

Article

Audit Service Quality Perceived by Customers: Formative Modelling Measurement Approach

Kristina Peštović , Nikola Milicevic , Nenad Djokic *  and Ines Djokic 

Faculty of Economics in Subotica, University of Novi Sad, 24000 Subotica, Serbia;
 kristina.pestovic@ef.uns.ac.rs (K.P.); nikola.milicevic@ef.uns.ac.rs (N.M.); ines.djokic@ef.uns.ac.rs (I.D.)
 * Correspondence: nenad.djokic@ef.uns.ac.rs

Abstract: The imperative to measure perceived service quality by a formative model in which it represents higher-order formative construct, consisting of reflective first-order constructs ((sub)dimensions), is defined in leading marketing literature in previous years. That approach is of special importance since model misspecifications were often occurring in perceived service quality measurement researches, which may lead to totally wrong conclusions. Furthermore, when it comes to the perceived audit service quality, according to the knowledge of the authors, this is the first implementation of the described approach. Besides the analysis of perceived quality dimensions (all of them originate from intensively used SERVQUAL instrument and are adopted to audit service quality: tangibles, reliability, responsiveness, assurance and empathy), the model included relations between quality and client's satisfaction and loyalty. The results were obtained by processing 123 responses from Serbian companies. All dimensions of perceived quality influenced it positively and significantly (the strongest influence is related to assurance, followed by responsiveness; smaller coefficient with relatively similar value describes the influence of reliability; followed by empathy; the weakest is the impact of tangibles). Furthermore, research results pointed to the existence of positive relations between audit quality, satisfaction and loyalty. Hereby, satisfaction partially mediates the relationship between quality and loyalty.

Keywords: audit quality; higher-order model; reflective-formative model; satisfaction; loyalty



Citation: Peštović, K.; Milicevic, N.; Djokic, N.; Djokic, I. Audit Service Quality Perceived by Customers: Formative Modelling Measurement Approach. *Sustainability* **2021**, *13*, 11724. <https://doi.org/10.3390/su132111724>

Academic Editor: Ionel Bostan

Received: 3 October 2021

Accepted: 20 October 2021

Published: 23 October 2021

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Bearing in mind the importance of the service sector in the economy overall and increasing competition within it, many companies are struggling to respond to demanding market challenges. In this situation, focusing on clients' needs and wants could be the starting point for achieving a better market position. Thus, attention should be paid to customer value (its research, creation, communication and delivery), whereas in the service sector, especially the business service sector [1] its perceived benefits can be manifested through quality. Hence, the quality of service can be considered as an important instrument for accomplishing strategic advantage [2]. Service quality was also associated with business sustainability and the success of the company [3].

The quality of service was often analyzed in the context of customer satisfaction and/or loyalty [4–8]. Positive relations between them only emphasized the importance of service quality, which directly and indirectly can lead to better business performances. Because of this, the quality of service and its association with satisfaction and loyalty have been examined in different sectors. Among them, a number of studies devoted attention to the audit sector, which has changed in the past few years. According to Mijic et al. [9] and Jovkovic et al. [10], the number of audit companies significantly increased in the last few years; in 2009, 41 audit companies operated in the Republic of Serbia, while in 2019 this number came to 73, representing an increase of 78%. A great majority of them have headquarters in Belgrade (79.45% or 58 companies) and have been established by

physical entities (80.82% or 59 companies) [10]. When it comes to company's size, the largest percentage of audit companies (73.97% or 54 companies) belongs to the group of micro, followed by small (20.54% or 15 companies) and medium-sized companies (5.49% or 4 companies); hereby, it should be stressed that medium-sized companies are in fact the members of "Big four" [10]. The largest four audit companies (E&Y, KPMG, Deloitte and PWC) comprise 76.27% of the total audit market, which is more than 50 million euros (each of them exceeding at least 9.8 million euros); the next six audit companies (BDO, Moore Stephens, Crowe RS, DFK Konsultant, RSM Serbia and PKF) possess 10.34%, while all other companies account for the remaining share [11].

Like in many other industries, aggressive competition for clients became an important attribute of the audit profession [12]. In this competitive struggle, the attention was primarily dedicated to auditing costs and their reduction. However, the reduction of auditing costs has led to many negative consequences related to poor audit quality, especially in the period after the economic expansion [12]. This can be an issue bearing in mind that credible audit quality is considered to be a prerequisite for a firm's sustainability [13]. Because of the importance of service quality and its impact on business performance, audit quality has been analyzed in several studies.

In practitioner literature, audit quality is often defined as "the degree to which the audit conforms to applicable auditing standards" [14] (p. 153). Besides this definition, many researchers use the explanation given by DeAngelo [15] (p. 186), according to which the audit quality represents "the market-assessed joint probability that a given auditor will both (a) discover a breach in the client's accounting system, and (b) report the breach". While the first task depends on the auditor's procedures and technological capabilities, the second is related to the auditor's autonomy in reporting the breaches. Bearing in mind that both these tasks are unobservable, for measuring audit quality two types of indirect approaches can be applied [16,17]. While the first type assesses audit quality by using surrogates (such as audit firm size, audit tenure, industry experience, etc.); the second is related to behavioral perspective by analyzing the set of attributes that are perceived to have significant relations with audit quality, whereby the audit clients evaluate the importance of each audit quality attribute according to their perceptions.

In this paper, we analyze the audit quality perceived by customers as a formative higher-order construct (consisting of reflective lower-order constructs), as well as its relations to satisfaction and loyalty. Although there is a need to consider service quality as a first-order reflective, second-order formative construct [18] because model misspecifications may lead to totally wrong conclusions [19], such approach is still relatively rare in perceived service quality measurement. When it comes to audit service quality, this method can be understood as a part of the behavioral perspective of analyzing audit quality with specificity that it, according to the authors' knowledge, implements reflective-formative treatment of audit quality construct for the first time.

In the literature review section, we present methodological and measurement issues regarding perceived service quality as well as several studies specifically related to the audit sector. After that, within the research methodology, we describe the sample and present the conceptual model. It should be stated that, on one side, the research instrument was based on SERVQUAL dimensions—tangibles, reliability, responsiveness, assurance and empathy—and, on the other side, that the model examined relationships of quality with loyalty directly and thorough satisfaction. The main results will suggest that in the researched market, the most important for the audit company is to pay attention to employees' knowledge, courtesy and ability to inspire trust and confidence, that is, the assurance dimension. In addition, they can increase loyalty by increasing the perceived quality, both directly and through increasing satisfaction. The scientific contribution of the research can be observed from two aspects. The first is the need to stress the importance of analyzing audit service quality from the customer perspective. The second and more important is the emphasis on appropriate methodological approach in such researches. Practical implications of the research are also present. The results can be used

as a basis for audit companies at the research market not only to see how certain aspects of quality is assessed by the clients, but also to understand the difference in influences of individual quality dimensions on quality, as well as relations of quality to clients' satisfaction and loyalty.

