining quality certificates appeared, which is related to their having quality management systems and holding ISO certificates. In company B, more than half of this phase's quality costs is other costs such as business travel costs, car lease costs, postal, courier and archiving service costs, as well as conference organisation costs. In contrast, the costs of internal errors, for example repair of measurement and control equipment, only occur in company C. None of the companies declared any external error costs in this phase.

The highest quality costs in the procurement phase were incurred by company A (EUR 3.66 million). In companies B and C, the comparable costs were much lower: approximately EUR 650,000 and EUR 170,000, respectively. By far the dominant role in this phase in all participating organisations is played by prevention costs.

Company A reported the largest amount of this cost category in the item "other" (over EUR 3.4 million), which consisted primarily of the costs of materials for water

treatment (PAX 16, PAX 19, sodium chlorite, sodium hypochlorite, activated carbon, liquid chlorine), water transmission, sewage disposal network operation, wastewater treatment and sludge disposal.

In companies B and C, the most important item in prevention costs is the costs of ensuring the efficient organisation of the people/team/department responsible for procurement. In company B, these include the costs of recruiting candidates for employment, the costs of hiring rooms/stands for recruitment purposes, the cost of renting and cleaning office space, as well as the cost of renting office equipment. In contrast, in company C, it is primarily the costs of the IT system and the maintenance of the head office, buildings and investment facilities.

What is worth noting in the procurement phase of the three surveyed companies is the absence of external error costs. In contrast, internal error costs occurred in companies B and C (additional deliveries to replenish stocks, assistance concerning the operation of the IT system and error correction). Other quality costs incurred in this phase were declared only by company B.

The analysis of the quality cost structure in the service delivery phase allowed the author to draw the following conclusions. The highest quality costs were identified and estimated for company A (more than EUR 57.5 million); in company B, they amounted to EUR 4.648 million, and in company C, they were slightly below EUR 320,000.

In companies A and B, prevention costs by far dominate, accounting for almost 93% and almost 87% of all quality costs, respectively. In company C, the largest cost items are assessment costs (around 49%) and prevention costs (around 43%).

In company A, prevention costs comprise mainly maintenance, inspection and repair operations (EUR 28 million), as well as ensuring adequate service provision conditions (over EUR 24.6 million).

Under maintenance, inspections and repairs, the company recognises such costs as the installation and operation of water meters, ongoing repairs of the wastewater treatment plant and sludge thermal treatment station, as well as the operation of the sewage disposal network.

The costs of ensuring adequate service provision conditions include water treatment costs, water transmission costs, wastewater treatment costs and costs allocated to the operation of the sludge thermal treatment station.

In company B, the most important prevention cost item is ensuring adequate service provision conditions (EUR 3.9 million). This item comprises the costs of merchandise services, travel services (employees travelling to Poland, France and Germany), accommodation services, agency services, as well as employee working clothes.

Meanwhile, the most important item in the assessment costs, which prevail in company C, is the assessment of the compliance of the quality of provided services with the applicable requirements (approx. EUR 147,600).

These are the costs of verifying the correctness of relevant documentation (bids, contracts, technical documentation, orders), as well as the remuneration of the site manager. Under assessment costs, all surveyed companies recognise the costs of controlling the quality of provided services and the compliance of this quality with the applicable requirements.

No organisation declared having incurred any external error costs in this phase of the service delivery process. Internal error costs were reported by companies A (approximately EUR 3 million) and C (EUR 28,000). In company A, these costs resulted from technical breakdowns and downtime (repairs of water supply and sewage disposal networks); and in company C, from corrections and rework (costs of renegotiation with customers) and other minor items (e.g., construction waste disposal). Other costs in the small amount of EUR 64.48 were disclosed only by company B.

The quality costs of the analysed organisations were in the range from EUR 173,000 to EUR 567,000. Company A had the highest quality costs, and company C the lowest. In each of the companies under examination, a different category of quality costs dominates in the sales phase. In company A, it is other quality costs, which account for 83% of all quality costs; in company B, it is prevention costs (approximately 89.5% of total quality costs); and in company C – external error costs (59.22% of total quality costs).

