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Assessing the Impact of AI Solutions' Ethical Issues on Performance in Managerial Accounting

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Abstract: In the contemporary, constantly changing business environment characterized by globalization, openness, and competitiveness, implementing different processes of new information technologies has become a competitive advantage. The field of managerial accounting is a successful example of the implementation of artificial intelligence in operations and the decision-making process based on accounting information. However, ethical issues within managerial accounting and those added through the implementation of artificial intelligence need to be addressed carefully. In this paper, the main objective is to investigate these ethical issues regarding the perception of accountants on the usefulness, efficiency, and effectiveness of implementing artificial intelligence in managerial accounting. To investigate these effects, we conducted a study based on a questionnaire among 396 accountants in Romania who use various artificial intelligence solutions in their activities in managerial accounting. The results of structural equation modeling showed that the ethical issues of autonomy, responsibility, and trust significantly influence the perceived usefulness and the performance of artificial intelligence solutions. The research concludes that artificial intelligence solutions solve many ethical issues in managerial accounting. Still, through their design and application, artificial intelligence solutions can create other ethical problems specific to managerial accounting and business ethics. Therefore, despite all the barriers and reluctance of professionals, artificial intelligence will substantially impact managerial accounting in the years to come.

Keywords: ethical issues; artificial intelligence; managerial accounting; usefulness; efficiency; effectiveness

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1. Introduction

In the fourth technological revolution, artificial intelligence (AI) technology has a crucial role in affecting all areas and activities. Managerial accounting (MA) cannot be an exception to this trend, as AI solutions are integrated with the entire information system of the organization [1]. While most AI solutions in MA are currently used for data collection, processing, interpretation, and repetitive operational decision-making, these technologies may gain independent learning, enhancing tactical or strategic decision-making.

As AI solutions are implemented in increasingly more organizational activities, the concept of AI solutions' ethics is a topical issue in the MA literature. Neglecting the ethical issues in AI solutions leads to organizational problems. Implementing AI solutions in organizational activities and processes has led to ethical issues related to AI solutions' security, safety, confidentiality, transparency, and integrity [2]. The progress generated by AI solutions has brought organizations significant advantages in various areas. However, the use of AI capabilities leads to several ethical issues. In addition to the classical methods (cost analysis, process cost, cost orders, absorption cost, analysis of residual income, analysis of return on investment flow) [3] and innovative methods used in accounting (activity-based cost, target cost, cost life cycle, economic added value, and balanced scorecard) [4–8], a reliable AI solution must take into account all these ethical issues [9] to be effective and efficient.

Investigating the gaps concerning the ethics of using AI in MA, the paper examines how the ethical issues influence AI solutions' usefulness, efficiency, and effectiveness. We propose a theoretical model tested through structural equation modeling (SEM) to investigate these effects. The paper is structured into five sections. First, a literature review follows the Introduction. The third section presents the research design and methodology, and the following sections show the research results, discussions, and conclusions. Finally, the paper concludes with the limitations and future research directions.

2. Literature Review

The purpose of MA is to collect, process, analyze, interpret, and communicate information to managers [10,11]. However, MA specialists believe traditional costing and cost quantification processes are incompatible with new information technologies, particularly AI solutions [12]. Furthermore, classical costing procedures lead to unnecessary information about what has happened in the past and are inefficient in estimating future phenomena necessary for the decision-making process [13,14]. Therefore, it is essential to establish a new paradigm in MA by adapting to digital technologies and modifying tools, techniques, and methods to increase the efficiency and effectiveness of managerial decisions [14].

Modern MA differs from the early stages of MA by considering the operational issues and the tactical and strategic levels of managerial decisions. MA provides the accounting and financial information necessary to make decisions at all organizational levels, ensuring management and strategic control. Risk management currently relies on information received from MA, and AI solutions can improve decisions made in both areas (MA and risk management).

AI is a cognitive technology with very high applicability in various fields, becoming increasingly relevant for application in MA [15]. Davenport and Ronanki [16] showed that organizations use AI to automate processes, collect data, process and interpret them, provide information, and connect in real-time with all stakeholders. Chukwuani and Egiyi [17] highlighted the role of MA in modern business process automation and presented how automation can radically change MA.