2. Literature Review

2.1. Service Quality—Formative Modelling Measurement

Jarvis et al. [19] (p. 203) provide recommendations for differentiation between reflective and formative constructs based on four criteria. The first one is “direction of causality from construct to measure implied by the conceptual definition” whereas, in the case of reflective constructs, that direction is from construct to items, while when it comes to formative constructs, the direction is from items to construct. The second criterion is “interchangeability of the indicators/items” which should be present for reflective and is not necessary to exist for formative construct. “Covariation among the indicators” is the third criterion and is expected to exist in the case of reflective constructs, but is not necessary to occur for formative constructs. Finally, the fourth criterion of the differentiation between reflective and formative constructs is the “nomological net of the construct indicators”, whereas it should not differ, that is, it is expected that indicators have the same antecedents and consequences in the first case, and may differ in the second one. The same authors also point out that model misspecification occurred relatively often (in four leading marketing journals in the 24-year period before 2000, 29% of the latent constructs with multiple measures were incorrectly modelled, whereas in most cases formative constructs were incorrectly treated as having reflective measures).

According to Becker et al. [20], the relationship between higher and lower-order constructs (formative and/or reflective) is primarily the question of the nature of the hierarchical latent variable. Therefore, a higher (or second)-order construct can be either constituted (formative) or represented (reflective) by its lower (or first)-order dimensions (constructs). Depending on these relations, when it comes to second-order models, four types of hierarchical latent variable models can be distinguished: reflective-reflective, reflective-formative, formative-reflective and formative-formative [20,21]. In the reflective-reflective type, relations between first-order constructs and their indicators, as well as relations between the second-order construct and its lower-order constructs are reflective. In the reflective-formative type, relations between first-order constructs and their indicators are reflective, while relationships between the second-order construct and its lower-order constructs are formative. Contrary to the reflective-formative type, in the formative-reflective model, relations between first-order constructs and their indicators are formative, while relations between the second-order construct and its lower-order constructs are reflective. In the fourth, formative-formative type of model, relations are formative at both levels, between first-order constructs and their indicators, as well as, between second-order construct and its lower-order constructs.

When it comes to service quality, it can be operationalized as unidimensional (e.g., [22]) or as a multidimensional construct (e.g., SERVQUAL [23]), whereby the latter is much more used in marketing researches. Considering relations within the hierarchical latent variable model, although there are studies in which service quality was modeled as a higher-order reflective construct, Parasuraman et al. [18] (p. 8) stress that “it might be more appropriate to treat the first-order dimensions as formative indicators of the second-order latent construct”. The assumption regarding conceptual interchangeability of reflective measures opposes the view that lower-order reflective dimensions are different in nature; thus, if lower-order constructs are mutually distinct, they should be operationalized as formative, which leads to the development of a reflective-formative type of hierarchical latent model [20] (p. 364). Rossiter [24] (p. 40) also supports the choice of formative approach presenting “a totally formed hierarchy: the first-order item scores form the second-order attribute component scores; the second-order scores form the third-order

attribute component scores; and those scores, in turn, form the first-order overall service quality attribute score”.

The applications of previous recommendations can be seen in Liu et al. [25], Dagger et al. [26] and Carlson and O’Cass [27]. Liu et al. [25] propose a reflective-formative model for measuring service quality in hot spring resorts within which second-order construct (service quality) is formed by six reflective components. Carlson and O’Cass [27] define a conceptual model of an e-service quality as a third-order hierarchical model, whereas first-order constructs possess reflective indicators and then form second-order dimensions, which then form a third-order dimension: e-service quality. This approach is analogous to Dagger et al. [26] when measuring health service quality.

All the questions explained in regard to perceived service quality modelling gain special importance in the context of the conclusions of Jarvis et al. [19] (p. 216) that “measurement model misspecification severely biases structural parameter estimates and can lead to inappropriate conclusions about hypothesized relationships between constructs”.

2.2. Audit Service Quality Measurement

For assessing audit service quality, different approaches have been used. As already stated, part of the research relies on the use of various indicators, while there is also research from the behavioral perspective.

DeFond and Zhang [28] grouped measures for assessing audit service quality into output-based (consisting of four categories: material misstatements, auditor communication, financial reporting quality characteristics and perception based measures) and input-based (including auditor and auditor–client contracting characteristics). While the former is linked to the level of audit quality that is actually delivered, the latter evaluates the quality of audit based on the use of observable inputs.

In the research of Knechel et al. [29], four groups of audit quality indicators were presented: inputs, process, outcomes, and context. Audit inputs are primarily associated with audit team individual characteristics, including incentives and motivation, professional skepticism, knowledge and expertise, and within-firm pressures. When it comes to the audit process, there are indicators that can influence and threaten the quality of audit, among which are the judgment in the audit process, audit production, risk assessment, analytical procedures, obtaining and evaluating evidence, auditor–client negotiation, and review and quality control. In regard to outcomes, there is a number of measurable proxies that can be used, including adverse outcomes (restatements and litigation), financial reporting quality (discretionary accruals and accounting conservatism), audit reports and regulatory reviews of audit firms. The fourth group of indicators refers to contextual features, such as audit partner compensation, non-audit fees, abnormal audit fees, audit fee premium (big N auditors and industry specialists), auditor tenure and market perceptions of audit quality.

Christensen et al. [30] conducted a detailed analysis of audit quality, by surveying both investors and auditors. Among the others, their findings revealed nine audit quality factors (review/inspection results, financial statement quality, fees and governance, auditor characteristics, timeliness of audit procedures, consultations, audit opinion, accruals and large/conservative audit firm) identified from auditors’ responses, as well as, six factors (financial statement quality, fees and governance, review/inspection results, auditor characteristics, large/conservative audit firm and audit opinion) identified from investors’ responses; as stated by Christensen et al. [30], these results emphasized the importance of considering audit quality as a multifaceted construct. In addition, it should be mentioned that responses of surveyed auditors and investors were related to a general audit quality framework, which included inputs, processes, outputs and opinion and post-opinion.

