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Evidence-Based Decision-Making for Intraoral Scanner Selection in Clinical Dental Practice: Development of the EBIOS Pilot Framework

Socratis Thomaidis [1], Georgios Chrisochoou [1], Eleni-Ioanna Tzaferi [1], Aikaterini Petropoulou [2] and Maria Antoniadou [1,3,*]

[1] Department of Operative Dentistry, Department of Dentistry, School of Health Sciences, National and Kapodistrian University of Athens, Goudi, 11527 Athens, Greece; sthom@dent.uoa.gr (S.T.); geohris13@gmail.com (G.C.); eleantzaf@gmail.com (E.-I.T.)
[2] Department of Prosthodontics, Department of Dentistry, School of Health Sciences, National and Kapodistrian University of Athens, Goudi, 11527 Athens, Greece; apetrop@dent.uoa.gr
[3] Certified Systemic Analyst Program (CSAP), University of Piraeus, 18534 Piraeus, Greece
* Correspondence: mantonia@dent.uoa.gr

Abstract

Background/ Objectives: Selecting an intraoral scanner (IOS) has evolved into a complex clinical decision that extends beyond technical performance alone. This study aimed to investigate the clinical, technical, educational, and organizational factors influencing intraoral scanner selection among dentists, evaluate awareness of ISO specifications and evidence-based criteria, and propose a conceptual framework to support evidence-based technology selection. **Methods:** A cross-sectional questionnaire-based study was conducted among dentists practicing in Greece. A total of 86 questionnaires were returned from 271 invited participants (response rate: 31.73%). Valid sample sizes varied across analyses according to item applicability and analyzable responses. The questionnaire assessed demographic and professional characteristics, intraoral scanner use, selection criteria, awareness of ISO specifications, educational background, and evidence-related factors. Composite indices were developed to evaluate the principal decision-making dimensions. **Results:** Technical and clinical performance-related criteria received the highest importance ratings in intraoral scanner selection. Although participants generally reported good perceived knowledge of intraoral scanners, only 35.7% reported awareness of ISO specifications. Dentists familiar with ISO standards assigned significantly greater importance to specification-related and safety-related criteria, suggesting an association between reported ISO awareness and greater emphasis on specification- and safety-related selection criteria. Continuing professional education represented the predominant source of knowledge acquisition. Based on the integration of these findings, the EBIOS Pilot Framework (Evidence-Based Intraoral Scanner Selection Framework) is proposed as a preliminary conceptual synthesis of factors potentially relevant to evidence-informed intraoral scanner selection. **Conclusions:** The findings suggest that intraoral scanner selection may be understood as a multidimensional decision-making process involving technical performance, scientific evidence, professional education, and standardized quality criteria. The proposed EBIOS Pilot Framework provides a preliminary conceptual basis for future validation and refinement in larger, independent populations.

Check for updates

Academic Editor: João Paulo Mendes Tribst

Received: 13 July 2026
Revised: 16 August 2026
Accepted: 24 August 2026
Published: 29 August 2026

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Keywords: intraoral scanner; digital dentistry; evidence-based dentistry; decision-making; CAD/CAM; ISO standards; technology adoption; continuing professional education; conceptual framework

1. Introduction

The rapid evolution of digital technologies has profoundly transformed contemporary dental practice, leading to a paradigm shift from conventional analogue procedures toward fully digital clinical workflows. Among these technologies, intraoral scanners (IOSs) have emerged as one of the most influential innovations in restorative and prosthodontic dentistry, enabling direct digital acquisition of intraoral structures while improving communication between clinicians and dental laboratories throughout the prosthetic workflow [1–6]. As an essential component of computer-aided design and computer-aided manufacturing (CAD/CAM) systems, IOS technology has substantially reshaped diagnostic procedures, treatment planning, restoration design, and manufacturing, contributing to greater efficiency, workflow optimization, and digital integration within contemporary dental practice [7].

