Adoption of Cloud Accounting in Croatian Accounting Firms: Benefits, Challenges, and User Perspectives

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Abstract

Background: Cloud technology enhances business operations by improving accessibility, efficiency, and scalability. In accounting, cloud-based solutions provide numerous advantages, including real-time financial reporting, improved collaboration, and cost-effective automation. **Objectives:** This study examines the adoption of cloud technology in small and medium-sized accounting enterprises in Croatia, analysing accountants' perspectives on its benefits, challenges, and implementation drivers. **Methods/Approach:** The study employs a quantitative survey distributed among accounting firm owners in Croatia, grounded in the Technology Acceptance Model (TAM). Exploratory factor analysis was used to identify key dimensions influencing cloud accounting adoption. **Results:** Grounded in the Technology Acceptance Model (TAM), a survey reveals that ease of access, collaboration, and new software availability are key advantages, while technical complexity, provider support issues, and data security concerns hinder adoption. Exploratory factor analysis identified three main dimensions that influence cloud accounting adoption: efficiency and usability, security and risk concerns, and system adaptability. **Conclusions:** The findings indicate that while efficiency and accessibility drive adoption, concerns about data privacy, service stability, and system integration challenges slow widespread implementation. The study highlights the need for greater awareness, education, and trust-building initiatives to foster wider adoption of cloud accounting in Croatia.

Keywords: cloud-based accounting; Technology Acceptance Model; SMEs; perceived risk; adoption barriers; Croatia

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Introduction

The modern era, often called the Fourth Industrial Revolution, has seen technological innovations that have transformed industries and businesses worldwide. Industry 4.0 technologies enable a continuous and cyclical flow of information and actions between the physical and digital worlds, a cycle known as the physical-digital-physical loop. Data is collected from many different physical and digital sources and locations; this data is then analysed to inform and execute actions in the physical world. It is precisely this shift from digital back to physical that defines Industry 4.0 (Pant et al., 2020). Key drivers of Industry 4.0 include digitalisation, optimisation and adaptation of production, automation and customisation, human–machine interaction, and automatic data exchange and communication (Das, 2023). In the era of the digital economy, which is a crucial component of the Fourth Industrial Revolution, information and communication technologies have changed the way society and businesses operate, with data storage and processing capacities reaching unprecedented levels. Digital technologies are powerful tools for transforming business activities and entire industries and can positively impact companies' competitiveness (Bilas et al., 2025).

Cloud technology in business helps optimise processes and supports the development of infrastructure, platforms, and software solutions across the supply chain over the Internet; a key advantage of cloud-based systems is their simplicity (Lacković Vincek et al., 2017). Cloud computing is transforming business operations across industries, shifting from traditional, localised accounting systems to more dynamic and accessible platforms (Chandra & Gupta, 2022). As online business transactions continue to grow, desktop computers or office servers are no longer sufficient. Cloud accounting has become an integral part of modern accounting practices, evolving alongside rapidly advancing technology (Adnan et al., 2024). Cloud-based accounting systems enable secure storage and efficient management of financial data from virtually anywhere, offering a high degree of flexibility (Moudud-Ul-Huq et al., 2020). While the fundamental principles of accounting remain largely unchanged, the rise of cloud technology has significantly enhanced the efficiency, functionality, and scalability of accounting systems (Egiyi & Udeh, 2020). Cloud computing has changed how companies store and manage accounting data. Cloud-based solutions now let businesses safely store, access, and exchange financial data without being constrained by conventional on-premises systems (Lawal & George, 2023). Cloud computing has fundamentally transformed the storage and management of accounting information, delivering significant advantages to organisations of all sizes.

Cloud computing has altered accounting businesses' operations and client interactions. Clients can now digest information more quickly thanks to this new technology, which also makes it easier to share information with others (with their consent). Clients and accounting firms can now enjoy convenient remote meetings (INAA Group, 2023). However, strong security measures are necessary to protect sensitive data and preserve the integrity of digital assets as more organisations move their operations to the cloud (Akinade et al., 2025). Cloud accounting is part of the broader shift towards digital accounting (Chandra & Gupta, 2022). Research on the digitalisation of accounting functions also considers organisational and technological conditions (Ghorbani, 2019). Although cloud accounting has become a widely recognised concept, accounting professionals in Croatia, including those serving small and medium-sized enterprises, face significant challenges in adapting to the technological transformations driven by the Internet. As a relatively new concept in Croatia, cloud accounting offers businesses opportunities to strengthen their

competitive advantage in the global market, following the example of developed countries. In more advanced economies, cloud technology and its diverse applications have already become integral to both professional and personal activities, and this trend is expected to expand further in the coming decades. However, in Croatia, there is still limited awareness of the potential benefits offered by cloud technology. The primary aim of this paper is to examine the baseline knowledge of Croatian accounting practitioners, particularly owners of accounting firms, and to assess their perspectives on the positive and negative impacts of cloud accounting, as well as the potential risks and barriers associated with its implementation in the Croatian market. The study aims to explore how accounting professionals in Croatia perceive the benefits and challenges of cloud accounting. To guide the research, the following questions were posed:

- *RQ1: What are the most perceived benefits of cloud accounting?*
- *RQ2: What are the main concerns and barriers to its adoption?*
- *RQ3: What latent factors influence accountants' perspectives?*

Based on prior literature, we hypothesise that:

- *H1: Cloud accounting is positively perceived in terms of efficiency and accessibility.*
- *H2: Security and technical concerns negatively affect adoption intentions.*

The study is divided into five sections, each addressing a critical component of the research. The first section introduces the topic and clearly outlines the study's aim and objectives. The second section provides a theoretical foundation, offering a detailed review of cloud technology and its application in accounting. Examines the benefits of cloud solutions, challenges in implementation, and reasons for resistance among organisations, while also comparing traditional and cloud-based accounting systems. The third section describes the research methodology, including survey design, sampling strategy, and development of key questions. The fourth section, the study's core, presents an empirical analysis based on the survey findings. It highlights user preferences for adopting cloud technologies and statistically evaluates key factors, contextualising results through comparisons with prior studies and exploring their implications for accounting service providers. The fifth section concludes the study by summarising key findings, offering actionable recommendations for adopting cloud technologies, and highlighting future research opportunities to enhance their integration into accounting practices.