In their study, Lee and Tajudeen [18] showed that AI is also adopted by smaller organizations with fewer financial resources to store and fully automate the process of capturing information. Kokina and Davenport [15] classified the level of AI technologies into four other categories: human element support, automation of repetitive tasks, context awareness and recognition, and self-conscious intelligence. Although AI technologies have not yet reached the last category depending on the level of intelligence (self-conscious), MA can use the other three categories to conduct accounting and decision-making operations.

AI solutions can provide information, create forecasts, and provide decision-making alternatives for a given context [19]. Therefore, adopting AI in organizational activities and processes will be a competitive advantage [20]. In addition, many researchers pointed out that adopting AI in the organization's current activities resulted in specific ethical and legal challenges [12,21,22]. Cubric [21] and Rubles Carrillo [21] reviewed the economic, legal, ethical, and technical challenges posed by implementing AI in organizational processes. Cubric [21] mentioned the cognitive and social barriers generated by the reluctance of human professionals, the substitution of the workforce for automated means of production, the ethical issues of privacy, the confidentiality of individuals concerning AI, and the responsibility of decisions made—based on AI or decisions made directly by AI solutions, without human control. However, AI solutions do not destroy jobs, including in MA. On the contrary, implementing AI solutions leads to the disappearance of jobs that require low skills and competencies in MA and generates jobs that require high skills and competencies in MA and IT. Although AI solutions are equal to and exceed human intelligence in certain areas (collecting, processing, and analyzing a large volume of complex data), human intelligence cannot be replaced in certain areas (making decisions in situations where human intuition is required, as well as decision-making) [23–25].

The widespread application of AI in accounting offers several advantages in effectiveness, efficiency, and accuracy [26–33]. However, some authors [34] consider the development and implementation of AI in MA a double-edged sword. Implementing AI in MA has generated the loss of jobs with a low level of difficulty.

Omoteso [35] highlighted the benefits of using AI technologies in MA efficiency, effectiveness, communication, staff training, beginner experience development, and reduced decision-making time. Chukwuani and Egiyi [17] suggested that AI improved MA by minimizing fraud and enhancing the quality of information. AI in MA can provide a significant competitive advantage by improving the quality of decisions [36]. The disadvantages of using AI in MA [35] include prolonging decision-making processes due to exploring a more extensive set of data, the very high cost of implementing AI solutions, and the need for special IT skills to update and maintain devices. Furthermore, using AI in MA inhibits the learning of hard skills and professional reasoning and enhances the risk of data leakage to competitors. Bizarro et al. [37] considered that AI cannot replace human resource competencies in professional reasoning and intuition-based decisions in the coming decades. Zemankova [38] pointed out that AI in MA can reduce the workforce and present ethical issues related to human prejudice embedded in AI technology. Furthermore, Makridakis [36] pointed out the disadvantages of using AI in MA, increasing unemployment among accountants and several ethical issues.

Currently, the main advantage of AI is its ability to collect unstructured data and process and provide information to increase the efficiency and effectiveness of decisions [39]. However, until a new technological leap, decisions that involve taking into account variables that cannot be digitized, critical thinking, and anticipatory and intuitive thinking remain tasks for human resources in accounting [39–42].

3. Research Design

3.1. Selected Variables and Hypotheses

Various authors [2,43–47] inventoried the ethical issues when designing and implementing AI solutions and regarding their regulation mechanisms. Table 1 presents the ethical issues that AI solutions may face in MA, with trust being the main vector of all ethical issues in accounting.

Table 1. Grouping the ethical issues of using AI in MA.

Category	Ethical Issue	Description
Ethical issues concerning transparency, confidentiality, and anonymity (TCP)	Transparency	Adopting transparency in AI solutions ensures real-time information [46] of all stakeholders on accounting operations and decisions.
	Confidentiality	Potential misuse of information by those who have access to this information could lead to significant threats [47].
	Privacy	The ethical issue of privacy is about ensuring non-intrusion into privacy through the use of AI solutions [44].
Ethical issues concerning the security, safety, and accuracy of accounting information (SSC)	Safety	Safety in AI solutions aims at the safety of people who use the results of AI solutions in MA [43].
	Security	The ethical issue of security concerns both the issues of information security prior to the implementation of AI solutions and those arising from the adoption of AI solutions [45].
	Correctness	Correctness is the hallmark of AI solutions to make a fair decision when conflicting requirements arise [46].
Ethical issues concerning responsibility, autonomy, and trust (RAT)	Responsibility	The characteristic of responsibility is determining the shared responsibility between the user and the AI solutions [46].
	Autonomy	The ability of computers to make real-time decisions based on data without human involvement [47].
	Trust	Trust is a way to ensure user-friendliness that enhances reliability by eliminating the risks of using an AI solution [43].