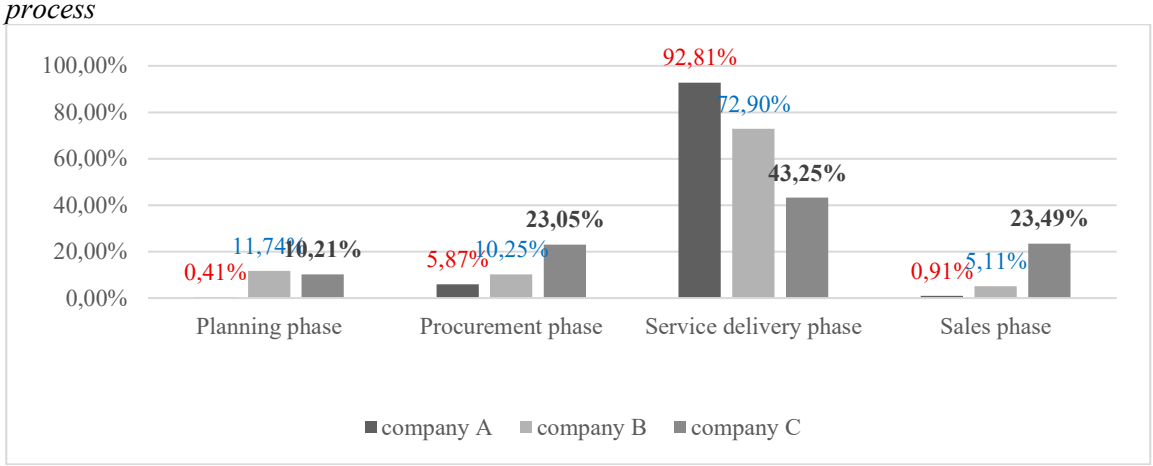
Company A's other quality costs result mainly from water losses, as well as consumption of water for employee welfare and technological purposes (flushing the water supply and sewage disposal networks).

Company B's prevention costs result primarily from ensuring the efficient organisation of its employees/team/department responsible for sales and distribution (telephone and internet services) as well as ensuring the good quality of contacts with customers (personnel and project consultancy, sales support and customer maintenance consultancy).

For company C, the largest part of external error costs results from the necessity to provide services again (maintenance services and repairs under warranty agreements).

It is worth noting that none of the three companies incurred any internal error costs during the sales phase, and only company A reported other quality costs. The author considered it important to collect the data on quality costs and recalculate their shares in the individual phases of the service delivery process of each organisation. These data were compiled and presented in Figure 1.

Figure 1. *The shares of quality costs in the individual phases of the service delivery process*



Source: *Author's calculations.*

The highest quality costs occur in the service delivery phase. They constitute 92.81% of all costs in company A, 72.9% in company B and 43.25% in company C. The dominant groups of quality costs in the service delivery phase are prevention costs in company A (EUR 53.81 million) and company B (EUR 4.036 million), and assessment costs in company C (EUR 154,900). In this phase, the major items of prevention costs are generated by maintenance, inspections and repairs, as well as ensuring adequate conditions for the provision of services.

Company C has the highest share of quality costs in the procurement and sales phase. The procurement phase of this company is dominated by prevention costs (approx. 90%) and the sales phase is dominated by external error costs (59.22%). The planning phase generates on average around 11% of quality costs in companies B and C. In company A, the procurement phase (5.87%), the sales phase (0.91%) and the planning phase (0.41%) have very little impact on the quality cost structure.

Table 2. *A quality cost process matrix*

Quality costs	**Enterprise**	**Core (operational) processes**	**Management (strategic) processes**	**Support processes**	**Total [EUR]**	**Share of QC in the QC structure [%]**
Prevention costs	A	57,234,213.07	167,207.55	54,159.77	57,455,580.39	92.13%
	B	4,165,333.94	0.00	989,072.07	5,154,406.02	80.86%
	C	55,848.12	12,981.15	238,566.70	307,395.97	41.54%
Assessment costs	A	1,186,305.31	9,402.74	293,580.35	1,489,288.40	2.39%
	B	34,291.81	2,761.72	742,647.60	779,701.12	12.23%
	C	219,297.60	5,319.78	21,502.43	246,119.81	33.26%

