Knowledge Creation on Costs in the Context of Economic Environment Changes: Perspective of SMEs

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Abstract: The increasingly challenging geopolitical situation and the growing frequency of various unpredictable crisis threats make the future uncertain and unstable. On the one hand, the sharp rise in raw material prices and labor costs, supply chain issues, pressures to implement sustainable development principles and non-financial reporting, and the transition to a circular economy model is increasing cost awareness and, consequently, the demand for more detailed cost data. On the other hand, the rapid development of technology and digitization, along with the evolution of Industry 5.0, means that business managers increasingly recognize knowledge as an indispensable element of business management. Knowledge management is an excellent tool for streamlining processes, which each company constructs based on its goals, needs, and capabilities, essential for effective planning and proper organizational functioning. Therefore, enterprises are compelled to continuously self-improve and seek new management methods, including cost management. This article raises a research question concerning how cost knowledge is created in SMEs in the context of changes occurring in the economic environment. The article aims to analyze the use of cost knowledge in managerial decision-making in medium-sized enterprises operating in the Polish SME market. The research methods used to achieve this goal include participant observation, critical analysis, and synthesis. The empirical research was conducted in the form of surveys carried out using CATI/CAWI methods among 400 randomly selected medium-sized enterprises operating in Poland, along with personal interviews. The research results suggest managers should focus on acquiring broader knowledge about incurred costs. Many surveyed enterprises still use traditional cost accounting solutions, providing data necessary solely for reporting purposes. The potential and tools offered by cost accounting are used to a limited extent. This indicates a need to continue and expand the discussion on the usefulness of detailed knowledge about incurred and forecasted costs in decision-making processes. The research findings presented in the article are intended for both researchers and practitioners. The article concludes with practical recommendations for enterprises and future research tasks. It is a continuation of the author's research on the role of cost accounting in managing SMEs in Poland.

Keywords: Industry 5.0, CE, Cost Accounting, SME

1. Introduction

Running a business is associated with significant challenges nowadays. Businesses must adapt to increasingly rapid changes in technology, development, and climate. Just as companies got used to the concept of Industry 4.0 (for more, see Łada, Kozarkiewicz, 2021; Łada 2021; Remlein et al., 2022), there is already a growing vision of further changes dubbed Industry 5.0, which emphasizes harnessing human skills alongside the technological potential of robots and intelligent systems.

The numerous alarming and threatening crisis phenomena that have occurred in the past decade disrupt trade flows and destabilize oli markets and other commodities.

There is an increase in tensions in financial markets and a sharp rise in commodity prices. Growing economic uncertainty, slow economic growth, and rising inflation heighten the risk of business insolvency. This leads to increased uncertainty about the future and the effective operation of companies (Schaltegger, 2020; Becla and Czaja, 2022; Meadows et al., 2022).

In recent years, there has also been increasing pressure to conduct business in line with the concept of sustainable development (Eckert and Kovalevska, 2021; Weizsäcker and Wijkman, 2018). ESG reporting is one of the most frequently addressed issues in managing contemporary enterprises. The amount of scientific research conducted on the popularization of sustainable development, social responsibility, and ESG reporting is impressive and growing yearly (for example Robertson et al., 2023; Arena et al., 2023; Schaltegger et al., 2022; Schaltegger 2020; Tettamanzi et al., 2022; Elalfy et al., 2021; Songini et al., 2021; Kwakye et al., 2018). Additionally, relevant legal regulations are being implemented. European Union (EU) countries have committed to achieving climate neutrality by 2050, fulfilling their obligations arising under the Paris Agreement of 2015. As resources become increasingly depleted, a growing emphasis is on transforming businesses into a circular economy model.

The volatility of the business environment implies new knowledge about environmental instability and the necessity of implementing projects that adapt the company's business strategy to the challenges of the economic environment (Łęgowik-Świącik, 2021).