In many researches, audit quality was assessed by accrual-based measures, and investigated in regard to various variables. Thus, Reichelt and Wang [31] examined relations between audit quality and auditor industry expertise on national and city-specific levels, implying that auditors who were specialists at both levels had clients with smaller abnormal accruals. The study of Dehkordi and Makarem [32] investigated audit quality,

represented through discretionary accruals, in regards to auditor type (public vs. private auditors) and size (Big vs. non-Big auditors). According to their results, public audits were related to higher quality, whereas, no significant difference in audit quality regarding the size of non-governmental audit firms was detected. Hoitash et al. [33] found that audit quality was negatively associated with auditor fees, while Lim and Tan [34] investigated the influence of non-audit fees on audit quality taking into account auditor industry specialization; in those researches, two (the absolute value of performance-adjusted discretionary accruals (ABSREDCA) and the accruals quality (FLOSAQ)) and four measures of audit quality (propensity for auditors to issue going-concern opinions, discretionary current accruals and firms' propensity to meet (avoid missing) analysts' forecasts, which all proxy for actual audit quality, and earnings-returns coefficients (ERCs) which proxy for perceived audit quality) were used, respectively. Beardsley et al. [35], among the others, paid attention to audit fee, that is, to its pressure, by examining the combined effect of mentioned variable and an increased focus on non-audit services on audit quality; in this research, client misstatements, detected through subsequent restatements, were applied as a proxy for the quality of audit. Bills et al. [36] analyzed audit quality in relation to the volume of audit work, taking into account office growth and size of audit firms; for its measuring, they used two different proxies: the absolute value of discretionary accruals and accounting restatements. In the research of Bianchi [37], in which the focus was on the relation between auditors' joint engagements and the quality of audit, the author emphasized three audit quality measures: the examination of auditors' reports set by the BSA, abnormal accruals estimated with the modified Jones model and financial reporting quality in the tax area. The research of Chi et al. [38] included both, audit quality and perceptions of audit quality, whereas these two variables were analyzed in regard to audit partner pre-client and client-specific experience; abnormal accruals and interest rate spreads were used as proxies for audit quality and creditor perceptions of audit quality, respectively. Carp and Istrate [39] analyzed how the level of discretionary accruals and accruals quality, as dependent variables, were affected by variables related to audited firms and variables related to auditors; among them were auditor category, opinion, dimension, leverage, operational profitability, sales growth and accounting standards. The quality of audit was also analyzed in relation to the knowledge sharing within an audit firm [40], the diversity of signing auditors [41], audit personnel salaries [42], auditors' job satisfaction [43], the presence and extent of client firms' Enterprise System implementations [44], etc.

When it comes to the behavioral approach, in the research conducted by Behn et al. [45] audit quality was investigated in relation to client satisfaction. For its measuring, 12 audit quality attributes were used: client experience, industry expertise, responsiveness, technical competence, independence, due care, quality commitment, executive involvement, field work conduct, ongoing interaction with the audit committee, ethical standards and skepticism. Client satisfaction was positively associated with six of them (client experience, industry expertise, responsiveness to client needs, executive involvement, field work conduct and ongoing interaction with the audit committee), while negatively with auditor skepticism.

Based on marketing and audit literature Turner et al. [46] used the 13-item service quality scale for analyzing client perceptions of MAS (Management Advisory Services) quality, as an important part of the service mix for the certified public accounting firm. All items were combined into four service dimensions: competence, credibility, responsiveness and reliability. The results have shown that responsiveness and reliability issues were much more important factors in explaining MAS quality than client and industry expertise.

For measuring audit quality Duff [47] developed the AUDITQUAL model, which consisted of nine dimensions: assurance, capability, labeled reputation, independence, experience, expertise, empathy, responsiveness and non-audit services. Afterward, all nine dimensions were classified into four higher-order factors: competence (assurance, capability and reputation), independence, relationship (experience and expertise) and

service qualities (empathy, responsiveness and non-audit services), whereby the first three represented the “technical” audit factors [48].

Within research from the behavioral perspective, there is wide use of the SERVQUAL instrument. Its final version included five quality dimensions [23]. Tangibles refer to physical facilities, equipment and appearance of personnel. Reliability is related to the ability of the promised service to be performed dependably and accurately. Responsiveness is connected to helping customers and providing them prompt service. Assurance is related to employees’ knowledge, courtesy and ability to inspire trust and confidence. Empathy refers to caring and individualized attention provided to the customers by the company.

Having all previously mentioned in mind, the first main hypothesis is formulated in the following manner:

Hypothesis 1 (H1). *Each of the dimensions of perceived audit service quality positively and significantly influence perceived audit service quality.*

Auxiliary hypotheses regarding the first main hypothesis are listed below:

Hypothesis 2 (H2). *Tangibles as a dimension of perceived audit service quality positively and significantly influences perceived audit service quality.*

Hypothesis 3 (H3). *Reliability as a dimension of perceived audit service quality positively and significantly influences perceived audit service quality.*

Hypothesis 4 (H4). *Responsiveness as a dimension of perceived audit service quality positively and significantly influences perceived audit service quality.*

Hypothesis 5 (H5). *Assurance as a dimension of perceived audit service quality positively and significantly influences perceived audit service quality.*

Hypothesis 6 (H6). *Empathy as a dimension of perceived audit service quality positively and significantly influences perceived audit service quality.*

2.3. Audit Service Quality, Satisfaction and Loyalty

A number of research studies using the behavioral approach to audit service quality measurement examined relationships of that construct with client satisfaction and/or loyalty. Saxby et al. [49] addressed service areas of CPA (certified public accountant) firms (such as audit, tax and financial statement preparation) with client satisfaction. Their research pointed to the importance of reliability and assurance dimensions of service quality, with no results for the tangible factor. Thus, in order to increase client satisfaction, CPA firms should focus on elements of these two dimensions.

The relationship between audit quality and audit satisfaction was analyzed in the public government sector as well. The results of the research conducted by Samelson et al. [50] revealed that attributes, such as expertise, responsiveness to the auditee’s scheduling needs, exercise of due professional care, fieldwork and professional skepticism, were recognized as important components of perceived audit quality. In addition, as in the private sector, several audit quality attributes (expertise, responsiveness to the auditee’s scheduling needs, executive involvement in the audit and fieldwork) were associated with audit satisfaction in the government sector.

Boon et al. [51] examined the attributes of audit quality in compulsory audit tendering (CAT). The analysis of perceptions of finance professionals and internal auditors regarding the quality of audit services delivered by their incumbent auditor has shown that industry expertise, the experience of audit firm with the council and technical competence were among the most important attributes when assessing the quality of audit service. In addition, Boon et al. [51] found five audit quality attributes (council experience, responsiveness,

independence, ethical standards and skepticism) to be associated with overall satisfaction with audit service quality.

Besides the relation between audit quality and satisfaction, Ismail et al. [3] included client loyalty in their model. This research showed that audit quality, measured by five SERVQUAL dimensions, affected client satisfaction overall. Hereby, positive effects have been found for reliability, empathy and tangibility and negative for assurance and responsiveness. All of them, except in the case of responsiveness, were significant. Moreover, Ismail et al. [3] pointed to the importance of client satisfaction in enhancing client loyalty, including its mediated role in the relationship of reliability and client loyalty.

The model applied by Turk and Avcilar [2] consisted of audit quality, satisfaction and behavioral intentions. According to their results, among the five SERVQUAL dimensions used for measuring perceived service quality of audit firms, assurance was the most important, followed by reliability, responsiveness, empathy and tangibles. The analysis also pointed to the existence of a direct positive effect of perceived service quality of audit firms on customer satisfaction, while customer satisfaction positively affected behavioral intentions. On the other hand, the perceived service quality of audit firms did not have a significant direct effect on behavior intentions (repurchase and word of mouth), but indirectly, through customer satisfaction, it positively influenced behavior intentions.