Current intraoral scanning systems are based on different optical acquisition principles, including triangulation, structured light projection, confocal microscopy, and optical coherence tomography, each influencing image acquisition, data processing, and three-dimensional reconstruction accuracy [1,2,8–10]. These technologies generate highly detailed point clouds that are subsequently converted into digital surface models, such as Standard Tessellation Language (STL) files, which constitute the digital foundation of CAD/CAM restorative workflows [8,9]. Continuous technological improvements in image acquisition, software algorithms, and computational processing have further enhanced scanner performance, expanding their indications across an increasingly broad spectrum of restorative and prosthodontic procedures [1,2].

From a clinical perspective, considerable scientific evidence supports the reliability and accuracy of digital impressions for single-unit restorations and short-span fixed dental prostheses, demonstrating marginal adaptation comparable or even superior to conventional impression techniques [11–15]. Recent technological advances, including intraoral photogrammetry and improved scanning algorithms, have further enhanced the registration of implant positions and the accuracy of implant-supported restorations, particularly in partially edentulous patients [16–19]. Nevertheless, systematic reviews continue to indicate that scanning accuracy remains highly dependent on multiple clinical and technical variables, including scanner technology, scanning strategy, operator experience, saliva control, soft tissue management, and arch configuration [20–25]. Moreover, discrepancies between standardized laboratory testing and routine clinical conditions continue to challenge the translation of in vitro performance into predictable clinical outcomes [26]. Although contemporary IOS systems generally achieve clinically acceptable accuracy for single restorations and short-span prostheses, limitations remain in full-arch rehabilitations and complex implant-supported restorations, where cumulative stitching errors and spatial distortions may compromise accuracy beyond clinically acceptable thresholds [27–30].

Beyond their documented clinical performance, intraoral scanners have consistently been associated with improved patient comfort, reduced treatment burden, and greater patient preference compared with conventional impression techniques, contributing to their increasing acceptance in everyday clinical practice [31–35]. Consequently, the adoption of IOS technology has increased steadily worldwide, although important variations continue to exist according to healthcare systems, educational background, practice charac-

teristics, and clinicians' exposure to digital technologies [36–39]. Previous surveys have investigated the implementation of intraoral scanners among dentists in several countries, including the Netherlands [36], the United Kingdom [37], Saudi Arabia [40–43], Austria [44], Germany [45], China [46], Austria and Switzerland [39], as well as multinational populations [38]. Additional investigations have examined the perspectives of orthodontists [47], military dentists [48], periodontists [49], and undergraduate dental students [50–53], collectively demonstrating the growing international interest in digital impression technologies.

Despite the extensive body of evidence supporting the clinical effectiveness of intraoral scanners, selecting an IOS represents considerably more than a purely technical decision. Contemporary clinicians are required to evaluate multiple dimensions simultaneously, including scanner accuracy, usability, workflow integration, interoperability with laboratory systems, acquisition cost, maintenance requirements, manufacturer support, educational opportunities, and anticipated return on investment [54–60]. Consequently, intraoral scanner selection has evolved into a complex clinical and organizational decision-making process, extending beyond technological performance alone.

To support the objective evaluation of digital intraoral impression systems, international standards and regulatory frameworks have been developed to promote more consistent assessment of device accuracy, safety, and performance. In particular, ISO 20896-1:2019 specifies standardized test methods and procedures for evaluating the accuracy of three-dimensional intraoral surface data acquired directly from patients using hand-held digital impression devices [61]. By contrast, ISO 12836 applies primarily to fixed or mechanically guided digitizing devices used within dental CAD/CAM workflows and is therefore not directly applicable to hand-held intraoral scanners [62]. Familiarity with the appropriate standards is clinically relevant, as it may help practitioners critically interpret manufacturers' performance claims and distinguish evidence generated through standardized testing from commercially reported technical specifications. In parallel, regulatory requirements, including CE certification under the applicable European medical device framework, establish essential safety and performance requirements for devices placed on the market [63,64]. Nevertheless, adherence to specific ISO testing standards is not uniformly required across manufacturers, and reported performance data may originate from heterogeneous experimental protocols, reference models, scanning conditions, and outcome measures, thereby limiting direct comparisons among commercially available systems [65]. This challenge is further compounded by the fact that laboratory-derived accuracy metrics do not necessarily translate directly into clinical performance. Although clinically acceptable marginal discrepancies have generally been reported within the range of approximately 120–150 μm, depending on the clinical indication, restorative design, and biomechanical requirements [14,66], the interpretation and application of standardized performance data in everyday clinical decision-making remain complex [11–13,28,29,67].