Knowledge is becoming the driving force behind business development and a key factor in creativity across all areas of life. An increasing number of companies are being forced to seek new management solutions to effectively meet contemporary challenges. Effective management in such an environment requires up-to-date and comprehensive information from various systems, including accounting. Detailed knowledge about incurred costs is becoming increasingly essential. This knowledge enables more effective and rational managerial decisions. Therefore, one of the key aspects of business management is tackling the challenges associated with acquiring and disseminating detailed cost knowledge, which allows for the implementation of necessary changes for efficient operation. This study aims to illustrate the extent to which cost knowledge is utilized in managerial decision-making by medium-sized enterprises in the SME sector operating in Poland.

2. Industry 5.0 - Opportunity or Threat for Businesses?

In 2021, the first comprehensive vision of the 5th Industrial Revolution was created as a report by the European Commission titled "Industry 5.0: Towards a Sustainable, Human-centric, and Resilient European Industry". This report attempts to comprehensively define the concept of Industry 5.0.

In the report, Industry 5.0 is portrayed as an evolutionary step in industry development, with a focus on social and environmental aspects, as well as the integration of advanced technologies with human needs (Di Nardo and Haoxuan, 2021; Longo et al., 2020; Elfar et al., 2021; Jamwal et al., 2021; Xu et al., 2021; Bai et al., 2020).

Industry 5.0 is envisioned as a response to the evolving reality and its challenges. A key element of this approach is the organization's ability to adapt and be flexible to changing conditions. Real-time data analysis allows production systems to adjust to shifting market conditions, eliminating overproduction and reducing costs. It paves the way for personalized production and on-demand manufacturing, contributing to increased competitiveness and sustainable development of enterprises (Yordanova, 2021; Zychowicz, 2023; Kwiek, 2022). Industry 5.0 is a construct that aligns well with the political agenda pursued by the European Union. It combines new technologies and digitization with an environmentally friendly approach, circular economy principles, and the creation of an "ecosystem" of companies and partners.

However, the implementation of Industry 5.0 brings many challenges. One of them is the proper preparation of workers to effectively collaborate with robots and use modern technologies. This requires flexibility from employees, as well as the ability to learn quickly and adapt to new situations. Therefore, investing in training is essential to enable employees to acquire the necessary competencies.

Another challenge is the integration of information and technological systems in manufacturing facilities. Industry 5.0 envisages sophisticated information systems, artificial intelligence, robotics, and the Internet of Things, which must be integrated and operate harmoniously. This requires the involvement of engineers, IT specialists, and automation experts (Saniuk, Grabowska, 2023). As Industry 5.0 involves collecting and processing vast amounts of information, ensuring data security and protection against cyber-attacks is essential. The development of Industry 5.0 also impacts changes in the accounting system. The level of organization of the accounting system in many Polish companies still reflects the limited organizational and financial potential presented at the beginning of their operations and does not evolve despite dynamic development. Therefore, it is necessary to adapt accounting systems to new requirements. Without this, companies will not be able to meet the challenges of the Industry 5.0 era.

3. The Circular Economy (CE)

The concept of the Circular Economy has garnered significant attention over the past few decades. Definitions of the Circular Economy presented in global literature reflect the evolution of its development and implementation (for more details, see Kulczycka and Pędziwiatr, 2019). The Circular Economy has also become one of the main strategic directions for thinking about the development of the European Union since the announcement of the action plan by the European Commission in 2015. Since then, the Commission has issued a series of directives concerning various aspects of the Circular Economy, and in 2020, it published a new, even more ambitious action plan for the Circular Economy. This is a part of the European Green Deal and efforts to achieve climate neutrality and resource efficiency by 2050. The Polish government adopted a Roadmap for the transition to a Circular Economy in 2019, aligning with these efforts.

In global literature and publications of many international organizations, there is also an indication of the role and connection of the Circular Economy with decoupling (separating economic growth from the use of limited

resources through breakthrough technologies). However, this may require radical structural modifications in existing business models and radical organizational changes (Baker et al., 2023; Cano-Rubio et al., 2021).