Source: elaborated by the author based on [2,43–47].

Based on the results of previous research [2,43–47], in this paper, we grouped these ethical issues of the AI solutions used in MA into three categories: ethical issues regarding transparency, confidentiality, and privacy (TCP), ethical issues concerning the safety, security and accuracy of accounting information (SSC), and ethical issues related to responsibility, autonomy, and trust (RAT). Therefore, we propose the following hypothesis:

Hypothesis 1 (H1). *Among the ethical issues, transparency, security, and trust are the most important antecedents that characterize the ethical issues of AI in MA in the users' perception.*

The ethical issues relate to the usefulness and performance of AI solutions in MA. For example, the usefulness of a product that incorporates information technology based on convenience and informativeness is a concept that we have retrieved from the literature on the acceptance of new technologies [48–52]. On the other hand, the performance of software products (efficiency and effectiveness) was retrieved from the literature on the engineering requirements of software solutions [53–55].

Based on these considerations, we propose the following hypotheses:

Hypothesis 2 (H2). *The most positive influence on AI usefulness and performance is exerted by the ethical issues of responsibility, autonomy, and trust (RAT) in users' perception.*

Hypothesis 3 (H3). *Usefulness is a mediating variable between the ethical issues of using AI in MA and the performance perceived by users.*

Figure 1 shows the theoretical model.

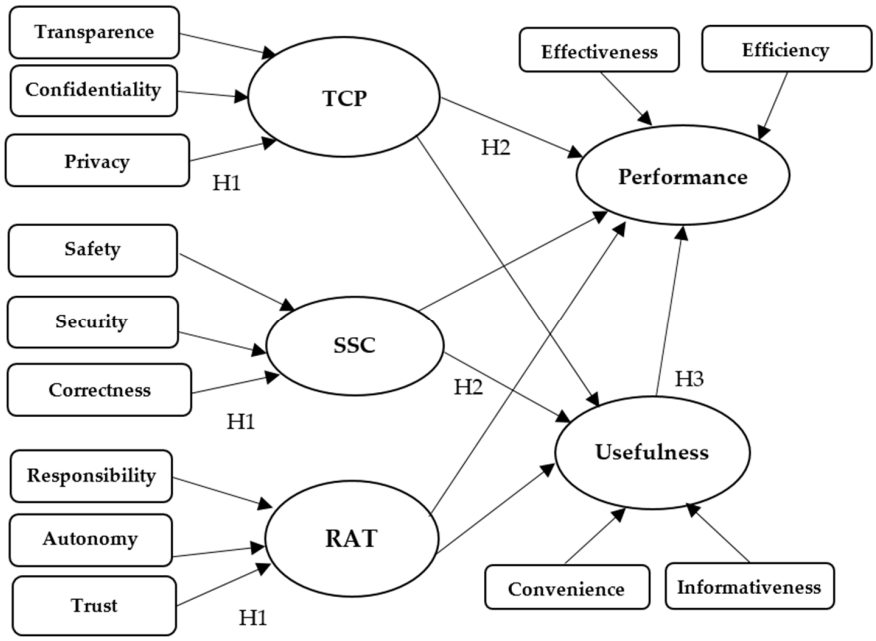

Figure 1. Conceptual model. Source: elaborated by the author based on [2,43–55].

3.2. Selected Sample and Method

In order to investigate the influences of the ethical issues of AI solutions on the usefulness, effectiveness, and efficiency of its users, we conducted a questionnaire-based study among 396 Romanian accountants who use various AI solutions in their activities. The survey was conducted online according to the methodology proposed by Dillman [56]. We used a Likert scale with five levels to facilitate data generalization. The scales were 1 to 5 (1—non-important, 5—most important) for ethical issues and 1 to 5 (1—very poor, 5—very good) for usefulness and performance variables.