Literature Review

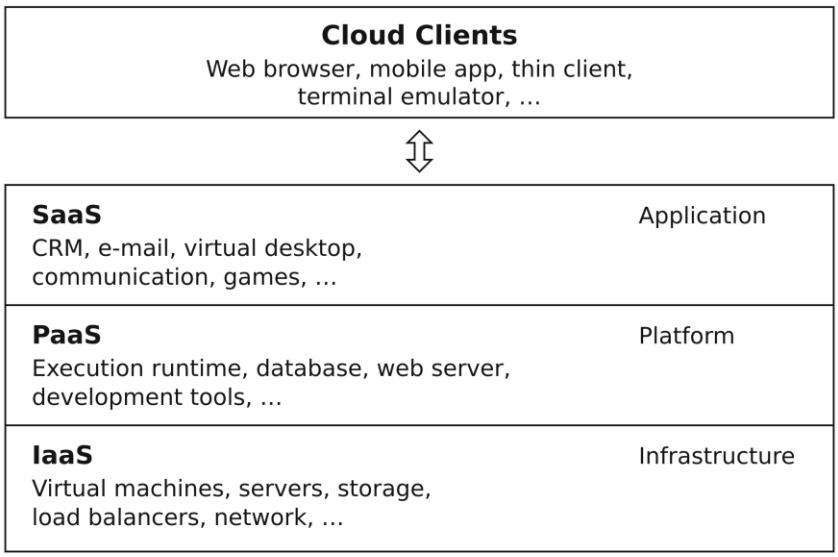
The review of the literature provides a detailed analysis of cloud technology and its application in accounting. It explores the benefits of cloud solutions, the challenges involved in their implementation, and the reasons some organisations resist adopting them. In addition, it compares traditional accounting systems with cloud-based alternatives, highlighting their differences and respective advantages.

Concept of Cloud

According to Lawal and George (2023), the concept of cloud refers to the delivery of various computing services, such as servers, storage, databases, networking, and software, through the Internet, enabling faster innovation, flexibility, and economies of scale. Unlike traditional on-premises systems, cloud solutions let users store and access data remotely, as long as they have an Internet connection. This approach eliminates the need for manual and local data management, reducing costs and improving efficiency. Khanom (2017) describes three cloud service models: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a

Service (SaaS). These models offer customised solutions for diverse needs, from raw computing power to fully managed software applications (Figure 1).

Figure 1
Presentation of Cloud Service Types



Source: Khanom (2017, p. 32).

Cloud service models cater to diverse needs:

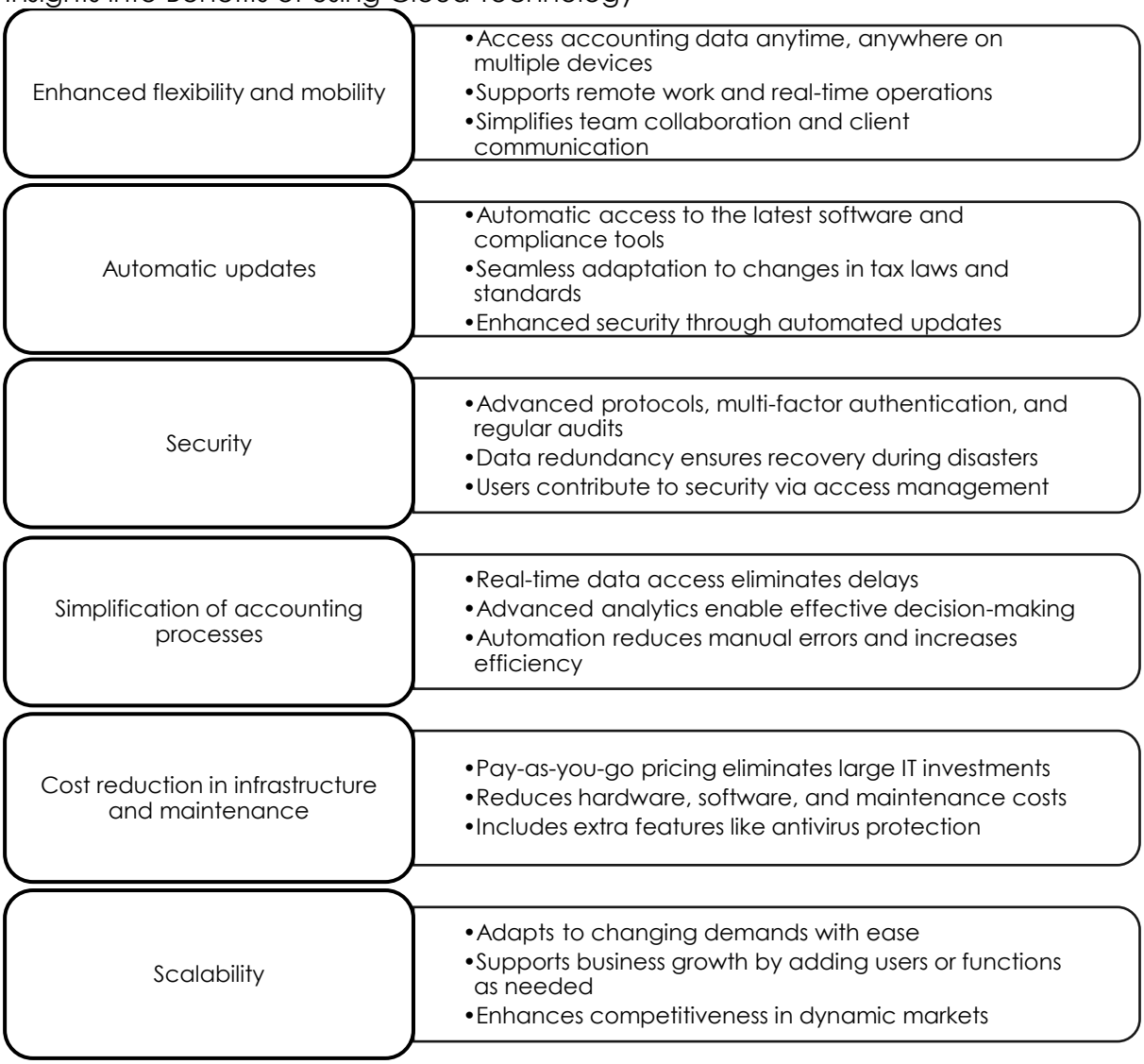
- SaaS provides Internet-based software, simplifying maintenance and eliminating local installation, but raises concerns about data security, as information is stored on provider servers.
- PaaS offers a cloud platform for the development and deployment of applications, reducing hardware and software management complexities.
- IaaS delivers virtualised computing resources on demand, enabling users to avoid the cost and effort of managing physical infrastructure while ensuring scalability.