Nevertheless, there is still a research gap at the micro level regarding the impact of the Circular Economy on financial performance. More and more companies are incorporating circularity principles into their strategies due to regulations and increased societal interest. For companies to succeed in their transition from a linear economy and a take-make-dispose mindset toward a circular economy, it is essential to be able to measure and report progress. The diversity of definitions of the Circular Economy (over 200 definitions according to Kulczycka and Pędziwiatr, 2019) complicates efforts to develop standards and indicators. Due to the diverse definitions, the question of "what to measure?" remains unclear, increasing the risk of choosing different indicators and yielding inconsistent conclusions (Degerstedt and Schaumberger, 2022; Moraga et al., 2019).

Circular Economy models have the potential to create value, reduce costs, generate revenue, support the legitimacy of firms (Park et al., 2010; Tukker, 2015; Urbinati et al., 2017), and provide environmental benefits (Lieder and Rashid, 2016; Moraga et al., 2019; Murray et al., 2017; see also Aureli et al., 2023). However, according to Rodrigue and Picard (2022), managers perceive formal accounting procedures as limiting and seek alternative management accounting systems to meet the needs of a more inclusive and holistic system that can support social and environmental progress.

The transformation of a company's business model into a Circular Economy requires more detailed analytical knowledge regarding the incurred costs. Due to the fact that CE primarily aims to eliminate waste, it involves only two streams: raw materials (inputs) and main and by-product streams. Therefore, it is necessary to value the product streams. According to Uberman's opinion (2019), one of the most reliable methods is the benchmark method. However, the requirement of its reality must be remembered. The fundamental issue in the practical application of benchmarking methods in valuing revenues and production costs of combined products is that they are not aligned with methods used in financial accounting. For this reason, their implementation is only possible when a company has an independent unit responsible for managerial accounting (Uberman, 2019). When redesigning products to be more circular, it is essential to consider budgeting and costs associated with regeneration at the beginning stage of the production process. Cost accounting must include, in addition to direct and indirect costs, overhead costs, delivery and distribution costs, as well as new regeneration costs, to accurately apply cost control and cost determination methods.

It is also necessary to analyze the costs associated with greenhouse gas emissions within the framework of carbon accounting (Kazemian et al., 2022; Burritt et al., 2023; Higashida, 2020). Although it is widely acknowledged that carbon accounting practices are essential for improving corporate sustainability performance, there is little interest in disclosing information externally. Another important aspect emphasized in this regard is the expansion of information beyond the organization to include supply chains. Given that the sustainability of supply chains significantly impacts the sustainable development of products and overall operations, Material Flow Cost Accounting (Burritt and Schaltegger, 2014; Marco-Fondevila et al., 2020) is becoming increasingly important.

4. The Methodology

The primary objective of the research undertaken in this study is to analyze cost awareness and the extent of utilization of cost data in the decision-making process of enterprises in the context of changes occurring in the economic environment. The research focuses on enterprises in the SME sector, which constitutes about 99.8% of all businesses in Poland. Micro, small, and medium-sized enterprises drive the economy, accounting for 43.6% of the national GDP (Gruszkowski, 2023). They are thus a vital element and a key source of economic growth, dynamism, and flexibility. Their operation represents healthy competition and reflects the entrepreneurial spirit of society. Entrepreneurs in this sector typically concentrate on a relatively narrow area of activity, enabling them to contribute to the dynamic development of specific fields. They can develop solutions that large enterprises might overlook during mass production.

The vast majority of SMEs are micro and small enterprises, which face numerous threats and barriers often stemming from their structure and limitations. Most of these businesses use simplified record-keeping forms for tax purposes only, resulting in access to a significantly smaller pool of information to support decision-making processes and limited knowledge about incurred costs. Small enterprises that keep accounting books often limit themselves to recording costs for reporting purposes only. Consequently, the target research group selected for this study comprises medium-sized enterprises employing between 50-250 people. These enterprises typically

maintain accounting books and increasingly go beyond cost reporting to adopt solutions useful in cost management.