Selecting an intraoral scanner should therefore be approached as an evidence-informed clinical and organizational decision rather than as a purely technological or commercial choice. In practice, however, clinicians must integrate heterogeneous sources of information, including scientific evidence, standardized performance criteria, clinical experience, professional education, workflow requirements, peer recommendations, manufacturer-related factors, and economic considerations [54–60,68,69]. Although previous studies have examined IOS accuracy, clinical performance, user experience, and patterns of technology adoption, these dimensions have largely been investigated separately. Consequently, limited evidence is available on how clinicians combine technical, educational, professional, and evidence-related considerations when selecting an IOS, or on whether awareness of

standardized performance criteria is associated with a more evidence-informed approach to technology evaluation.

The present study addresses this gap by examining IOS selection as a multidimensional decision-making process rather than focusing on scanner performance or adoption in isolation. Its novel contribution lies in the concurrent assessment of clinicians' technical priorities, professional and educational characteristics, awareness of ISO specifications, and use of scientific and professional information in technology selection. These dimensions are subsequently integrated into the preliminary Evidence-Based Intraoral Scanner Selection (EBIOS) Pilot Framework, providing a structured conceptual basis for understanding and subsequently testing evidence-informed technology-selection decisions in dentistry. This approach may extend the existing literature by shifting attention from the question of whether clinicians adopt digital technologies to how they evaluate and select them, while also identifying potential areas for professional education and future research.

Accordingly, the objectives of the study were to: (a) identify the clinical, technical, educational, and organizational factors associated with intraoral scanner selection; (b) evaluate clinicians' awareness of ISO specifications and scientific evidence related to intraoral scanning; (c) examine associations between professional characteristics, education, evidence awareness, and scanner-selection priorities; and (d) integrate the observed findings into a preliminary conceptual framework describing evidence-informed IOS selection in contemporary dental practice. Accordingly, the study addressed the following research questions: (a) What criteria do clinical dentists prioritize when selecting an intraoral scanner? (b) To what extent are clinicians aware of ISO specifications and scientific evidence related to intraoral scanners? (c) How are professional characteristics, educational background, and evidence awareness associated with intraoral scanner-selection priorities? (d) Can the observed relationships among these factors be integrated into a preliminary conceptual framework describing evidence-informed intraoral scanner selection in contemporary dental practice?

2. Materials and Methods

2.1. Study Design and Data Collection

This study employed a cross-sectional research design based on questionnaire data collection, a method widely used in dental research to investigate clinical practices, perceptions, and decision-making processes [70,71]. The questionnaire was developed in digital format using Google Forms and was accessible via a unique QR code, enabling participants to directly access and complete the survey in a time-efficient and user-friendly manner. The survey was distributed to a total of 271 clinical dentists, including faculty members, postgraduate students, scientific collaborators, PhD candidates, and postdoctoral researchers affiliated with the Department of Dentistry of the National and Kapodistrian University of Athens, as well as to dentists registered with the Attica Dental Association. All participants were either engaged in private clinical practice or actively working in a dental setting at the time of the study. The study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics and Deontology Committee of the Dental School, National and Kapodistrian University of Athens (protocol approval number 86704/11.09.2024). Data collection was conducted over a ten-month period, from April 2025 to February 2026.

All data collected in this study were treated with strict confidentiality, in accordance with applicable ethical guidelines and data protection regulations. No personal or identifiable data were collected, and any potentially identifying information was either not recorded or appropriately anonymized or pseudonymized. Data were securely stored in

digital format, with access restricted exclusively to members of the research team, and data retention and disposal procedures followed relevant ethical standards.