According to Mohammadi and Mohammadi (2014), cloud deployment models include public, private, and hybrid clouds, each serving different needs. Public clouds are the most common, featuring massive data centres operated by providers such as Google, Amazon, and Microsoft. These clouds offer services such as PaaS, SaaS, and IaaS on a "pay-per-use" basis, supporting thousands of users with scalable infrastructure. Private Clouds cater to specific organisational needs, offering greater control, enhanced security, and flexibility by restricting access to internal users or specific groups. They are often used in industries like healthcare, where data confidentiality is critical. However, private clouds lack the scalability of public clouds, requiring organisations to invest in additional hardware as demand grows. Hybrid cloud systems combine public and private cloud features, enabling organisations to leverage the benefits of both. They allow seamless data exchange and provide greater security while maintaining flexibility. Hybrid models are ideal for organisations that need customised infrastructure with scalable, secure solutions.

Benefits and Challenges in Adopting Cloud Technology

Lawal and George (2023) describe cloud adoption as driven by benefits such as cost savings, enhanced productivity, scalability, performance, and robust security. It operates on a pay-as-you-go basis, allowing users to optimise expenses by paying only for the services they consume. However, this model can lead to unexpected operating costs. Cloud computing utilises shared resources across distributed data centres, offering a highly flexible and efficient framework that enables individuals and businesses to manage data and applications with ease. Figure 2 illustrates the key benefits of cloud technology, including scalability, cost efficiency, and enhanced collaboration, highlighting its transformative impact on modern computing infrastructure.

Figure 2
Insights into Benefits of Using Cloud Technology



Source: Adapted from Chandra and Gupta (2022), Dimitriu and Matei (2014), and Ghorbani (2019).

These advantages collectively enhance efficiency, productivity, and innovation within accounting teams, enabling them to focus on delivering value to clients while

maintaining a competitive edge. Although there are many benefits to adopting cloud computing, there are also some significant barriers to adoption (Figure 3).

Figure 3
Challenges of Adopting Cloud Computing from an Enterprise Perspective

Connectivity and Open Access	High-speed internet access is critical to unlock the full potential of cloud computing, enabling industrial and consumer innovation.
Security and Privacy	Uncertainty about achieving security across all levels and compliance with privacy regulations poses major concerns for organizations
Reliability	Continuous availability and disaster recovery are essential for critical enterprise applications, requiring strong Service Level Agreements (SLAs) and contingency plans.
Interoperability	Seamless integration between private and public clouds is vital but challenging, as businesses need consistent data and system standards to maintain operational efficiency.
Economic Value	While cloud computing offers cost savings, hidden expenses like disaster recovery, data insurance, and transition costs may impact the overall ROI
IT Organizational Changes	Cloud adoption shifts IT roles and skill requirements, demanding faster adaptation and a focus on managing IT risks alongside technological advancements
Political Issues	Global data regulations and political influences (e.g., jurisdictional laws, data localization) create barriers to cloud adoption, requiring service providers to address compliance and neutrality challenges

Source: Adapted from Avram (2014), Chandra and Gupta (2022), and Ghorbani (2019).

Figures 2 and 3 highlight the key benefits and challenges of cloud computing, emphasising its role in enhancing connectivity, reliability, and economic value while addressing concerns related to security, interoperability, and regulatory compliance. One of the most significant obstacles to cloud accounting adoption is data privacy. Because accountants handle sensitive financial data, such as client records, payroll information, and tax filings, data security breaches are a major concern (Mostafa et al., 2023). Concerns about unauthorised access and data leakage can hinder the adoption of cloud services (Akinade et al., 2025). Cloud accounting solutions rely on external service providers, making system reliability and uptime critical concerns. A major business continuity risk for accountants is the possible unavailability of financial data during crucial reporting times, like tax filings or audits. Accountants must assess cloud providers' service level agreements (SLAs) when deciding whether to adopt them, considering factors such as uptime guarantees, backup systems, and disaster recovery protocols. Potential interruptions in access to accounting data are a practical consideration when selecting a cloud provider (Keglević Kozjak et al., 2024).

Digitalisation offers notable advantages for companies that process a high volume of documents annually, particularly through cloud-based technologies. In accounting, these tools facilitate timely access to information and enhance process transparency. However, realising these benefits fully requires organisations to effectively manage challenges such as data security, system integration, and user adaptation (Dečman et al., 2019). These aspects are especially relevant in the field of external auditing, where technological advancements compel auditors to adapt

continuously to changing client environments and evolving digital tools that reshape traditional audit practices. Despite improvements in efficiency and real-time data accessibility through cloud solutions, the audit process remains constrained by core principles such as materiality, sampling, and the provision of only reasonable assurance, raising questions about whether emerging technologies can overcome these limitations or merely optimise existing audit frameworks (Sever Mališ et al., 2021).

Adopting cloud technology requires a balanced approach that ensures seamless integration, cost management, and compliance with data protection laws. Organisations must strategically navigate these factors to maximise the advantages of cloud computing while mitigating potential risks.

Comparison of Traditional Accounting Systems and Cloud-Based Alternatives

Traditional accounting and cloud accounting represent two distinct approaches to managing financial functions within a business. The key differences between these methods lie in several crucial aspects. In traditional accounting, the company determines the system's location, which typically means maintaining local servers within the organisation. On the contrary, cloud accounting operates on cloud-based infrastructure, allowing access to data and applications from any location via the Internet. This flexibility improves teamwork and collaboration within an organisation, which is often limited in traditional accounting.

As accounting processes become more automated and less time-consuming, accountants are strengthening their connections with clients and expanding their advisory roles in daily business operations. Herbert et al. (2016) examined how digitalisation and automation are implemented to reduce or eliminate repetitive, routine tasks, allowing accountants to focus on more complex, non-routine, and strategic activities that require critical thinking and advanced skills. This change in approach is expected to significantly influence the future responsibilities of experienced accountants. Gulin et al. (2019) discuss how digitalisation changes accountants' responsibilities and the skills required in the profession.