The empirical results presented in this study are part of ongoing research conducted by the author since 2018 on the use of pro-quality cost accounting by SMEs operating in Poland.

To achieve this goal, a triangulation of research methods was applied. The theoretical part was conducted based on a critical analysis of the literature. Critical literature analysis is a research method that presents existing theoretical and empirical approaches and demonstrates how to prepare research work aimed at expanding existing knowledge or developing a specific research area.

This allows for the presentation of a new approach to the research objective and indicates the validity and novelty of the adopted solutions. Critical literature analysis should, therefore, be regarded as a synthetic, objective, and reliable summary of a specific theoretical area. The descriptive analysis method was used to describe the research methodology adopted in the studies conducted in this study. The qualitative research method was employed to answer the research question, including a survey and unstructured interviews with practitioners. Conducting survey research is empirical as it enables the analysis and evaluation of the examined phenomena.

The research process involved conducting pilot studies to select the target group of enterprises, developing a survey questionnaire, and implementing the survey research. Following the pilot studies, the target group was identified as SMEs operating in Poland with 50 to 249 employees (medium-sized enterprises). Due to the scope of the survey research, the surveys were directed toward the managerial staff. The survey research was conducted in 2019 and is currently being repeated.

For some time now, unstructured interviews with practitioners have also been conducted regarding the solutions used in cost accounting and the level of interest in contemporary forms of cost accounting. Since last year, to supplement the knowledge about the level of interest of enterprises in the concept of sustainable development and the scope of actions taken in this regard, especially concerning reporting, the surveys and interviews have been expanded to include questions in this area. The interviews are conducted during meetings at scientific conferences, controllers' congresses and by seeking potential speakers at career fairs or on the LinkedIn platform.

5. Results of Empirical Research and Discussion

The survey was conducted on a representative group of 400 medium-sized companies from the manufacturing, services, and manufacturing services sectors. The study had a nationwide scope. An ordinal scale and a dichotomous scale were used in the survey. Therefore, the formula for the structure index was deemed appropriate for determining the minimum sample size. Assuming a 5% margin of error, the minimum sample size was determined to be 385. The obtained sample size of N=400 meets this requirement. The questions used in the questionnaire were verified for quality using Cronbach's alpha. The resulting value of $\alpha = 0.822$ for aggregated data and consistently exceeding 0.700 for individual items indicates that the scales and sequence of questions used are appropriate.

Given the scale used in the study, Wilcoxon signed-rank tests and Mann-Whitney U tests were employed to compare the assessments of individual objectives. The ϕ – Yule coefficient, based on the $\chi 2$ statistic, was used to examine correlations. For the tests applied in the study, a significance level of 0.05 was adopted (see Biadacz 2021, Biadacz 2024).

Due to the research objective pursued in this article, questions regarding the cost accounting solutions used by the examined SME entities and the statements obtained from unstructured interviews are analyzed. In the survey research, one part was dedicated to cost accounting. Three of the surveyed questions were concerned with the cost accounting method for operational activities. Among the 400 surveyed enterprises, 211 (52.75%) use simplified cost accounting, mostly in the form of cost types (chart of accounts 4) (188 respondents). These results are not surprising, as it is a normal trend that has been maintained for years.

Enterprises that indicated cost accounting in the form of cost types (a total of 377 enterprises) were asked to specify how it was expanded to adapt to the needs of the enterprise. The obtained results are summarized in Fig. 1.