Participation in the study was entirely voluntary, and no financial or other incentives were provided. Dentists had the right to decline participation without any consequences. Informed consent was obtained prior to participation, as indicated within the survey form, and submission of the questionnaire was considered as consent to participate in the study. Each participant was allowed to submit the questionnaire only once.

Every effort was made to minimize the time required for participation, and the study was designed to be risk-free. Strict confidentiality protocols were implemented to ensure that all responses remained anonymous and that no individual participant could be identified at any stage of data analysis or publication. The study adhered to established ethical principles for research involving human participants, ensuring the protection of privacy, confidentiality, and the responsible handling and use of all collected data.

2.2. Questionnaire Development and Structure

The questionnaire was developed specifically for the purposes of the present study following a review of the literature concerning intraoral scanner adoption, digital dentistry, technology-selection criteria, professional education, and evidence-based clinical decision-making. Candidate items were selected to represent the principal clinical, technical, educational, economic, organizational, and evidence-related dimensions identified in previous studies. The initial questionnaire was reviewed by members of the research team with clinical and academic expertise in restorative dentistry, prosthodontics, digital dentistry, and dental practice management in order to evaluate item relevance, clarity, and content coverage. Following this review, wording and response categories were refined to improve comprehensibility and reduce ambiguity. A pilot assessment was subsequently conducted among five dentists who were not included in the final study sample. Participants were asked to comment on item clarity, comprehensibility, response options, and completion time. Minor wording modifications were made based on their feedback. No major changes to the conceptual structure of the questionnaire were required.

2.3. Questionnaire Structure

The study questionnaire was structured into six sections, each designed to capture distinct dimensions of intraoral scanner use, decision-making, and professional attitudes.

Part A (Q1–Q5) collected demographic and professional characteristics, including gender, age group, educational background, type of practice, and years of clinical experience. Part B (Q6–Q14) addressed clinical activity and participants' experience with intraoral scanning, including restorative workload, duration and frequency of scanner use, scanner type, satisfaction with digital impression procedures, and selected restorative practice characteristics. Part C (Q15–Q19) focused on scanner acquisition and selection-related factors, including reasons for purchase, the perceived importance of technical and non-technical criteria, software characteristics, and associated costs. Part D (Q20–Q24) explored education and training in digital dentistry, self-perceived knowledge of intraoral scanner technology, awareness of ISO specifications, and perceptions regarding scanner accuracy and clinical performance. Part E (Q25) assessed perceived practice- and patient-related implications of intraoral scanner use, including potential effects on practice turnover, patient attraction, treatment volume, return on investment, and patient satisfaction. Finally, Part F (Q26–Q29) consisted of open-ended questions addressing clinical evaluation of indirect restorations, purchasing behavior, brand preferences, and participants' perceptions of the characteristics of an ideal intraoral scanner [72].

All questionnaire items required a response before submission. However, the valid sample size varied across analyses because responses such as "Don't know/no answer", "I do not have a digital scanner", and other non-applicable response categories were excluded where appropriate. Accordingly, the total number of returned questionnaires (n = 86) was distinguished from the valid analytical sample size for each specific analysis, and the corresponding valid n is reported throughout the Results, tables, and figures.

The questionnaire was designed to be completed within approximately 15 min. The study primarily employed quantitative analysis to evaluate responses across all sections, with particular emphasis on ISO specifications and related scientific evidence. In addition, qualitative input derived from open-ended responses provided complementary insights, enhancing the depth of interpretation in line with established methodological approaches in healthcare research [73,74].

The full survey instrument is provided in Supplementary File S1.

2.4. Statistical Analysis

Statistical analyses were conducted according to the predefined research questions. Categorical variables were summarized as frequencies and percentages, continuous variables and composite indices as means and standard deviations, and multiple-response items as percentages of cases. Reasons for intraoral scanner acquisition (Q15) and scanner-selection criteria (Q16) were examined descriptively. ISO awareness (Q22), perceived knowledge of intraoral scanner-related concepts (Q21), and ISO/specification-related considerations (Q16, Q23) were also summarized descriptively and compared according to ISO awareness using Mann–Whitney U tests and, for categorical variables, chi-square or Fisher's exact tests as appropriate. Non-applicable and "Don't know/no answer" responses were treated as missing for the corresponding analyses, resulting in variable-specific valid sample sizes.