Cloud accounting can improve accessibility and scalability and reduce upfront investment in local software and infrastructure. Cloud providers can also manage updates and backups, while access to the service depends on reliable internet connectivity (Chandra & Gupta, 2022; Dimitriu & Matei, 2015; Keglević Kozjak et al., 2024).

Mostafa et al. (2023) propose a multifactor authentication framework to protect user identities in cloud environments. However, due to their online nature, cloud accounting systems can be targets for cyberattacks, requiring constant security updates and robust data protection measures. Despite these risks, cloud accounting improves collaboration by letting employees, partners, and suppliers work seamlessly within a shared system.

Another benefit of cloud accounting is eliminating paperwork, as all financial data can be accessed digitally from any device connected to the Internet. Unlike traditional accounting software, which requires manual installation and setup, cloud-based solutions operate entirely online, reducing installation and maintenance efforts. Cloud accounting also simplifies document management by enabling direct electronic submission of invoices, payment orders, and other financial records. In general, cloud accounting centralises financial data, providing real-time access and improved decision-making capabilities while reducing operational costs (Keglević Kozjak et al., 2024). These advantages make cloud accounting an efficient, scalable, and cost-effective solution for businesses seeking to optimise their financial processes.

Table 1 presents a detailed comparison of traditional and cloud-based accounting in key categories.

Table 1
Comparison of Traditional and Cloud-Based Accounting

Aspect	Traditional Accounting	Cloud Accounting
Data Access	Limited to a specific computer and location.	Accessible from any device and location via the Internet
System Location	Local servers within the company.	Hosted in the cloud, available online.
Collaboration	Limited, restricted to a fixed location.	Enhanced, supports remote teamwork.
Data Security	Relies on local storage and manual security measures.	Improved security with automatic backups.
Scalability	Limited, may struggle to support business growth.	Highly scalable and adaptable.
Software licencing	Company-owned software licences.	Subscription-based licensing model.
Hardware procurement	The company must purchase the necessary hardware.	Hardware included in cloud service.
Windows & SQL Server licences	Purchased separately by the company.	Included in the cloud service.
Maintenance costs	Separate software and hardware maintenance costs.	Included in the subscription fee.
User access	Limited by software licences.	Flexible, supports more users without additional costs.
IT resource management	Requires internal IT management.	The cloud provider handles maintenance.
Internet connectivity	Operates on local networks, independent of the Internet.	Requires a stable internet connection.
Software Updates	Manual updates required.	Automatic updates managed by provider.
Mobility	Limited access.	Accessible via mobile devices.
Disaster Recovery	Slow and Complex Data Recoverage.	Built-in Disaster Recovery Plans.

Source: Chandra and Gupta (2022), Dimitriu and Matei (2014), Ghorbani (2019), and Ionescu et al. (2013).

This comparison clearly demonstrates the advantages of cloud accounting, including cost efficiency, ease of access, and enhanced security, making it an increasingly popular choice for companies seeking to modernise their financial management systems.

Cloud Accounting Adoption: A Comparative Perspective

Studies of cloud adoption have examined the factors that shape uptake among SMEs (Friedrich-Baasner et al., 2018; Khayer et al., 2020). In accounting, inferential analytics can help practitioners draw conclusions from large data sets (Schneider et al., 2015). In a separate study of Polish public administration, Brzozowska-Rup et al. (2024)

examined cloud use across administrative units and differences among regions in the conditions for cloud adoption.

Lawal and George (2023) discuss infrastructure and regulatory challenges to the adoption of cloud-based accounting. Furthermore, the cost of cloud subscriptions and distrust in data security represent significant barriers to implementation (Saha et al., 2020). Altin and Yilmaz (2022) found that computer self-efficacy, social influence, and performance expectations were positively related to attitudes towards cloud-based accounting services in Turkey, while perceived risk was negatively related to attitudes. These studies identify barriers to cloud adoption in the settings examined.

Croatia faces similar barriers as developing countries, such as scepticism and security risks, but benefits from EU membership, which provides access to more favourable regulations that can promote cloud accounting adoption. EU regulations, such as GDPR, can increase trust in cloud solutions and accelerate digitalisation. However, smaller markets in the region, such as Slovenia and Hungary, are experiencing higher adoption rates due to stronger incentives for digitalisation, putting them in a more favourable position compared to Croatia. Given all the above, this study aims to analyse the adoption of cloud accounting in Croatia, positioning it within the broader European and global landscape.

Theoretical Framework

This study is grounded in the Technology Acceptance Model (TAM), a widely recognised framework for examining the adoption of new technologies in organisational and individual contexts (Davis, 1989). TAM posits that two primary beliefs drive technology adoption: perceived usefulness (PU) and perceived ease of use (PEOU). Perceived usefulness refers to the extent to which an individual believes that using a particular technology will enhance job performance, while perceived ease of use pertains to the extent to which the technology is seen as free of effort (Davis, 1989). TAM2 extends the model to account for social influence and cognitive instrumental processes, while TAM3 also addresses determinants of perceived ease of use (Venkatesh & Bala, 2008; Venkatesh & Davis, 2000). Given the sensitive nature of financial data and the operational reliance on accounting software, cloud accounting adoption is influenced not only by perceptions of efficiency and convenience but also by concerns over data security, system reliability, and adaptability. Perceived risk has been examined in cloud-based accounting adoption (Altin & Yilmaz, 2022). In an ERP implementation, Amoako-Gyampah and Salam (2004) extended TAM to consider shared beliefs about system benefits. This study therefore applies an expanded TAM lens that integrates perceived risk as a key construct influencing cloud technology adoption. The structure of the survey and the exploratory factor analysis (EFA) conducted in this study reflect these TAM dimensions:

- Factor 1: Efficiency and Usability aligns with Perceived Usefulness, capturing beliefs that cloud accounting improves performance through automation, advanced reporting, and better collaboration.
- Factor 2: Security and Risk Concerns corresponds to Perceived Risk, encompassing fears about data loss, unauthorised access, and reliance on third-party providers.
- Factor 3: System Adaptability and Accessibility relates to Perceived Ease of Use, emphasising seamless access, system flexibility, and convenience. This theoretical framework provides a structured basis for interpreting user attitudes and explaining adoption behaviour among accounting professionals in Croatian SMEs. It also allows for comparison with prior studies in both developed

and emerging markets, contributing to the broader literature on digital transformation in professional services (Alshamaila et al., 2013).