Butcher et al. [52] examined the association between perceived audit quality attributes and the auditor retention decision in the context of compulsory audit tendering (CAT). By using the marketing model as a basis, they found a positive association between two audit quality dimensions (expertise and responsiveness to client needs) and auditor retention. On the other hand, contrary to the expectations, the remaining five dimensions (assurance, capability, experience, independence and reputation) were not positively associated with auditor retention.

The audit quality attributes and client satisfaction were investigated due to the client's sector. Hereby, Al Sawalqa [53] categorized all audit quality attributes in three factors: experience and responsiveness; field work conduct and technical competence; independence and executive involvement. The study conducted in Jordan indicated that clients' evaluations of audit quality attributes, as well as client satisfaction, did not differ due to the client's sector. Moreover, its results revealed that only one audit quality factor (field work conduct and technical competence) contributed to client satisfaction with audit service, while between the remaining two factors (experience and responsiveness and independence and executive involvement) and client satisfaction there were no significant relationships.

Starting from previous considerations, the second main hypothesis is formulated as stated below:

Hypothesis 7 (H7). *Client satisfaction partially mediates the relationship between perceived audit service quality and clients' loyalty.*

Auxiliary hypotheses regarding the second main hypothesis are following:

Hypothesis 8 (H8). *Perceived audit service quality positively and significantly influences clients' satisfaction.*

Hypothesis 9 (H9). *Perceived audit service quality positively and significantly influences clients' loyalty.*

Hypothesis 10 (H10). *Client satisfaction positively and significantly influences clients' loyalty.*

3. Methodology

Research methodology can be described by following steps:

1. Formulation of the research model:

- 1.1. Specifying perceived audit service quality as second-order factor (first-order reflective, second-order formative),
- 1.2. Specifying the relations among variables: perceived audit service quality, satisfaction and loyalty,
2. Formulation of the instrument (variables measured as in previous researches), back-translation procedure,
3. Sending the questionnaire to the sample and collecting the data,
4. Analysis of the data:
 - 4.1. Testing the instrument (individual indicator reliability (standardized indicator loadings); internal consistency reliability (composite reliability—CR), convergent validity (average variance extracted—AVE) and discriminant validity (Fornell–Larcker criterion and HTMT₉₀ criterion)),
 - 4.2. Results regarding the research model (influence of each of quality dimensions on the quality, relationships between quality, satisfaction and loyalty—structural equation modeling).

Our sample consisted of companies that are legally obliged to use the external audit services from audit companies in the Republic of Serbia. Questionnaires were sent to more than 250 randomly selected companies, whereby the emphasis was on managers who participate in engaging auditors. We used 123 responses for the analysis. The majority of respondents were female (around 60%) and had a basic academic or master's degree (88%). Furthermore, most of them were specialized in accounting (64%).

For measuring audit quality, satisfaction and loyalty, we used scales applied in previous researches. Attributes in relation to audit service quality (its five dimensions) and loyalty were taken from Ismail et al. [3] while the measuring satisfaction variable was based on Al Sawalqa [53]. Hereby, 22 items were used for measuring perceived audit quality (3 for tangibles (T1–T3), 5 for reliability (R1–R5), 4 for responsiveness (Re1–Re4), 5 for assurance (A1–A5) and 5 for empathy (E1–E5)), 5 for satisfaction (S1–S5) and 4 for loyalty (L1–L4). The order of the items was partly changed in comparison to the original questionnaire. Negatively formulated items are italic in Table 1. Respondents were asked to rate each statement by using a seven-point Likert scale.

Table 1. Quality criteria of the reflective first-order constructs.

Attributes	Loadings	AVE	Composite Reliability
<i>Audit Quality</i>			
Tangibles		0.805	0.925
The audit firm is equipped with the latest information technology.	0.883		
The physical facilities are visually appealing.	0.934		
The employees are well dressed and appear neat to show professionalism.	0.874		
Reliability		0.718	0.910
The audit firm delivers services within a certain time frame as promised.	0.862		
The audit firm is sympathetic and reassuring towards clients' problems.	0.912		
The audit firm is dependable in providing its/their services.	0.858		
The audit firm has employees who are technically competent to perform the service.	0.748		
Responsiveness		0.884	0.958
My audit firm provides prompt services.	0.941		
Employees of my audit firm show a willingness to help their clients.	0.924		
My audit firm does inform my organization exactly when services will be performed.	0.957		

Table 1. Cont.

Attributes	Loadings	AVE	Composite Reliability
Assurance		0.751	0.938
My organization is able to trust the employees of the audit firm.	0.895		
My organization experienced confidentiality on transactions with the employees of the audit firm(s).	0.924		
Employees of the audit firm are polite.	0.840		
Employees of the audit firm received adequate support from their organization to perform their tasks well.	0.853		
The services rendered by the audit firm are commensurate with the fees charged.	0.818		
Empathy		0.671	0.891
<i>My audit firm does not provide my organization with individual attention.</i>	0.742		
<i>The employees of my audit firm do not know the needs of my organization.</i>	0.856		
<i>My audit firm does not have my organization's best interest at heart.</i>	0.838		
<i>My audit firm does not visit my organization at times convenient to us.</i>	0.836		
Satisfaction		0.874	0.972
In general, I am pretty satisfied with the audit firm.	0.929		
Overall, the audit firm is a good firm to do business with.	0.935		
I want to retain the audit firm.	0.948		
Overall, the audit firm's policies and programs benefit my company.	0.946		
Overall, the audit firm is very fair.	0.917		
Loyalty		0.833	0.952
I say positive things about the audit firm to other people.	0.952		
I intended to continue being a client of the audit firm for a long time to come.	0.852		
I will encourage friends and relatives to use the services offered by the audit firm.	0.918		
To me, the audit firm clearly is able to provide the best service.	0.925		

For examining relations between them, the hierarchical component model was applied [20]. Satisfaction and loyalty were presented as unidimensional reflective constructs and audit quality was conceptualized as a multidimensional construct. Hereby, the audit quality as a formative higher-order construct consists of five reflective lower-order constructs (tangibles, reliability, responsiveness, assurance and empathy). Following Becker et al. [20], the repeated indicator approach was used for estimating the higher-order construct (audit quality). Thus, the audit quality was specified as “a latent variable that represents all the manifest variables of the underlying lower-order latent variables” [20], that is, it was specified using 22 manifest variables of all five underlying lower-order constructs. The conceptual model can be seen in Figure 1.