To examine broader dimensions of scanner-selection decision-making, study-specific composite indices were constructed from conceptually related Q16 items. The technical/clinical importance index comprised build quality, ease of handling, imaging accuracy, compliance with specifications, patient safety, and personnel safety; the evidence/reputation/professional influence index comprised manufacturer reputation, attendance at relevant conferences/workshops/webinars, existing scientific literature, specialist colleague opinion, and scanner-user colleague opinion; and the ISO/specification-related importance index comprised build quality, impression accuracy, compliance with specifications, patient safety, personnel safety, and existing scientific literature. Some items were intentionally included in more than one composite index because the indices represented conceptually overlapping, rather than mutually exclusive, dimensions of scanner-selection decision-making. Cost and environmental considerations were analyzed separately as single-item criteria. Composite scores were calculated as the arithmetic mean of the corresponding 5-point Likert-type items, with higher scores indicating greater perceived importance, and internal consistency was assessed using Cronbach's alpha. As these indices were developed for the present exploratory study and were not externally validated, they were treated as study-specific analytical measures rather than validated scales.

Differences in composite scores according to gender were assessed using Mann–Whitney U tests and according to educational background and workplace setting using Kruskal–Wallis tests; associations with age and years of clinical experience were examined using Spearman's rank correlations. Given the exploratory nature and limited sample size of the study, analyses were primarily descriptive and bivariate, without multivariable adjustment for potential confounding. No formal correction for multiple comparisons was applied; accordingly, inferential findings should be interpreted as exploratory and hypothesis-generating. All tests

were two-tailed, with statistical significance set at $p < 0.05$. Analyses were performed using IBM SPSS Statistics for Windows, Version 29.0 (IBM Corp., Armonk, NY, USA).

3. Results

3.1. Demographics of the Sample

A total of 86 questionnaires were returned from 271 invited participants, corresponding to a response rate of 31.73%. For the sociodemographic and professional characteristics presented in Table 1, valid responses were available for 84 participants. Of these, 53.6% were male, and the largest age group was 24–35 years (39.3%). Nearly half held a postgraduate degree (47.6%), whereas 26.2% held a doctoral degree. Most participants worked in a private solo dental practice (52.4%). The largest clinical-experience group comprised dentists with 0–5 years of experience (21.4%), followed by those with 6–10 and 21–25 years of experience (17.9% each). Detailed sociodemographic and professional characteristics of the study population are presented in Table 1.

Table 1. Participant sociodemographic and professional characteristics.

Characteristic	Category	n	%
Gender	Male	45	53.6
	Female	38	45.2
	Other	1	1.2
Age	24–35	33	39.3
	36–45	15	17.9
	46–55	22	26.2
	56–65	12	14.3
	66–75	2	2.4
Educational background	Dental School graduate	22	26.2
	Postgraduate degree	40	47.6
	Doctoral degree	22	26.2
Professional employment	Work in a private solo dental practice	44	52.4
	Work in a colleague's dental practice	11	13.1
	Work in a multi-dentist practice with more than 3 dentists	16	19.0
	Work in a university clinic	11	13.1
	Public sector facility	1	1.2
	Other	1	1.2
Years of clinical experience	0–5 years	18	21.4
	6–10 years	15	17.9
	11–15 years	7	8.3
	16–20 years	11	13.1
	21–25 years	15	17.9
	26–30 years	8	9.5
	More than 31 years	10	11.9

Note. Valid n = 84. Percentages are based on valid responses.