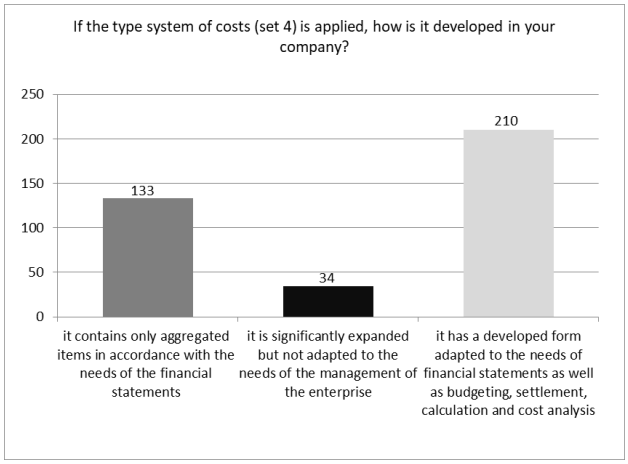

Figure 1: The degree of expansion of the type system of costs in the surveyed enterprise

Note(s): Twenty-three enterprises keep simplified cost accounting only in the costs by functions system (only chart of accounts 5).

Source: own study

Referring to this question, nearly 56% of the surveyed enterprises use an expanded cost type structure adapted for both reporting and managerial purposes, 9.02%, despite having an expanded structure of cost types, do not apply it for managing the enterprise, and 35.28% of the respondents use a cost type structure containing only aggregated items according to the needs of financial reporting. This means that enterprises moderately recognize the need to acquire broader knowledge regarding incurred costs.

The next question referred to the type of cost accounting used. Five of the most commonly applied cost accounting systems in business practice were listed. Respondents were allowed to select more than one solution. The responses are presented in Fig. 2.

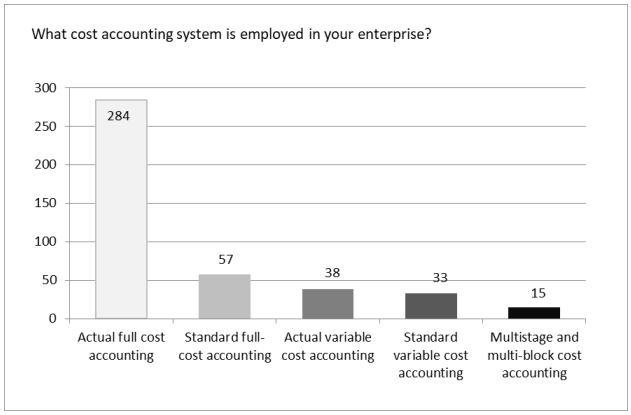

Figure 2: Cost Accounting Systems Used in the Enterprise (400 surveyed enterprises)

Note(s): Respondents could indicate more than one answer

Source: own study

After analyzing the responses to the above question, it is noteworthy that the majority of surveyed firms use the full actual cost accounting system (71%). Although much less commonly chosen, the second most preferred solution is the full standard cost accounting (14.25%). The use of actual variable cost accounting was indicated by 9.5% of respondents, while 8.25% indicated standard variable cost accounting. The multi-block cost accounting system is the least popular among respondents, with only 3.75% using it.

Regarding the method of allocating common costs used in the enterprise, 44% of respondents (176 out of 400 surveyed) indicated that they allocate common costs to departments. A similar number of companies allocates common costs to products/services (112 out of 400 respondents, 28%) as to tasks/projects (103 out of 400 respondents, 25.65%). The complete distribution of responses is presented in Fig. 3.

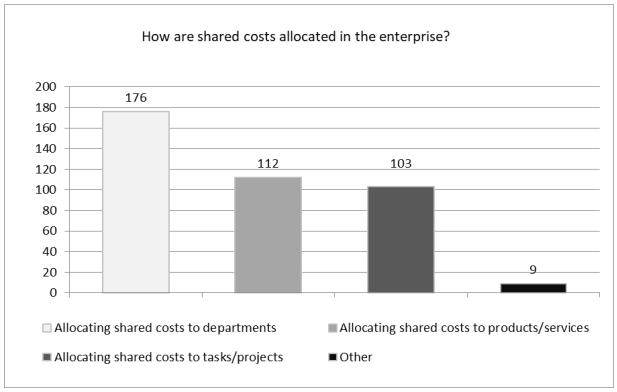

Figure 3: Allocation of shared costs in the enterprise.