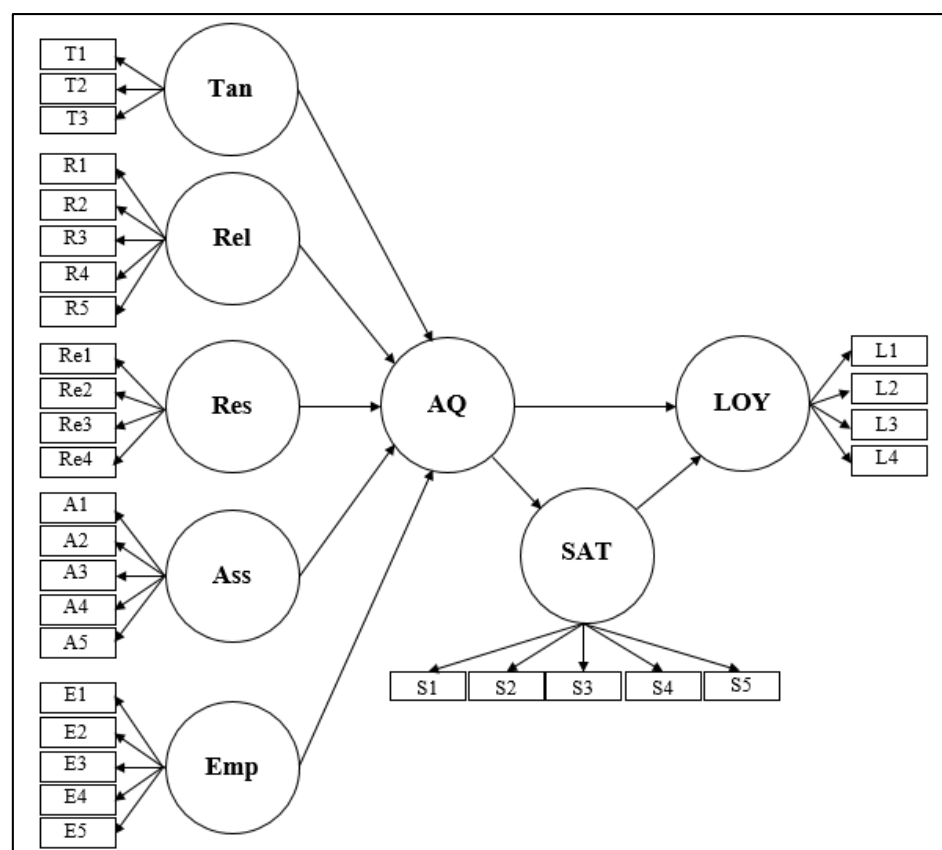


Figure 1. Conceptual model.

Data were processed in 2021 by using SmartPLS 3 software. The program allows illustrative creation of the model through setting the constructs and their specifying and connecting. The new project was created in SmartPLS software and data were imported. As all first-order variables are reflective, the direction of arrows was from the constructs to their corresponding individual items. When it comes to the single second-order construct, the direction of arrows was from its individual dimensions to the constructs, since it is considered as formative. In addition, because of the repeated indicator approach, all individual items belonging to its dimensions were also associated with it in a manner that the arrows were directed from the construct to the items. Finally, the paths representing the inner model were directed from the construct quality to both, satisfaction and loyalty, as well as from satisfaction to loyalty.

According to Hair et al. [54], for evaluating reflective constructs, we relied on the examination of individual indicator reliability, internal consistency reliability, convergent validity and discriminant validity.

Indicator reliability was checked by the evaluation of the standardized indicator loadings. Their values were higher than 0.7 for all items, except for items E4 and Re4. In regard to internal consistency reliability and convergent validity, all reflective constructs had satisfactory levels of composite reliability above 0.7 and AVE (average variance extracted) above 0.5 [55,56]. However, the approach based on HTMT₉₀ criterion, used for the assessment of discriminant validity [57], pointed to problems between assurance and reliability and between reliability and responsiveness. To handle these problems, we identified item R3 which had high correlations with items in comparable constructs (assurance and responsiveness). Following the repeated indicator approach, “problematic” items (E4, Re4 and R3) were eliminated not only from their original constructs but from higher-order service quality construct as well.

After presented changes, the new model provided satisfactory evidence of reliability and validity for reflective constructs.

Table 1 presents the first part of the results of testing the instrument - in regard to individual indicator reliability, internal consistency reliability and convergent validity. For all items, standardized indicator loadings were higher than 0.7, which confirms that individual indicator reliability is proven. When it comes to internal consistency reliability, it can be seen that values of composite reliability for all reflective constructs are above the recommended level of 0.7, which proves its existence. Finally, considering convergent validity, it can be seen that values of AVE (average variance extracted) for all constructs stayed above 0.5, confirming there are no problems regarding that issue.

The results of testing discriminant validity are presented in Tables 2 and 3.

Table 2. Discriminant validity assessment—Fornell–Larcker Criterion.

	Ass	Emp	Loy	Rel	Res	Sat	Tan
Ass	0.867						
Emp	0.608	0.819					
Loy	0.745	0.651	0.912				
Rel	0.773	0.656	0.732	0.847			
Res	0.779	0.589	0.749	0.764	0.940		
Sat	0.796	0.560	0.849	0.686	0.788	0.935	
Tan	0.676	0.435	0.471	0.600	0.697	0.576	0.897

Note: bold numbers represent the values of the square root of each construct's AVE.

Table 3. Discriminant validity assessment - HTMT₉₀ criterion.

	Ass	Emp	Loy	Rel	Res	Sat	Tan
Ass							
Emp	0.686						
Loy	0.805	0.731					
Rel	0.863	0.764	0.816				
Res	0.837	0.653	0.804	0.847			
Sat	0.845	0.615	0.895	0.750	0.829		
Tan	0.718	0.476	0.474	0.662	0.729	0.578	

In Table 2, discriminant validity is considered from the aspect of the Fornell–Larcker criterion, while in Table 3 in respect to HTMT₉₀ criterion. When it comes to discriminant validity, both Fornell–Larcker and HTMT₉₀ criteria were established. In accordance with the former (as presented in Table 2), each construct's AVE was higher than its squared correlations with other constructs i.e., the square root of each construct's AVE was higher than its correlations with other constructs [54]. Hereby, the values of the square root of each construct's AVE are presented in bold on the main diagonal in Table 2, while correlations of each of the constructs with other constructs can be seen below and/or from the left side of the main diagonal.

In the case of the latter approach, all HTMT values (given in Table 3) were lower than a threshold of 0.90 [57].

When analyzing the appropriateness of perceived audit quality as a formative higher-order construct, following Hair et al. [56], we assessed multicollinearity (based on VIF values) and observed path coefficients between that construct and its first-order constructs. All inner VIF values within the higher-order construct were lower than 5, indicating that there were no multicollinearity issues, while path coefficients were positive and significant. In this way, it can be concluded that it is appropriate to treat perceived audit quality as a formative higher-order construct.

Having all previous comments in mind, it can be stressed that it is proven that the instrument (after exclusion of previously mentioned items) can be used in analysis when testing the main model of this research.

4. Results

PLS-SEM path coefficients, their significance levels and R^2 values are presented in Figure 2. The R^2 values for satisfaction and loyalty equaled 0.669 and 0.757, while for audit quality it was 1; the R^2 value of 1 was expected because of the use of the repeated indicator approach for audit quality as a formative higher-order construct.