3.2. Decision Drivers for Intraoral Scanner Selection

To investigate the factors underlying evidence-based decision-making for intraoral scanner selection, participants were asked to report both their primary reasons for purchasing an intraoral scanner and the relative importance assigned to different selection criteria. Overall, the findings indicated that clinicians based their purchasing decisions predominantly on factors related to clinical performance and workflow efficiency rather than on external influence or patient-driven considerations. The most frequently reported reason for purchasing an intraoral scanner was the ability to transmit digital impressions immediately to the dental laboratory (57.1%), followed by quality control of tooth preparation (51.2%), ease of impression-taking (47.6%), and reduced working time during impression procedures (41.7%) (Table 2). Approximately one-third of respondents also considered keeping pace with technological developments (39.3%) and facilitating the management

of complex clinical cases (33.3%) as important reasons for scanner acquisition. In contrast, patient-related motivations played only a limited role, with only 2.4% of participants reporting that patient requests for digital impressions influenced their purchasing decision.

Table 2. Reasons for purchasing an intraoral scanner.

Reason	n	% of Cases
Immediate sending to the laboratory	48	57.1
Quality control of tooth preparation	43	51.2
Ease of impression-taking	40	47.6
Possibility of reducing working time during impression-taking	35	41.7
More modern approach/keeping up with developments	33	39.3
Easier management of complex or demanding cases	28	33.3
Many patients are impressed by the procedure	22	26.2
Informed patients asked about digital impression-taking	2	2.4

Note. Valid n = 84. This was a multiple-response question; therefore, participants could select more than one reason. Percentages represent percentages of valid cases and therefore do not sum to 100%.

When participants evaluated the importance of individual scanner-selection criteria, technical and clinical characteristics clearly predominated over external or promotional factors (Table 3). Impression accuracy emerged as the most influential criterion, followed by build quality, ease of use, patient safety, staff safety, and compliance with technical specifications. Manufacturer reputation, cost, and existing scientific literature were also considered important by a substantial proportion of respondents, whereas environmental considerations, conferences, and colleague recommendations received comparatively lower ratings.

Table 3. Importance of factors when purchasing an intraoral scanner.

Factor	Most Important	Very Important	Important	Slightly Important	Not at all Important
Cost	10 (11.9)	43 (51.2)	26 (31.0)	2 (2.4)	3 (3.6)
Build quality	28 (33.3)	46 (54.8)	9 (10.7)	0 (0.0)	1 (1.2)
Manufacturer's reputation	10 (11.9)	50 (59.5)	14 (16.7)	6 (7.1)	4 (4.8)
Ease of use	30 (35.7)	43 (51.2)	9 (10.7)	1 (1.2)	1 (1.2)
Impression accuracy	64 (76.2)	16 (19.0)	2 (2.4)	0 (0.0)	2 (2.4)
Compliance with specifications	20 (23.8)	35 (41.7)	20 (23.8)	7 (8.3)	2 (2.4)
Patient safety	24 (28.6)	40 (47.6)	13 (15.5)	5 (6.0)	2 (2.4)
Staff safety	23 (27.4)	40 (47.6)	14 (16.7)	5 (6.0)	2 (2.4)
Environmental factors	8 (9.5)	25 (29.8)	25 (29.8)	11 (13.1)	15 (17.9)
Conference, seminar, or webinar	8 (9.5)	22 (26.2)	23 (27.4)	19 (22.6)	12 (14.3)
Existing literature	22 (26.2)	31 (36.9)	18 (21.4)	11 (13.1)	2 (2.4)
Expert colleague's opinion	9 (10.7)	25 (29.8)	23 (27.4)	13 (15.5)	14 (16.7)
Friend/colleague's opinion	7 (8.3)	23 (27.4)	22 (26.2)	15 (17.9)	17 (20.2)

Note. Values are presented as n (%). Valid n = 84 for all items.

The technical and clinical importance index showed the highest mean score (M = 4.11, SD = 0.68), followed closely by the ISO/specification-related importance index (M = 4.03, SD = 0.70), whereas the evidence, reputation, and professional influence index showed a lower mean score (M = 3.24, SD = 0.86). Cost and environmental considerations, which were analyzed separately as single-item criteria rather than composite indices, had mean scores of 3.65 (SD = 0.86) and 3.00 (SD = 1.24), respectively (Table 4).