Table 2 presents the descriptive statistics for the variables proposed in the theoretical model.

Table 2. Descriptive statistics.

	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
Sex	1	2	1.46	0.499	0.142	−1.990
Age	1	3	2.04	0.752	−0.066	−1.225
Transparency	1	5	3.70	0.881	−0.049	−0.707
Privacy	1	5	3.84	0.891	−0.476	−0.149
Security	1	5	3.73	1.043	−0.550	−0.241
Safety	2	5	3.96	0.878	−0.481	−0.512
Correctness	1	5	3.87	0.943	−0.518	−0.435
Responsibility	2	5	4.00	0.948	−0.543	−0.742
Autonomy	2	5	3.83	0.997	−0.390	−0.923
Trust	1	5	3.72	0.997	−0.381	−0.507
Convenience	1	5	3.55	0.965	−0.111	−0.802
Informativeness	1	5	3.82	0.878	−0.501	−0.136
Efficiency	1	5	3.86	0.943	−0.393	−0.703
Effectiveness	1	5	3.30	1.301	−0.199	−1.077

Source: elaborated by the author using SPSS v.20 (IBM, Armonk, NY, USA).

We used SEM to test the theoretical model and determine the influences within the theoretical model, similarly to other authors [48–52]. In addition, we defined TCP, SSC, RAT, usefulness, and performance as latent variables. These latent variables are based on the observable exogenous variables representing the questionnaire items found in Table 1.

4. Results

We used a dedicated software SmartPLS v3.0 (SmartPLS GmbH, Oststeinbek, Germany) for SEM in the partial least-squares variant to investigate the influences established within the theoretical model. Figure 2 illustrates the model obtained using SEM.

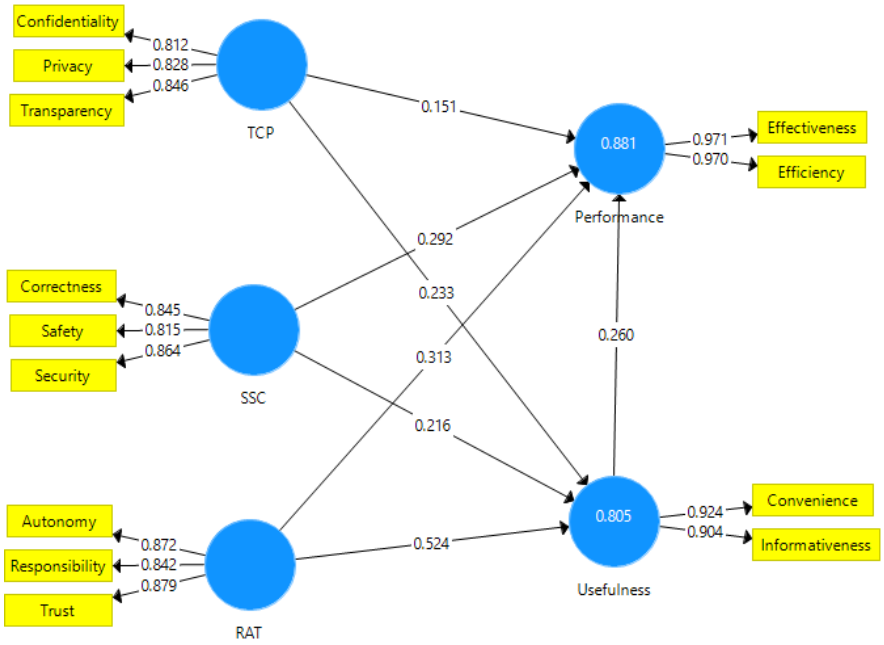

Figure 2. Empirical model. Source: elaborated by the author using SmartPLS v3.0 (SmartPLS GmbH, Oststeinbek, Germany).

To confirm the validity of H1, we analyzed outer loadings and outer weights (Table 3) for the antecedents of the latent variables that characterize the AI ethics in MA: TCP, SSC, and RAT.

Table 3. Outer loadings and weights for ethical issues.