Methodology

To collect primary data, a quantitative descriptive study was conducted using a survey questionnaire. The survey was carried out between July 5 and 22, 2024, distributed via email and a Facebook group targeted at accounting service owners, using a purposive sampling method. The questionnaire was anonymous and consisted of 40 questions divided into several key sections. The survey instrument was developed based on the Technology Acceptance Model (TAM), particularly drawing from the constructs of perceived usefulness, perceived ease of use, and perceived risk. These dimensions guided the formulation of Likert-scale items addressing efficiency, usability, data security, and adaptability in cloud accounting systems.

The first section of the questionnaire collected general information about the respondents (gender, age, education) to determine which factors influence the use of cloud technology in business operations. The second section assessed the familiarity of the respondents with the cloud concept. The third section focused on the recognised advantages of using cloud technology, exploring the benefits respondents perceive in their practice, while the fourth section addressed challenges and issues encountered by users. The questions allowed respondents to select one or multiple predefined answers, provide their own input, and rate their agreement with statements on a 5-point Likert scale. Each item asked respondents to indicate the extent of their agreement or frequency of a behaviour on a scale ranging from 1 to 5. In this study, a value of 1 represented "strongly disagree" or "never," 2 indicated "disagree" or "rarely," 3 corresponded to a neutral or moderate position, 4 reflected "agree" or "frequently," and 5 represented "strongly agree" or "very frequently". Table A1 lists the questionnaire statements on the advantages and disadvantages of cloud accounting.

For research purposes, the sample was drawn from owners of accounting services in the Republic of Croatia, whose businesses, according to the National Classification of Activities, belong to category 69.20, accounting, bookkeeping, and auditing activities. The survey was sent to 306 email addresses and shared in a specialised group for owners of accounting services. The research collected 215 responses, of which 200 were deemed valid and formed the study sample. Of the total responses collected, 15 were excluded from the final analysis due to incompleteness. The respondents did not answer a significant portion of the questionnaire, including one or more of the key sections essential for the intended analysis.

The survey questions were developed based on previous research to ensure their relevance and alignment with the study objectives. The focus when formulating the questions was on obtaining concrete data that would allow for an analysis of the current situation and the challenges faced by accounting service owners in adopting cloud technology.

Results and Discussion

Sample characteristics

The study sample comprises 200 valid respondents, predominantly middle-aged professionals. The largest proportion of respondents is in the 45-54 age group (37%), followed by those aged 35-44 (24%) and 55-64 (23%), indicating that most participants are in their mid-career or late-career stages. Younger individuals under 35 years of age

are less represented, making up only 10% of the sample, while a small percentage of respondents are 65 years or older (4%).

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The gender distribution shows a significant dominance of female respondents (72%), while male participants comprise 28% of the total. This suggests that the field, or at least the study's target group, may have a higher representation of women in leadership roles within accounting services.

Regarding educational background, most respondents hold a university degree (58%), while 20% have a higher professional qualification. A smaller proportion, 19%, completed only high school, and a limited number of participants hold a PhD (3%). These findings indicate that most professionals working with cloud technology in accounting services possess higher education qualifications.

The participants are geographically distributed in various regions of Croatia, with the highest concentration in Zagreb and its surroundings (30%), followed by Dalmatia (23%), northern Croatia (18%) and Slavonia (12%), which also have notable representations, while Istra (10%), Kvarner (6%) and Lika and Gorski Kotar (2%) contribute smaller portions to the sample. This distribution suggests that cloud technology adoption in accounting services is not confined to the capital but is also present in different regions of the country.

Work experience data show that the vast majority of respondents (83%) have been in the industry for more than 10 years, indicating a highly experienced sample. Only a small fraction of the participants reported 1-3 years (6%), 4-6 years (3%), or 7-10 years (7%) of experience, suggesting that cloud technology adoption in accounting services is primarily being implemented by professionals with substantial expertise in the field.

In summary, the respondents are predominantly highly educated and experienced professionals in the field of accounting with a wide regional distribution throughout Croatia.

Descriptive Analysis

Statistical analysis was performed using the R programming language (R Core Team, 2025). Data analysis started with descriptive statistics.

In terms of cloud technology adoption, 71% of respondents are currently using cloud-based solutions, while 20% are in the implementation phase. A smaller proportion (9%) is still in the trial stage, suggesting that cloud adoption is already well integrated among most professionals in the sample.

Table 2 presents key descriptive statistics for selected statements on the perceived benefits and challenges of cloud accounting. Respondents rated ease of access highest ($M = 4.82$, $SD = 0.53$), followed by better cooperation ($M = 4.46$) and access to new software ($M = 4.37$), indicating strong agreement. In contrast, lower scores were observed for technical complexity ($M = 2.58$) and support from providers ($M = 3.17$), reflecting areas of concern. Standard deviations above 1.0 for several items (e.g., data loss risk, provider support) suggest variability in user experiences and perceptions. The results offer a foundation for further analysis and highlight areas where cloud service providers and businesses can improve adoption strategies and risk management policies. Table A2 reports descriptive statistics for all Likert-scale items.

Table 2
Descriptive Statistics of Perceived Cloud Accounting Benefits and Challenges

Statement	Mean	Median	Standard Deviation
Ease of access	4.82	5	0.53
Better cooperation	4.46	5	0.79
Access to new software	4.37	5	0.88
Automated billing	4.2	5	1.02
Technically complex for users	2.58	3	1.24
Less support from provider	3.17	3	1.26
Data loss risk	3.31	4	1.26
Client data abuse	3.49	4	1.15

Explanatory Factor Analysis

Factor analysis is a widely used statistical technique to identify latent constructs within a data set by grouping correlated variables into meaningful factors. This method is particularly valuable in behavioural and social sciences, where complex phenomena are often explained by underlying dimensions (Hair et al., 2019). However, before applying factor analysis, it is crucial to assess whether the data set meets the necessary assumptions. Two key preliminary tests are Bartlett's sphericity test, which examines significant correlations between variables, and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, which assesses whether the data set is suitable for factor extraction (Field, 2018).