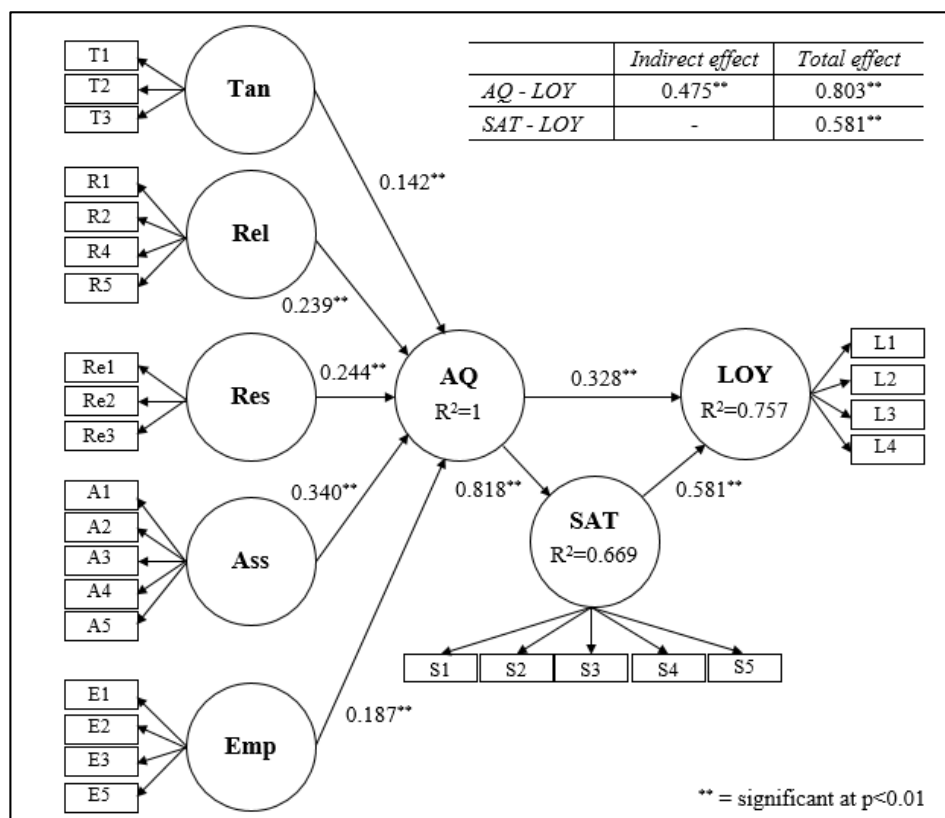


Figure 2. Path coefficient estimates.

When considering audit quality dimensions, as already mentioned, all path coefficient estimates were positive and significant at $p < 0.01$. Hereby, the highest one was recorded at assurance (0.340). If looking back to the definition of that dimension, it can be generally stated, that for the clients of audit companies, the most important is employees' knowledge, courtesy and ability to inspire trust and confidence. The second-largest coefficient is related to responsiveness (0.244). As already stated, responsiveness refers to helping customers and providing them prompt service. A very similar level of importance (0.239) is associated with the ability of the promised service to be performed dependably and accurately, as reliability is defined. On the other hand, lower importance (but still significant) is associated with caring and individualized attention provided to the customers by the company, that is, empathy (the value of that coefficient is 0.187). The lowest coefficient is related to tangibles (0.142), referring, as already stressed, to physical facilities, equipment and appearance of personnel. The presented results confirm auxiliary hypotheses regarding the first main hypothesis and thus the first main hypothesis as well. The audit quality had a significant positive effect on satisfaction (0.818). In addition, it can be stressed once again that 66.9% of the variance in clients' satisfaction is explained by perceived quality. Quality also significantly affected customer loyalty, directly (0.328) and indirectly (0.475). Moreover,

customer loyalty was positively affected by customer satisfaction at a p -value lower than 0.01. At this place, two additional moments can be emphasized. Firstly, the model explains 75.7% of the variance in client loyalty. Secondly, the mechanism of partial mediation is present, that is, perceived quality affects loyalty both, directly and indirectly through satisfaction. It also confirms auxiliary hypotheses regarding the second main hypothesis and thus the second main hypothesis.

5. Discussion and Conclusions

Before commenting on the concrete results of the research, its methodological contribution should be emphasized. As already suggested, the need to consider service quality as a first-order reflective, second-order formative construct is not new in the literature [18]. However, model misspecifications are often present even in the highly respected marketing literature and may lead to totally wrong conclusions [19]. According to the authors' knowledge, this is the first approach to perceived audit service quality that implements previously mentioned recommendations, thus obtaining reliable results. Therefore, the level of comparability of this research and other perceived audit service quality researches is limited because of the different implemented methodologies. Furthermore, only when having reliable results, there is a sense to formulate managerial implications, based on the significance of influences of different factors in customer behavior [58].

The results of the research show that the level of the influence of a single quality dimension on audit service quality perception in comparison to other quality dimensions' influences differs to some extent. Such differences are also noticed in previous researches [2,3,46,50,53]. However, the specificity of this research is not only that all considered quality dimensions have significant, but also the positive influence on the perceived quality of audit services (that was the case only with Turk and Avcilar [2] as well).

Hereby, as already suggested, the strongest influence is related to assurance. It is followed by the impact of responsiveness. A smaller coefficient with a relatively similar value describes the influence of reliability, followed by empathy. Finally, the weakest, although significant and positive, is the impact of tangibles.

The managerial implications on the domestic audit market arising from these results should also be noticed. The audit companies should implement in their business behavior, firstly, the elements of the assurance dimension and the representatives of these companies should firstly communicate elements of that value (trust, confidentiality, politeness, support, value for the money) with potential clients. This should be followed by elements of responsiveness (prompt services, willingness to help, appropriate announcements of service delivery). Not only the behavior of the staff, sales persons but also messages on websites and other media should deliver messages accordingly.

Furthermore, perceived quality of audit service influences positively satisfaction, as well as loyalty. The positive influence of perceived quality on clients' satisfaction is in accordance with some of the previously described research [2,3,45,49]. Hereby, it should be stated that the influence of quality dimensions on client satisfaction was considered in part of these research studies directly and that some of the dimensions did not have a positive influence, while this research considers perceived quality as a higher-order construct. In the case of loyalty, the influence is statistically significant both directly and indirectly through the satisfaction construct, that is, there can be identified partial mediation. This is partly in line with the results of Ismail et al. [3]. However, this is not in line with neither Turk and Avcilar [2], who find full mediation between perceived quality and loyalty, nor with Butcher et al. [52] who research the relation between quality dimensions and loyalty only in a direct manner. Nevertheless, here should once again be stressed the limited level of comparability of this research results with other researches results because of methodological differences.

Finally, it should be stated that the more audit companies' services are perceived as being characterized by quality, the more clients will continue their relations with such companies and recommend them to others. There is not only the direct influence but it

is also mediated by client satisfaction. These conclusions have significant consequences for the management of domestic audit companies and their future competitive position. Future researches might include mediating role of some of client companies' characteristics and could take into account respondents from other countries.