Category	Issue	Outer Loadings	Outer Weights
TCP	Transparency	0.846	0.418
	Confidentiality	0.812	0.411
	Privacy	0.828	0.368
SSC	Safety	0.815	0.362
	Security	0.864	0.425
	Correctness	0.845	0.400
RAT	Responsibility	0.842	0.344
	Autonomy	0.872	0.378
	Trust	0.879	0.434

Source: elaborated by the author using SmartPLS v3.0 (SmartPLS GmbH, Oststeinbek, Germany).

Following the analysis of Table 2, transparency (0.846; 0.418), security (0.864; 0.425), and trust (0.879; 0.434) have the highest load and weight in each of the three categories (latent variables TCP, SSC, RAT), which confirms that H1 as valid.

The model was reliable and valid (Table 4), recording a value below 0.08 (0.078) for the standardized root-mean-squared residual (SRMR).

Table 4. Validity and reliability.

	Cronbach's Alpha	Composite Reliability	AVE
Performance	0.938	0.970	0.942
RAT	0.832	0.899	0.747
SSC	0.794	0.879	0.708
TCP	0.773	0.868	0.687
Usefulness	0.804	0.910	0.836

Source: elaborated by the author using SmartPLS v3.0 (SmartPLS GmbH, Oststeinbek, Germany).

All indicators in Table 4 show values that confirm good reliability and validity. According to Hair et al. [57], a model is valid and reliable when Cronbach's Alpha records values above 0.7, composite reliability records values above 0.8, and average variance extracted (VE) records values above 0.7.

Running a bootstrapping procedure, we calculated the path coefficients in the model for assessing ethical issues of AI use in MA (Table 5). The bootstrapping procedure results applied to the built model show that when using a two-tailed *t*-test (5% significance level), all the path coefficients are statistically significant (because t-statistics are larger than 1.96 and *p*-values are less than 0.05).

Table 5. Path coefficients.

	Original Sample	Standard Deviation	t-Statistics	*p*-Values
RAT -> Performance (H2)	0.313	0.034	9.168	0.000
RAT -> Usefulness (H2)	0.524	0.041	12.862	0.000
SSC -> Performance (H2)	0.292	0.036	8.101	0.000
SSC -> Usefulness (H2)	0.216	0.046	4.750	0.000
TCP -> Performance (H2)	0.151	0.031	4.893	0.000
TCP -> Usefulness (H2)	0.233	0.035	6.703	0.000
Usefulness -> Performance (H3)	0.260	0.034	7.553	0.000

Source: elaborated by the author using SmartPLS v3.0 (SmartPLS GmbH, Oststeinbek, Germany).

Analyzing the path coefficients in Table 5, among the latent variables that characterize the ethics of using AI in MA, the most substantial positive influence is exerted by responsibility, autonomy, and trust (RAT) in users' perception. All other latent variables significantly influence users' perception with path coefficients values above 0.2, t-statistics larger than 1.96, and *p*-values less than 0.05. Consequently, H2 is confirmed to be valid.

To determine the mediation effect, we calculated specific indirect effects of the variables that characterize the AI ethics on the performance perceived by users. Table 6 illustrates specific indirect effects.

Table 6. Specific indirect effects.

	Original Sample	Standard Deviation	t-Statistics	*p*-Values
RAT -> Usefulness -> Performance	0.136	0.020	6.985	0.000
TCP -> Usefulness -> Performance	0.061	0.013	4.706	0.000
SSC -> Usefulness -> Performance	0.056	0.015	3.869	0.000

Source: elaborated by the author using SmartPLS v3.0 (SmartPLS GmbH, Oststeinbek, Germany).

Table 6 shows a mediating effect between the ethical issues of AI used in MA and the performance perceived by users; however, this effect is small, and H3 is partially validated. Although t-statistics are larger than 1.96 and *p*-values are less than 0.05, path coefficients are in the range 0.056–0.136 (less than 0.15, which indicates a medium indirect effect).

The empirical model indicates significant influences of the ethical issues of AI used in MA on usefulness and performance. Therefore, managers must consider these ethical issues when implementing AI solutions in MA.