To determine the suitability of the data for factor analysis, a correlation matrix was first examined. The goal was to assess whether the observed variables exhibited sufficient intercorrelations to justify the use of Exploratory Factor Analysis (EFA). Bartlett's Test of Sphericity was then performed to statistically test the null hypothesis that the correlation matrix is an identity matrix, which would indicate that variables are unrelated and unsuitable for factor analysis (Tabachnick & Fidell, 2019). The test produced a chi-square value (χ^2) of 1035.319 with 300 degrees of freedom (df) and a p-value of 1.387×10^{-81}.

Because the p-value is well below the conventional 0.05 threshold, the null hypothesis is rejected, confirming that the correlation matrix differs significantly from an identity matrix. Therefore, the data are appropriate for factor analysis, as they exhibit sufficient shared variance among variables.

The KMO test was also applied to assess the proportion of common variance among the variables. The overall KMO value was 0.80, indicating a meritorious level of sampling adequacy (Kaiser & Rice, 1974).

Notably, several individual items had particularly high KMO values, for example, "Advanced Reporting" (0.91), "Automated Billing" (0.88), and "Real-Time Cost Analysis" (0.87), demonstrating strong factorability. Even the lowest-scoring items, such as "Data Loss Risk" (0.67) and "Internet Speed Dependence" (0.69), were above the acceptable minimum. Table A3 reports the item-level measures of sampling adequacy (MSA). These results support the inclusion of all variables in the factor model and further confirm the dataset's suitability for EFA.

Factor analysis produced three distinct factors, explaining 52% of the total variance in respondents' perspectives on cloud accounting. These factors capture different dimensions of cloud adoption, including efficiency and usability, security and risk concerns, and system adaptability (Table 3). Table A4 presents the full matrix of standardised factor loadings, and Table A5 reports the variance explained by each factor.

Table 3
Summary of Extracted Factors, Key Items, and Explained Variance

Factor	Items with High Loadings	Variance Explained
Factor 1: Efficiency and Usability (MR1)	• Real-time cost analysis (0.88) • Advanced reporting (0.86) • Automated billing (0.76) • Access to new software (0.71) • Better cooperation (0.71)	25.1%
Factor 2: Security and Risk Concerns (MR2)	• Data loss risk (0.78) • Greater risk from third-party storage (0.77) • Unauthorised data access risk (0.68) • Less provider support (0.66) • Less adaptability to specific needs (0.68)	20.2%
Factor 3: Adaptability and Accessibility (MR3)	• Unlimited data backup (0.60) • Ease of access (0.52) • Better security (0.50)	6.7%

Source: Authors' work

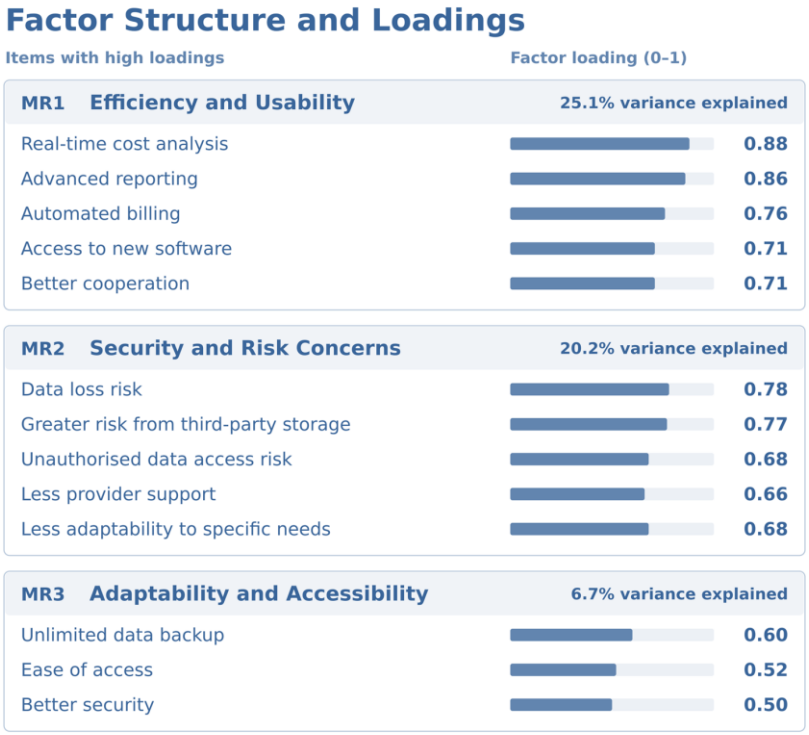
The following factors were extracted:

- *Factor 1: Efficiency and Usability (MR1)*, accounting for 25.1% of the variance and including items related to the efficiency and ease of use of cloud accounting solutions. This factor indicates that respondents perceive cloud accounting as a time-saving, performance-enhancing tool that enables real-time analytics, automation, and improved collaboration. These perceived benefits are consistent with earlier descriptions of cloud accounting (Dimitriu & Matei, 2015; Keglević Kozjak et al., 2024).
- *Factor 2: Security and Risk Concerns (MR2). Explaining 20.2%* of the variance, this factor includes variables related to data security, system risks, and service limitations. Grouping these variables into a single factor highlights perceived vulnerabilities and risks in cloud accounting, such as dependence on third-party providers and concerns about data breaches (Akinade et al., 2025). Although cloud technology offers numerous advantages, accountants remain cautious about data security, service reliability, and adaptability to specific business needs.
- *Factor 3: Adaptability and accessibility of the system (MR3), accounting for* 6.7% of the variance, focuses on the system's flexibility and accessibility. This factor reflects the importance of accessibility and system stability for accountants, which are among the practical benefits discussed in earlier cloud accounting literature (Dimitriu & Matei, 2015; INAA Group, 2023). However, the explained variance (6.7%) suggests that adaptability is less of a primary concern compared to efficiency and security.