Author Contributions: K.P., N.M., N.D. and I.D. formulated goals of the research and interpreted available literature; conducting and analyzing research was performed K.P., while implications were developed by N.M., N.D. and I.D. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

References

- Marquardt, A.K.; Olaru, M.; Ceaușu, I. Study on the Development of Quality Measurements Models for Steering Business Services in Relation to Customer Satisfaction. *Amfiteatru Econ.* **2017**, *19*, 95–109.
- Turk, Z.; Avcilar, M.Y. The Effects of Perceived Service Quality of Audit Firms on Satisfaction and Behavioural Intentions: A Research on the Istanbul Stock Exchange Listed Companies. *Res. J. Bus. Manag.* **2009**, *3*, 36–46. [\[CrossRef\]](#)
- Ismail, I.; Haron, H.; Ibrahim, D.N.; Isa, S.M. Service Quality, Client Satisfaction and Loyalty towards Audit Firms: Perceptions of Malaysian Public Listed Companies. *Manag. Audit. J.* **2006**, *21*, 738–756. [\[CrossRef\]](#)
- McDougall, G.H.G.; Levesque, T. Customer satisfaction with services: Putting perceived value into the equation. *J. Serv. Mark.* **2000**, *14*, 392–410. [\[CrossRef\]](#)
- Pollack, B.L. Linking the hierarchical service quality model to customer satisfaction and loyalty. *J. Serv. Mark.* **2009**, *23*, 42–50. [\[CrossRef\]](#)
- Gounaris, S.; Dimitriadis, S.; Stathakopoulos, V. An examination of the effects of service quality and satisfaction on customers' behavioral intentions in e-shopping. *J. Serv. Mark.* **2010**, *24*, 142–156. [\[CrossRef\]](#)
- Setó-Pamies, D. Customer loyalty to service providers: Examining the role of service quality, customer satisfaction and trust. *Total. Qual. Manag. Bus. Excell.* **2012**, *23*, 1257–1271. [\[CrossRef\]](#)
- Rajic, T.; Dado, J. Modelling the relationships among retail atmospherics, service quality, satisfaction and customer behavioural intentions in an emerging economy context. *Total. Qual. Manag. Bus. Excell.* **2013**, *24*, 1096–1110. [\[CrossRef\]](#)
- Mijic, K.; Jaksic, D.; Vukovic, B. Koncentracija tržišta revizijskih usluga u Republici Srbiji. *Ekonom. Teme* **2014**, *52*, 117–130.
- Jovkovic, B.; Karapavlovic, N.; Radojevic, A. Profitability of Audit Companies in the Republic of Serbia: Empirical Research in the Period 2010–2019. *Acta Econ.* **2021**, *19*, 205–221.
- Milojevic, M.M. Revizorske firme u Srbiji 2019. *Revizor* **2020**, *23*, 83–94. [\[CrossRef\]](#)
- Imhoff, E.A. Accounting Quality, Auditing, and Corporate Governance. *Account. Horiz.* **2003**, *17*, 117–128. [\[CrossRef\]](#)
- Kim, S.M.; Kim, S.M.; Lee, D.H.; Yoo, S.W. How Investors Perceive Mandatory Audit Firm Rotation in Korea. *Sustainability* **2019**, *11*, 1089. [\[CrossRef\]](#)
- Watkins, A.L.; Hillison, W.; Morecroft, S.E. Audit Quality: A Synthesis of Theory and Empirical Evidence. *J. Account. Literature* **2004**, *23*, 153–193.
- DeAngelo, L.E. Auditor Size and Audit Quality. *J. Account. Econ.* **1981**, *3*, 183–199. [\[CrossRef\]](#)
- Kilgore, A.; Radich, R.; Harrison, G. The Relative Importance of Audit Quality Attributes. *Aust. Account. Rev.* **2011**, *21*, 253–265. [\[CrossRef\]](#)
- Kilgore, A.; Martinov-Bennie, N. *The Drivers of Audit Quality: Auditors' Perceptions*; ACCA: London, UK, 2014.
- Parasuraman, A.; Zeithaml, V.A.; Malhotra, A. E-S-QUAL: A Multiple Item Scale for Assessing Electronic Service Quality. *J. Serv. Res.* **2005**, *7*, 213–233. [\[CrossRef\]](#)
- Jarvis, C.B.; MacKenzie, S.B.; Podsakoff, P.M. A Critical Review of Construct Indicators and Measurement Model Misspecification in Marketing and Consumer Research. *J. Consum. Res.* **2003**, *30*, 199–218. [\[CrossRef\]](#)
- Becker, J.M.; Klein, K.; Wetzels, M. Hierarchical Latent Variable Models in PLS-SEM: Guidelines for Using Reflective-Formative Type Models. *Long Range Plan.* **2012**, *45*, 359–394. [\[CrossRef\]](#)
- Crocetta, C.; Antonucci, L.; Cataldo, R.; Galasso, R.; Grassia, M.G.; Lauro, C.N.; Marino, M. Higher order PLS PM approach for different types of constructs. *Soc. Indic. Res.* **2021**, *154*, 725–754. [\[CrossRef\]](#)
- Jones, T.; Taylor, S.F. Service loyalty: Accounting for social capital. *J. Serv. Mark.* **2012**, *26*, 60–74. [\[CrossRef\]](#)
- Parasuraman, A.; Zeithaml, V.A.; Berry, L.L. SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. *J. Retail.* **1988**, *64*, 12–40.