Internal error costs	A	2,949,601.32	–	–	2,949,601.32	4.73%
	B	–	–	44,909.94	44,909.94	0.70%
	C	25,790.37	–	56,464.76	82,255.13	11.12%
External error costs	A	214.92	–	–	214.92	0.00%
	B	–	–	–	0.00	0.00%
	C	102,907.30	–	–	102,907.30	13.91%
Other quality costs	A	470,889.12	–	–	470,889.12	0.76%
	B	–	–	395,809.06	395,809.06	6.21%
	C	–	–	1,257.28	1,257.28	0.17%
Total	A	61,841,223.75	176,610.29	347,740.12	62,365,574.16	100.00%
	B	4,199,625.75	2,761.72	2,172,438.67	6,374,826.13	100.00%
	C	403,843.38	18,300.93	317,791.18	739,935.49	100.00%
Shares of individual processes in the QC structure [%]	A	99.16%	0.28%	0.56%	100.00%	–
	B	65.88%	0.04%	34.08%	100.00%	–
	C	54.58%	2.47%	42.95%	100.00%	–

Source: *Author's calculations.*

All surveyed organisations attach considerable importance to the process of employee training and development, as can be seen by the costs incurred for this purpose in each phase of the service delivery process.

The next step in the presentation of the research results is the disclosure of the developed quality cost matrix (Table 2), which is based on the data collected in the quality cost estimation form.

The prepared process matrix of quality costs allowed the author to draw the following conclusions. The level of quality costs in the surveyed companies varies. Company A has the highest level of quality costs (EUR 62.366 million), with companies B and C incurring considerably less quality costs (EUR 6.4 million and EUR 740,000, respectively). In all three businesses, the most important quality cost item is prevention, which constitutes 92.13%, 80.86% and 41.54% of total quality costs in companies A, B and C, respectively.

The other significant quality cost item is assessment. Assessment costs account for 33.26% of total quality costs in company C and 12.23% in company B. The importance of assessment costs in company A is marginal, as their share in total quality costs is just 2.39%. Compliance costs, i.e. prevention and assessment costs, dominate the cost structures of the surveyed enterprises.

Non-compliance costs (external error costs and internal error costs) and other quality costs have a small share in the cost structure. This is a very positive and desirable development indicating a high level of quality awareness in these companies. The highest shares of internal error costs (11.12%) and external error costs (13.91%) were recorded in company C, which may cause some concern. Other quality costs exceeded the 5% threshold only in company B with a share of 6.21%.

The prepared matrix also makes it possible to indicate the processes that generate the most quality costs. In all three business organisations, it is the core processes that are responsible for the most of quality costs. The respective shares of total quality costs are 99.16% in company A (costs of potable water production as well as sewage collection and treatment), 65.88% in company B (costs of "carer-in-Germany" and order fulfilment processes) and 54.58% in company C (costs of contract performance and maintenance services). Support processes play important roles in companies C and B, as they generate, respectively, 42.95% and 34.08% of their total quality costs.

On the other hand, management processes are responsible for rather insignificant shares of total quality costs (2.47% in company C, 0.28% in company A and 0.04% in company B). In summary, the use of the quality cost matrix made it possible to identify the largest groups of quality costs in the surveyed organisations (prevention and evaluation costs), as well as to indicate the major groups of processes generating quality costs.

The final element in the presentation of the research results is a quality cost ratio analysis included in Table 3.

Table 3. *A quality cost ratio analysis*

Ratio	**Enterprise**		
	A	**B**	**C**
Ratio of quality costs to total costs	65.09%	14.75%	4.35%
Ratio of compliance costs to quality costs	94.52%	93.09%	74.81%
Ratio of non-compliance costs to quality costs	4.73%	0.70%	25.02%
Ratio of prevention costs to quality costs	92.13%	80.86%	41.54%
Ratio of assessment costs to quality costs	2.39%	12.23%	33.26%
Ratio of internal error costs to quality costs	4.73%	0.70%	11.12%
Ratio of external error costs to quality costs	0.00%	0.00%	13.91%
Ratio of other quality costs to total quality costs	0.76%	6.21%	0.17%
Ratio of non-compliances to quality costs	1.83%	0.0004%	0.0027%
Ratio of quality costs to sales revenue	62.31%	14.72%	4.48%
Ratio of quality costs to net profit	622.96%	695.11%	-178.00%
Ratio of non-compliance costs to net profit	29.47%	4.90%	-44.54%
Ratio of quality costs to operating costs	67.10%	15.17%	4.40%