5. Discussion

Digital technologies transform MA activities and processes [58], impacting strategic cost management and decision-making [34]. AI technology will automate operational and repetitive activities (primary data collection and processing), allowing MA specialists to use their time for higher value-added activities such as tactical and strategic decisions [59]. MA specialists will need to develop cognitive skills in the IT field to use and monitor AI solutions. According to Pilipczuk [60], future MA specialists must have cognitive skills to be involved in strategic decision-making. The role of MA has been redefined through the transition to digital accounting, a transition that impacts budgeting, cost management, strategic approaches, and risk management [61].

AI facilitates the computerization and automation of the accounting process by providing speed, fast feedback, and improving the efficiency of accounting work. However, AI technology brings opportunities and risks to the development of MA, such as ethical issues related to the exposure of the decision-making process to machines that do not have human characteristics [62]. Following the research (H1), we found that ethical issues such as security, transparency, and trust, in particular, and other issues such as confidentiality, responsibility, privacy, correctness, and security can be barriers to implementing AI solutions in MA. These issues must be addressed in the future [43–47] so that AI technology can best serve the field of MA. Furthermore, the impact of AI solutions in MA is highly complex to evaluate, and many complex ethical variables can affect this process. Among the ethical issues, we found that those related to responsibility, autonomy, and trust exert the most significant favorable influence on usefulness and performance (H2) in the users' perception, similar to other authors [43–47,53–55].

By analyzing the model built, we concluded that MA specialists were confident in AI's usefulness and, finally, through the mediation effect (H3), in the efficiency and effectiveness of these technologies in MA [53–55]. Furthermore, the ethical challenges in adopting AI are not an obstacle, but a vector for trust in AI solutions. However, AI will generate radical changes in the long run, and AI will make more and more decisions.

6. Conclusions

In the coming years, intelligent systems based on AI will perform more activities involving the decision-making process than human resources. Although AI technology has been used in MA for several decades, the accelerated development of AI in recent years is an opportunity to improve the quality of decisions substantially. AI enables obtaining

valuable information by collecting and processing large and complex volumes of data that go beyond human effort. The accountants must understand the limits of AI, which do not yet reproduce human intelligence in all its characteristics. AI offers MA specialists many opportunities to improve efficiency and effectiveness in the short and medium term, providing the information needed to make decisions, even operational and repetitive decisions [63]. However, AI will generate radical changes in the long run, and more and more decisions will be left to AI.

6.1. Empirical Implications

At least in the next few years, MA specialists will not be entirely replaced by AI because AI solutions cannot yet replace creativity and human reason based on emotions and feelings. However, technological changes will paradigmatically change the way we approach MA activities. How the implementation of AI solutions in MA is perceived will influence the pace of adoption of this technology. Therefore, existing ethical issues within MA and those added by implementing new information technologies must be carefully addressed. The effects of these ethical issues on accountants' perceptions of their usefulness, efficiency, and effectiveness in MA's operations and decision-making activities need to be investigated. To determine these effects, we conducted a study among 396 Romanian accountants using AI solutions in their activity. The results showed that the ethical issues of autonomy, responsibility, and trust substantially influenced the perceived usefulness and the performance of using AI solutions through the effectiveness and efficiency of the adoption process decisions.

6.2. Theoretical and Practical Implications

As the implementation of AI in MA is a relatively new field, the literature in this area is still focused on understanding the concepts and influences that AI can bring to MA. Ethical issues related to the implementation of AI in MA are essential, given the importance of ethics in accounting. However, there is not a rich literature to analyze the potential ethical impact of the implementation of AI in MA on the efficiency and effectiveness of MA decisions. Furthermore, few studies have analyzed the link between the ethical issues of AI implementation in MA and the performance obtained by substantiating decisions based on the information provided by AI solutions. The rare implementation of advanced AI solutions in MA justifies the lack of in-depth research. Therefore, this study fills an existing gap and shows how ethical issues affect the usefulness and performance of AI in MA. The study results give those who design AI solutions the opportunity to focus on solving problematic ethical issues from the accountants' point of view.

6.3. Limitations and Further Research

Future research studies should focus more on an interdisciplinary approach, concentrating on research topics such as the implications of AI solutions on MA decision-making processes, examining the biasing effects, and identifying the determinants of the adoption of AI technologies in MA. Furthermore, starting from the limit on the sample composition, only from Romanian specialists in MA, in future research, an essential direction would be the application of the questionnaire among MA specialists from other countries, capturing the differences arising from national culture and the specificity of MA field.

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