24. Rossiter, J. Toward a Valid Measure of E-Retailing Service Quality. *J. Theor. Appl. Electron. Commer. Res.* **2007**, *2*, 36–48. [\[CrossRef\]](#)
25. Liu, X.; Fu, Y.; Chao, R.; Li, J. A formative measurement approach for exploring how to form service quality in hot spring resorts. *Tour. Hosp. Res.* **2019**, *19*, 27–39. [\[CrossRef\]](#)
26. Dagger, T.; Sweeney, J.C.; Johnson, L.W. A Hierarchical Model of Health Service Quality. *J. Serv. Res.* **2007**, *10*, 123–142. [\[CrossRef\]](#)
27. Carlson, J.; O’Cass, A. Developing a Framework for Understanding E-Service Quality, Its Antecedents, Consequences, and Mediators. *Manag. Serv. Qual. Int. J.* **2011**, *21*, 264–286. [\[CrossRef\]](#)
28. DeFond, M.; Zhang, J. A review of archival auditing research. *J. Account. Econ.* **2014**, *58*, 275–326. [\[CrossRef\]](#)
29. Knechel, W.R.; Krishnan, G.V.; Pevzner, M.; Shefchik, L.B.; Velury, U.K. Audit Quality: Insights from the Academic Literature. *Audit. A J. Pract. Theory* **2013**, *32*, 385–421. [\[CrossRef\]](#)
30. Christensen, B.E.; Glover, S.M.; Omer, T.C.; Shelley, M.K. Understanding Audit Quality: Insights from Audit Professionals and Investors. *Contemp. Account. Res.* **2016**, *33*, 1648–1684. [\[CrossRef\]](#)
31. Reichelt, K.J.; Wang, D. National and Office-Specific Measures of Auditor Industry Expertise and Effects on Audit Quality. *J. Account. Res.* **2010**, *48*, 647–686. [\[CrossRef\]](#)
32. Dehkordi, H.F.; Makarem, N. The Effect of Size and Type of Auditor on Audit Quality. *Int. Res. J. Financ. Econ.* **2011**, *80*, 121–137.
33. Hoitash, R.; Markelevich, A.; Barragato, C.A. Auditor fees and audit quality. *Manag. Audit. J.* **2007**, *22*, 761–786. [\[CrossRef\]](#)
34. Lim, C.; Tan, H. Non-audit Service Fees and Audit Quality: The Impact of Auditor Specialization. *J. Account. Res.* **2008**, *46*, 199–246. [\[CrossRef\]](#)
35. Beardsley, E.L.; Lassila, D.R.; Omer, T.C. How Do Audit Offices Respond to Audit Fee Pressure? Evidence of Increased Focus on Nonaudit Services and their Impact on Audit Quality. *Contemp. Account. Res.* **2019**, *36*, 999–1027. [\[CrossRef\]](#)
36. Bills, K.L.; Swanquist, Q.T.; Whited, R.L. Growing Pains: Audit Quality and Office Growth. *Contemp. Account. Res.* **2016**, *33*, 288–313. [\[CrossRef\]](#)
37. Bianchi, P.A. Auditors’ Joint Engagements and Audit Quality: Evidence from Italian Private Companies. *Contemp. Account. Res.* **2018**, *35*, 1533–1577. [\[CrossRef\]](#)
38. Chi, W.; Myers, L.A.; Omer, T.C.; Xie, H. The effects of audit partner pre-client and client-specific experience on audit quality and on perceptions of audit quality. *Rev. Account. Stud.* **2017**, *22*, 361–391. [\[CrossRef\]](#)
39. Carp, M.; Istrate, C. Audit Quality under Influences of Audit Firm and Auditee Characteristics: Evidence from the Romanian Regulated Market. *Sustainability* **2021**, *13*, 6924. [\[CrossRef\]](#)
40. Duh, R.R.; Knechel, W.R.; Lin, C.C. The Effects of Audit Firms’ Knowledge Sharing on Audit Quality and Efficiency. *Audit. A J. Pract. Theory* **2020**, *39*, 51–79. [\[CrossRef\]](#)
41. He, C.; Li, C.K.; Monroe, G.S.; Si, Y. Diversity of Signing Auditors and Audit Quality. *Audit. A J. Pract. Theory* **2021**, *40*, 27–52. [\[CrossRef\]](#)
42. Hoopes, J.L.; Merkley, K.J.; Pacelli, J.; Schroeder, J.H. Audit personnel salaries and audit quality. *Rev. Account. Stud.* **2018**, *23*, 1096–1136. [\[CrossRef\]](#)
43. Khavis, J.A.; Krishnan, J. Employee Satisfaction and Work-Life Balance in Accounting Firms and Audit Quality. *Audit. A J. Pract. Theory* **2021**, *40*, 161–192. [\[CrossRef\]](#)
44. Pincus, M.; Tian, F.; Wellmeyer, P.; Xu, S.X. Do Clients’ Enterprise Systems Affect Audit Quality and Efficiency? *Contemp. Account. Res.* **2017**, *34*, 1975–2021. [\[CrossRef\]](#)
45. Behn, B.K.; Carcello, J.V.; Hermanson, D.R.; Hermanson, R.H. The Determinants of Audit Client Satisfaction among Clients of Big 6 Firms. *Account. Horiz.* **1997**, *11*, 7–24.
46. Turner, L.D.; Aldhizer, G.R.; Shank, M.D. Client Perceptions of MAS Quality as Measured by a Marketing-Based Service Quality Model. *Account. Horiz.* **1999**, *13*, 17–36. [\[CrossRef\]](#)
47. Duff, A. *Auditqual: Dimensions of Audit Quality*; The Institute of Chartered Accountants of Scotland: Edinburgh, UK, 2004.
48. Duff, A. Measuring Audit Quality in an Era of Change: An Empirical Investigation of UK Auditmarket Stakeholders in 2002 and 2005. *Manag. Audit. J.* **2009**, *24*, 400–422. [\[CrossRef\]](#)
49. Saxby, C.L.; Ehlen, C.R.; Koski, T.R. Service Quality in Accounting Firms: The Relationship of Service Quality to Client Satisfaction and Firm/Client Conflict. *J. Bus. Econ. Res.* **2004**, *2*, 75–86. [\[CrossRef\]](#)
50. Samelson, D.; Lowensohn, S.; Johnson, L.E. The Determinants of Perceived Audit Quality and Auditee Satisfaction in Local Government. *J. Public Budg. Account. Financ. Manag.* **2006**, *18*, 139–166. [\[CrossRef\]](#)
51. Boon, K.; McKinnon, J.; Ross, P. Audit Service Quality in Compulsory Audit Tendering. *Account. Res. J.* **2008**, *21*, 93–122. [\[CrossRef\]](#)
52. Butcher, K.; Harrison, G.; Ross, P. Perceptions of Audit Service Quality and Auditor Retention. *Int. J. Audit.* **2013**, *17*, 54–74. [\[CrossRef\]](#)
53. Al Sawalqa, F. External Audit Services Quality and Client Satisfaction: Evidence from Jordan. *Res. J. Financ. Account.* **2014**, *5*, 223–236.
54. Hair, J.; Sarstedt, M.; Ringle, C.; Mena, J. An Assessment of the Use of Partial Least Squares Structural Equation Modeling in Marketing Research. *J. Acad. Mark. Sci.* **2012**, *40*, 414–433. [\[CrossRef\]](#)
55. Hair, J.; Ringle, C.; Sarstedt, M. Partial Least Squares Structural Equation Modeling: Rigorous Applications, Better Results and Higher Acceptance. *Long Range Plan.* **2013**, *46*, 1–12. [\[CrossRef\]](#)

-
56. Hair, J.; Hult, G.; Ringle, C.; Sarstedt, M. *A primer on partial least squares structural equation modeling (PLS-SEM)*; Sage Publications: Los Angeles, CA, USA, 2017.
 57. Henseler, J.; Ringle, C.; Sarstedt, M. A new criterion for assessing discriminant validity in variance-based structural equation modeling. *J. Acad. Mark. Sci.* **2015**, *43*, 115–135. [[CrossRef](#)]
 58. Boja, C.; Zamfiroiu, A.; Zurini, M.; Iancu, B. User Behaviour Profiling in Social Media Applications. *Econ. Comput. Econ. Cybern. Stud. Res.* **2019**, *53*, 21–38.