Source: *Author's calculations.*

The main conclusions of the quality cost ratio analysis are the following:

- A high ratio of quality costs to total costs (65.09%), as well as to operating costs (67.10%) in company A.
- Low or very low ratios of quality costs to total costs and operating costs in company B (14.75% and 15.17%, respectively) and company C (4.35% and 4.40%, respectively) may be due to the intense use of outsourcing services in ongoing processes or the author's limited access to the data provided by the enterprises participating in the research.
- The dominance of compliance costs over non-compliance costs in all three companies (94.52% to 4.73% in company A, 93.09% to 0.70% in company B and 74.18% to 25.02% in company C) indicates low numbers of errors made in their operational processes and very efficient quality cost structures.
- The highest non-compliance costs occur in company C and account for 25% of all quality costs, which indicates numerous errors in the implemented processes. The share of external error costs in total quality costs (13.91%) is slightly higher than that of internal error costs (11.12%). In the other two companies, non-compliance costs do not exceed 5% of total quality costs (4.73% in company A and only 0.70% in company B).
- The shares of other quality costs in the quality cost structures of the surveyed enterprises are negligible (0.76%, 6.21% and 0.17%, respectively).
- A very low ratio of the number of non-compliances to total quality costs (1.83% in company A, less than 0.1% in companies B and C).
- In company A, quality costs account for more than 62% of total sales revenue and more than six times its net profit (622, 96%), which allows one to conclude that they have a strong impact on the company's financial results and income statement.
- In companies B and C, on the other hand, quality costs account for less than 15% and 4.48% of their respective sales revenue amounts, which means that these costs do not have a large impact on the companies' financial results.
- In the case of company B, the almost 700% value of the ratio of quality costs to net profit means that its net profit would not be sufficient to cover all quality-related costs.
- The negative value of the ratio of quality costs to net profit (-178%) indicates that there is no relationship between these elements.
- Almost 30% of net profit is non-compliance costs and any increase in this ratio in the following years will be a worrying phenomenon.
- The ratio of non-compliance costs to net profit in the surveyed companies varies. In company A it is 30%, in company B – 4.9% and -44.54% in company C. A positive value of this ratio indicates that net profit obtained secures costs resulting from the occurrence of irregularities. On the other hand, a negative value of this ratio is due to net loss generated in the year under review.

Summing up the ratio analysis, it is important to emphasise that in all the surveyed enterprises, compliance costs predominate over non-compliance costs and other quality costs. Such a cost structure ensures high quality and efficient processes and,

consequently, an adequate level of provided services. The surveyed companies carry out their activities and processes in a well-thought-out and planned manner.

Referring to the quality cost structures of other service enterprises is rather difficult because no in-depth research focused on quality costs has been conducted in such organisations so far. An attempt by U. Sulowska-Banaś (2015) to implement a quality costing system in a hospital shows that it is a useful and universal accounting tool. Before the introduction of the system, non-compliances and errors occurring in the hospital had been hidden or ignored.

The usefulness and universality of quality cost accounting as a tool supporting the decision-making process in business organisations are confirmed by the research discussed in this article, where the author presents the structure of quality costs, the phases of the service delivery process that generate the most quality-related costs and other processes incurring quality costs.

A model of quality costing implemented in an accredited laboratory is presented by Wierzowiecka (2015). This model is purely theoretical and has not been verified in business practice; the author does not estimate quality costs.

A study carried out in a textile enterprise in Portugal shows that the implementation of a quality costing system based on a PAF (Prevention, Appraisal and Failure) model makes it possible to estimate quality costs. Their structure is as follows: 23% – prevention costs, 26% – assessment costs, 46% – internal error costs and 5% external error costs (Barros *et al.,* 2023). Comparing a quality cost structure of an industrial enterprise with that of a service company, it is important to be cautious and not to draw far-reaching conclusions, as these two types of business organisations have different characteristics.