Source: own study

One of the important issues for these studies relates to the systems used. In response to the question, "Do you have information systems that allow processing and storing a wide range of data?" as many as 349 respondents answered negatively. Considering the changes occurring in the environment and the perspective of transitioning to a circular economy and adapting enterprises to the Industry 5.0 concept, this cannot be considered a positive phenomenon.

The next question pertains to the calculation of the unit cost of the production of goods (provision of services). In this case, the results obtained are also unsatisfactory, as only 19.25% confirmed that they use cost accounting. A total of 323 respondents answered that they do not prepare calculations for the actual cost of producing products (provision of services). However, the cost of production of a product or provision of a service is an extremely important indicator for enterprises of this profile. It is used for various analyses both at the reporting and decision-making levels. It plays a crucial role in setting prices, managing resources, and business strategies in the enterprise. Knowing the unit cost of producing a product allows for setting competitive selling prices and identifying areas where costs can be reduced without compromising product quality. As a result, companies can improve their profit margins and increase competitiveness in the market. Efficient management of the cost of production of a product/service can positively impact the competitiveness of the company, its long-term stability, and its development. Therefore, different responses would be expected in the above area.

The responses to the question regarding the role of cost accounting in the enterprise can be moderately positive. The full distribution of responses regarding the role of cost accounting is presented in Fig. 4.

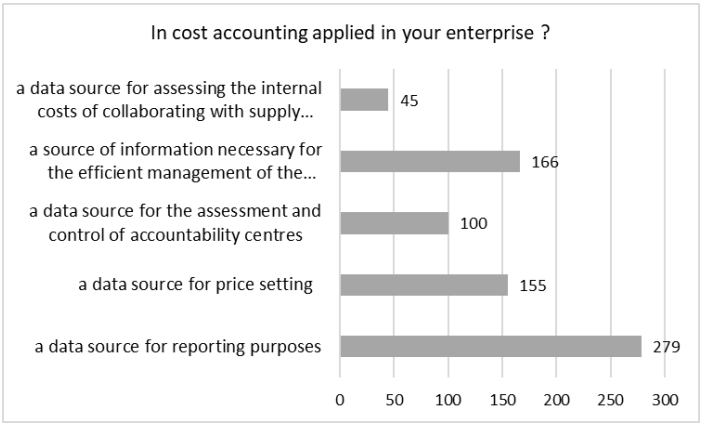

Figure 4: Role of cost accounting in enterprises

Note(s): Respondents could indicate more than one answer

Source: own study

After analyzing the respondents' answers, the following conclusions can be drawn: for 69.70% of respondents, cost accounting serves as a data source for reporting purposes; for 41.5%, it is a source of information necessary for effective enterprise management; for 38.75%, it is a source of data for pricing decisions. Cost accounting is

used by 25% of respondents for assessing and controlling responsibility centers, and by 11.25% for assessing internal costs of cooperation with partners in the supply chain.

These results are consistent with earlier research conducted in this area (Nesterak et al., 2017; Świderska, 2016). This is also confirmed by numerous case studies and publications referring to specific enterprises.

From the conducted research, it emerges that a small percentage of respondents indicate the use of the multi-block contribution margin cost accounting (28%). 72% do not use this solution. The full distribution of obtained responses is presented in Table 1.

Table 1: The use of multi-block cost coverage margin analysis in enterprises.

Is the multi-block cost coverage margin analysis used in the enterprise?	Total 400
A. Yes:	112
a) According to customer segments	24
b) According to product categories/goods/services	81
c) According to sales regions	7
B. No. It is not used	288

Source: own study

Supplementary to the research was a question concerning the application of selected elements of cost accounting. The results are presented in Fig.5. From the respondents' opinions, it appears that various solutions are being used. The majority, about 37.25% of surveyed enterprises, apply gross margin calculation, while 30.5% allocate indirect costs to cost centers. About 23% divide costs within cost centers into fixed and variable, and a similar percentage use planned costs for each center. Significantly fewer respondents identify and monitor the utilization level of production capacity (14.75%) or conduct variance analysis for all cost centers.