Figure 5 presents the visual mapping of survey items onto the extracted factors (MR1, MR2, MR3). Rather than a conventional scree plot showing eigenvalues, this diagram functions as a path diagram, illustrating how each item loads onto a factor based on strength of association (factor loading values). The interpretation considered the magnitude and pattern of the loadings, including potential cross-loadings (Costello & Osborne, 2005). MR1 primarily captures performance benefits and automation. MR2 aggregates concerns about data protection, risk, and service

limitations. MR3 identifies supporting features like accessibility and backup, which, though important, explained less variance. These themes are consistent with the benefits and risks discussed in cloud accounting and cloud security research (Akinade et al., 2025; Dimitriu & Matei, 2015; Keglević Kozjak et al., 2024).

Figure 5
Factor Structure and Loadings



Source: Author's illustration

Model Fit
Table A6 presents fit indices and diagnostics for the three-factor model. The root mean square error of approximation (RMSEA) was 0.075, indicating an acceptable fit (<0.08), while the Tucker-Lewis index (TLI) was 0.836, suggesting a moderate fit (ideally >0.90). The Bayesian Information Criterion (BIC) was -636.62, where lower values indicate a better model. The cumulative variance explained by the extracted factors was 52%, which is reasonable for social science research.

Table A7 reports factor score adequacy. The estimated correlations between regression scores and their corresponding factors were 0.96 for MR1, 0.96 for MR2, and 0.86 for MR3. The results provide several insights into accountants' perspectives on cloud accounting. Efficiency and usability drive adoption. The factor that explains the most variance emphasises that cloud accounting is valued for automating processes, improving reporting, and enabling real-time financial analysis. Security concerns remain a barrier because a substantial proportion of variance is attributed to concerns about data protection, provider reliability, and adaptation issues, which may slow adoption among accounting firms. The system's accessibility and adaptability play a secondary role. Although important, these factors contribute less to the overall variance, suggesting that users prioritise efficiency and security over system customisation. These findings align with the Technology Acceptance Model (TAM), which posits that perceived usefulness and security concerns are key determinants of cloud adoption in professional settings (Venkatesh & Bala, 2008). This study identifies

three key dimensions of cloud accounting adoption among accountants: efficiency, security concerns, and accessibility. Although efficiency and usability are the main motivators, security risks and adaptability issues remain key barriers to adoption. The study contributes to the growing literature on cloud-based financial technologies, offering practical insights for accounting firms, software providers, and policymakers looking to improve trust, security, and efficiency in cloud-based accounting solutions.

Conclusion

This study provides valuable insights into the adoption of cloud accounting among small and medium-sized enterprises in Croatia. The survey results reveal that accounting professionals perceive cloud solutions as beneficial, particularly with respect to efficiency, accessibility, and improved collaboration. These features are seen as drivers of operational improvement and modernization in financial processes. However, despite recognising the benefits, respondents expressed ongoing concerns about data security, service provider reliability, and technical complexity. These issues continue to represent significant barriers to full-scale adoption, especially for firms with limited internal IT support or less experience with digital platforms.

Exploratory Factor Analysis (EFA) identified three main dimensions shaping accountants' perceptions of cloud accounting. The first is Efficiency and Usability, which reflects the value placed on automation, real-time data access, and ease of use. The second, Security and Risk Concerns, includes worries about data breaches, unauthorised access, and reliance on third-party providers. The third factor, Adaptability and Accessibility, highlights the importance of system flexibility, but also points to challenges related to customisation and integration into existing workflows.

Although the overall perception of cloud accounting is positive, adoption remains limited by these concerns. The findings suggest that improving user trust through better training, more transparent service-level agreements, and stronger security assurances could support broader adoption. Service providers and policymakers alike can play a role by improving support structures, clarifying legal responsibilities, and offering user-focused education initiatives.

This study has several limitations that should be acknowledged. Most notably, the sample was not selected using a random sampling method. Therefore, the results cannot be generalised to all accounting firms in Croatia, but rather apply only to those that participated in the survey. The sample may reflect certain characteristics, such as size, digital readiness, or regional concentration, that could limit the broader applicability of the findings.

Future research could expand this study by incorporating a larger and more diverse sample, employing a probabilistic sampling method, or conducting longitudinal analysis to track changes over time. It would also be valuable to compare perceptions between early adopters and firms that have not yet transitioned to cloud accounting, to better understand adoption drivers and resistance factors.

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Appendixes

Table A1
Cloud Accounting Statements

Advantages of Cloud Accounting Statements	Code
Enables easier access to data from any location and device	Ease of access
Reduces costs and maintenance of IT infrastructure	decreas_cost_maintance
Improves collaboration and communication	better_cooperation
Allows for automatic software updates without workflow interruptions	automatic_update
Enhances data security through additional authentication measures	better_security
Increases efficiency and business productivity	better_efficiency
Provides unlimited data storage and automatic backups	unlimited_data_backup
Simplifies accounting processes compared to traditional systems	simple_accounting_processes
Reduces the time required for data collection, recording, processing, and reporting compared to traditional accounting systems	less_time_consuming_data_management
Ensures access to the latest software versions	acces_to_new_software
Enables advanced reporting and data analysis	advanced_reporting
Allows for real-time cost and profit tracking	real_time_cost_analysis
Supports an automated invoicing and payment process	automated_billing
Facilitates compliance with regulations and standards through automatic updates and integrations	standards_compliance
Disadvantages of Cloud Accounting Statements	**Code**
Increases the threat to client data security from unauthorized access	Unauthorized_Data_access_risk
Increases the risk of data loss	data_loss_risk
Increases the possibility of data misuse by cloud service providers	client_data_abuse
Increases the cost of renting software solutions	greater_lease_cost_software
Technically complex for users	tehnicaly_complex_users
Depends on the speed and stability of the internet connection	Internet_speed_depend
Increases risks as data is stored by third parties in unknown locations	Greater_risk_third_party_data_storage
Lacks sufficient support from the provider	less_support_provider
Has limited customization options for specific user needs	less_adaption_specific_needs
May lead to loss of access to data during service interruptions	dana_loss_service_interruption
Depends on the stability of the service provider	service_provider_stability