A comparison of the quality cost structures of the service companies described in this article with that of the aforementioned textile company shows clear differences concerning compliance costs and non-compliance costs. In the surveyed service companies A, B and C, the dominant role is played by prevention and assessment costs, which account for from 74.81% to as much as 94.52% of total quality costs. In contrast, in the said textile company, non-compliance costs (mainly rework and scrap costs) constitute 51% of total quality costs, while in the three surveyed service companies, non-compliance costs range from 0.70% to 25.02% of total quality costs.

The identification of quality costs was also undertaken by researchers from the Czech Republic and Slovakia, who analysed 50 industrial (engineering, metallurgy, automotive industry) companies from the SME sector, with 10 to 40 employees and an annual turnover of up to EUR 3 million (Teplicka and Hurna, 2021). The cost analysis covered the three years 2017-2019. The largest items in the surveyed enterprises' quality cost structures is assessment costs (product quality control, measurements, calibration, input-output monitoring, sampling), which account for

from 60.64% to 75.93% of total quality costs, and compliance costs, which range from 69.75% to 83.40%.

External error costs range from 14.36% to 26.02%, where total non-compliance costs constitute from 16.60% to 30.25% of total quality costs. The dominance of compliance and non-compliance costs in quality cost structures is very similar to the situation of the surveyed service companies A, B and C, with one important difference: prevention costs dominate over assessment costs in service organisations, while in industrial enterprises it is the other way round.

Teplicka and Hurna (2021) also indicate that the ratio of quality costs to total costs in a business organisation should not exceed 20%. This is the case in the aforementioned SME entities and service companies B and C (14.75% and 4.35% respectively), but company A falls outside the accepted range (65.09%). Unfortunately, the adopted period of the research discussed here was one year; consequently, the obtained results cannot be compared over time.

Comparing the implementation of quality cost accounting systems in manufacturing and industrial entities, one can see different quality cost structures. Quality cost estimation is possible in both types of organisations. Furthermore, a more advanced model has been prepared for service companies, in which it is also possible to refer to the individual phases of the service delivery process and other processes generating the highest quality costs

5. Conclusions, Proposals, Recommendations

The main objective of the conducted research was achieved. The author estimated the level of quality costs in selected companies providing different types of services (water supply and sewage disposal services, employment agency services, and construction services).

The highest quality costs are incurred by the water supply and sewage disposal service provider (EUR 62.366 million); the temporary employment agency pays for quality almost ten times less (EUR 6.4 million), and the construction business pays the least (approx. EUR 740,000). Such considerable differences in the estimated values show that the level of quality costs in the surveyed companies is diversified.

The conducted research allowed the author to answer the research questions posed. Prevention costs play the most important role in all three surveyed organisations (Q1). In the structure of quality costs, assessment costs also have a significant share. What is characteristic of the analysed companies is a small percentage share of non-compliance costs. The dominance of compliance costs over non-compliance costs in all three companies may indicate a small number of errors in their respective business processes as well as a very efficient quality cost structure.

The service delivery phase of the service process generates the highest proportion of quality costs in the surveyed enterprises (Q2). In the water supply and sewage disposal service provider, 92.81% of all quality costs arise in this phase (the highest proportion of prevention costs); in the temporary work agency and the construction company, it is 72.9% (the highest proportion of prevention costs) and 43.25% (assessment costs dominate), respectively.

Prevention costs incurred during the service delivery phase comprise such cost items as maintenance, inspections and repairs, as well as ensuring adequate conditions for the provision of services.

The most quality costs arise in the core processes of the surveyed service enterprises (Q3). In the water supply and sewage disposal company, quality costs dominate in the processes of potable water production as well as sewage collection and treatment. In the employment agency, the highest costs arise in the "carer-in-Germany" and order fulfilment processes; and in the construction company, the highest quality costs occur in the contract performance and maintenance service processes. Ancillary processes also play important roles in the latter two companies.

In summary, the procedure adopted for estimating quality costs made it possible to establish their level in the surveyed service companies and to carry out a multidimensional analysis of them. The obtained results indicate that quality costs account for approximately 1/3 of total costs incurred by the companies participating in the research. Quality costing presented in this way can constitute a point of reference for an in-depth analysis of any service organisation.

The author recommends the continuation of the research presented in this publication. This should allow for the identification of the structures of quality costs and their calculation in service enterprises providing other types of services (e.g. medical, tourist, hospitality, educational, transport, computer or automotive services).

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