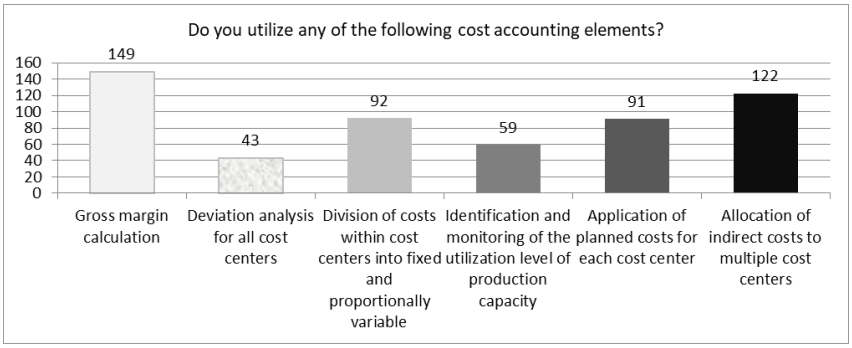

Figure 5: Utilization level of selected cost accounting elements.

Note(s): Respondents could indicate more than one answer

Source: own study

Surprisingly, 394 respondents answered affirmatively to the question of whether the information received from cost accounting is useful for managerial decision-making. This somewhat contradicts the earlier statement that cost accounting is primarily used for reporting purposes, and only 41.5% consider it a source of information necessary for the effective management of the enterprise. Respondents indicated that the data are useful for making both strategic (36%) and operational (47.25%) managerial decisions, as well as for efficient and detailed cost control and precise planning of future actions (both 48.75% of enterprises).

These results indicate that many medium-sized enterprises still use cost accounting only for reporting purposes. This is also confirmed by respondents' opinions from unstructured interviews.

The vast majority of respondents use cost accounting tools to a limited extent to support managerial decision-making. Contemporary variations of cost accounting arouse interest, although, in most cases, companies do not anticipate the possibility of implementing them in the near future. Regarding questions about sustainable development and reporting, only 4 surveyed companies indicated that they had taken action in this area.

6. Conclusion

As indicated by the above considerations, cost accounting should evolve, adapting to current economic, social, and environmental conditions. Unfortunately, this is not the case in a significant portion of the surveyed enterprises. The utilization of cost accounting is insufficient for making managerial decisions in today's volatile and unpredictable economic environment. Most surveyed enterprises rely solely on reporting cost accounting, which often fails to provide accurate information about the costs of resources, products, customers, or partners. Additionally, the calculation of product or service production costs and the utilization of production capacities are not conducted in many cases.

Relying on incomplete or inaccurate cost information results in making misguided decisions. Supporting the implementation of the intended strategy can be contemporary variations of cost accounting, serving as tools for strategic cost management and sustainable managerial accounting. While cost awareness has increased in recent years, interest in advanced cost accounting solutions and cost management is insufficient compared to the demands posed by the contemporary market and legislation. Therefore, it is crucial to raise awareness among the managerial staff of these enterprises about the necessity of implementing new tools adequate to current conditions.

The partial results presented above from the research indicate that selected cost accounting tools are not sufficiently utilized in the practices by medium-sized enterprises operating in Poland. It is therefore recommended that efforts be made to increase cost awareness among the management of these enterprises and convince them to implement new cost accounting solutions. These efforts will contribute to more effective enterprise management and operation in accordance with the principles of sustainable development.

This is essential because all enterprises, sooner or later, will need to adapt to new conditions and meet the challenges brought by the concept of Industry 5.0 and the increasingly emphasized necessity of transitioning to a circular economy model and reporting in this regard in order to survive in the market.

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