Table A2
Descriptive statistics of Likert Scale Variables

Variable	Mean	Median	SD
Ease of access	4.82	5	0.527
decreas_cost_maintance	3.92	4	1.190
better_cooperation	4.46	5	0.792
automatic_update	4.43	5	0.847
better_security	4.05	4	1.124
better_efficiency	4.28	4	0.910
unlimited_data_backup	4.17	4	0.840
simple_accounting_processes	4.20	4	0.971
less_time_consuming_data_management	4.22	4	0.976
acces_to_new_software	4.37	5	0.876
advanced_reporting	4.11	4	0.868
real_time_cost_analysis	4.06	4	1.029
automated_billing	4.20	5	1.019
standards_compliance	4.15	4	0.972
Unauthorized_Data_access_risk	3.71	4	1.114
data_loss_risk	3.31	4	1.261
client_data_abuse	3.49	4	1.147
greater_lease_cost_software	3.66	4	1.094
tehnicaly_complex_users	2.58	3	1.236
Internet_speed_depend	4.28	4	0.839
Greater_risk_third_party_data_storage	3.74	4	1.035
less_support_provider	3.17	3	1.257
less_adaption_specific_needs	3.32	3	1.213
dana_loss_service_interruption	3.65	4	1.316
service_provider_stability	4.11	4	0.986

Table A3
Factor Loadings and Measures of Sampling Adequacy

Factor	Item	Factor loading	MSA
MR1 – Efficiency and Usability	Real-time cost analysis	0.88	0.87
MR1	Advanced reporting	0.86	0.91
MR1	Automated billing	0.76	0.88
MR1	Less time-consuming data management	0.75	0.80
MR1	Standards compliance	0.73	0.87
MR1	Better cooperation	0.71	0.81
MR1	Access to new software	0.71	0.87
MR1	Simpler accounting processes	0.67	0.80
MR1	Better efficiency	0.62	0.87
MR1	Lower IT maintenance costs	0.61	0.86
MR1	Better security	0.56	0.81
MR1	Automatic software updates	0.39	0.81
MR2 – Security and Risk Concerns	Data loss risk	0.78	0.67
MR2	Greater risk from third-party data storage	0.77	0.81
MR2	Risk of client data misuse	0.75	0.70
MR2	Unauthorised data access risk	0.68	0.83
MR2	Less adaptability to specific needs	0.68	0.75
MR2	Loss of data access during service interruptions	0.66	0.69

MR2	Less provider support	0.66	0.81
MR2	Higher software rental costs	0.63	0.72
MR2	Technical complexity for users	0.63	0.76
MR2	Dependence on service provider stability	0.61	0.74
MR2	Dependence on internet speed and stability	0.42	0.69
MR3 – Adaptability and Accessibility	Unlimited data backup	0.60	0.78
MR3	Ease of access	0.52	0.62

Table A4
Standardised Factor Loadings

Item	MR1	MR2	MR3	h^2	u^2	Complexity
Ease of access	0.27	0.12	0.52	0.35	0.65	1.6
Lower IT maintenance costs	0.61	−0.12	0.34	0.50	0.50	1.7
Better cooperation	0.71	0.17	0.10	0.55	0.45	1.2
Automatic software updates	0.39	−0.13	0.23	0.23	0.77	1.9
Better security	0.56	−0.08	0.50	0.57	0.43	2.0
Better efficiency	0.62	−0.07	−0.03	0.39	0.61	1.0
Unlimited data backup	0.51	−0.24	0.60	0.67	0.33	2.3
Simpler accounting processes	0.67	−0.06	0.18	0.49	0.51	1.2
Less time-consuming data management	0.75	−0.09	−0.13	0.59	0.41	1.1
Access to new software	0.71	0.01	0.50	0.75	0.25	1.8
Advanced reporting	0.86	−0.06	0.14	0.76	0.24	1.1
Real-time cost analysis	0.88	0.00	0.08	0.78	0.22	1.0
Automated billing	0.76	−0.05	0.14	0.60	0.40	1.1
Standards compliance	0.73	−0.09	0.20	0.58	0.42	1.2
Unauthorised data access risk	−0.12	0.68	−0.17	0.51	0.49	1.2
Data loss risk	−0.07	0.78	−0.14	0.63	0.37	1.1
Risk of client data misuse	0.02	0.75	0.12	0.58	0.42	1.0
Higher software rental costs	−0.10	0.63	0.30	0.50	0.50	1.5
Technical complexity for users	−0.04	0.63	0.13	0.42	0.58	1.1
Dependence on internet speed and stability	0.01	0.42	−0.04	0.18	0.82	1.0
Greater risk from third-party data storage	0.05	0.77	0.06	0.59	0.41	1.0
Less provider support	−0.10	0.66	−0.14	0.46	0.54	1.1
Less adaptability to specific needs	−0.17	0.68	−0.10	0.50	0.50	1.2
Loss of data access during service interruptions	−0.12	0.66	0.11	0.46	0.54	1.1
Dependence on service provider stability	0.06	0.61	−0.17	0.40	0.60	1.2

Note: Extraction method: minimum residual (MINRES). Rotation: varimax. The analysis used the correlation matrix.

Table A5
Variance Explained by the Three Factors

Measure	MR1	MR2	MR3
Sum of squared loadings	6.27	5.05	1.69
Proportion of total variance explained	0.25	0.20	0.07

Cumulative proportion of total variance explained	0.25	0.45	0.52
Share of variance explained by the retained factors	0.48	0.39	0.13
Cumulative share of variance explained by the retained factors	0.48	0.87	1.00

Note. The three factors jointly explained approximately 52% of the total variance. MR1 accounted for 48% of the variance explained by the three retained factors.

Table A6
Fit and Diagnostics for the Three-Factor Model

Statistic	Value
Sample size	200
Harmonic sample size	200
Null-model degrees of freedom	300
Null-model objective function	18.88
Null-model χ^2	1035.32
Three-factor model degrees of freedom	228
Three-factor model objective function	5.96
Root mean square residual (RMSR)	0.07
Degrees-of-freedom-adjusted RMSR	0.08
Empirical χ^2	167.25
Likelihood χ^2	315.14
Likelihood χ^2 p-value	< 0.00012
Tucker–Lewis index (TLI)	0.836
Root mean square error of approximation (RMSEA)	0.075
90% confidence interval for RMSEA	[0.055, 0.097]
Bayesian information criterion (BIC)	−636.62
Fit based on off-diagonal values	0.96
Mean item complexity	1.3

Table A7
Factor Score Adequacy

Measure	MR1	MR2	MR3
Correlation of regression scores with factors	0.96	0.96	0.86
Multiple R^2 of scores with factors	0.93	0.91	0.75
Minimum correlation of possible factor scores	0.86	0.83	0.49

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