Table 4. Composite dimensions underlying intraoral scanner selection.

Variable	Valid n	Missing n	M	SD
Technical and clinical importance index	84	0	4.11	0.68
Evidence, reputation, and professional influence importance index	84	0	3.24	0.86
ISO/specification-related importance index	84	0	4.03	0.70
Cost	84	0	3.65	0.86
Environmental considerations	84	0	3.00	1.24

Note. M = mean; SD = standard deviation. All variables were scored on a 1–5 Likert-type scale, with higher scores indicating greater perceived importance. Cost and environmental considerations were analyzed as single-item criteria rather than composite indices. Valid n = 84 for all variables.

3.3. Awareness of ISO Standards and Scientific Evidence

Participants' awareness of ISO specifications and the role of scientific evidence in intraoral scanner selection were subsequently investigated to determine whether evidence-based knowledge influences clinical decision-making. Overall, awareness of ISO specifications was limited despite relatively high levels of self-perceived knowledge regarding intraoral scanner concepts.

Among the 84 participants with valid responses to the ISO-awareness item, 30 (35.7%) reported awareness of an ISO specification related to intraoral scanners, whereas nearly two-thirds of the sample reported no confirmed awareness. Nevertheless, participants reported relatively high perceived knowledge and understanding of intraoral scanner concepts (M = 3.82, SD = 0.89), indicating a discrepancy between perceived familiarity with technology and awareness of internationally recognized standards (Table 5).

Table 5. Awareness of ISO specifications and evidence-related knowledge indicators.

Variable	Category/Statistic	n (%) or Value
Awareness of an ISO specification for intraoral scanners	Yes	30 (35.7)
	Do not know/no	54 (64.3)
Importance of existing literature when purchasing an intraoral scanner	Not at all important	2 (2.4)
	Slightly important	11 (13.1)
	Important	18 (21.4)
	Very important	31 (36.9)
	Most important	22 (26.2)
Existing literature rated as very/most important	Not high importance	31 (36.9)
	High importance	53 (63.1)
Perceived knowledge and understanding index	M (SD)	3.82 (0.89)
	Median	4.00
	Range	1.00–5.00
Evidence, reputation, and professional influence index	M (SD)	3.24 (0.86)
	Median	3.40
	Range	1.20–4.80

Note: Valid n = 84 for ISO-awareness and literature-related variables. For the perceived knowledge and understanding index, valid n = 77.

Existing scientific literature was considered an important source of information during scanner selection, with 63.1% of respondents rating it as either very important or most important. However, the broader evidence, reputation, and professional influence index demonstrated only moderate importance (M = 3.24, SD = 0.86), suggesting that evidence-based considerations coexist with other professional and experiential factors during the decision-making process (Table 6).

Table 6. Differences by ISO awareness in perceived knowledge and evidence-related indicators.

Variable	Mean Rank: ISO Aware	Mean Rank: Uncertain/No Stated Awareness	U	z	*p*
Perceived knowledge and understanding index	46.88	33.97	468.50	−2.51	0.012
Importance of existing literature	47.97	39.46	646.00	−1.60	0.110
Evidence, reputation, and professional influence index	45.95	40.58	706.50	−0.97	0.333

Note. Mann–Whitney *U* tests were used. Higher mean ranks indicate higher scores. For perceived knowledge and understanding, valid n = 77. For importance of existing literature and the evidence/reputation/professional influence index, valid n = 84.

Participants reporting awareness of ISO specifications also reported significantly greater perceived knowledge of intraoral scanner concepts than those without confirmed ISO awareness (p = 0.012). No statistically significant differences were observed in the importance assigned to existing scientific literature or in the broader evidence, reputation, and professional influence index. Thus, although reported ISO awareness was relatively limited, it was associated with greater perceived knowledge of intraoral scanner technology, but not with greater emphasis on scientific literature or broader evidence-related factors during scanner selection.

3.4. The Role of ISO-Related Characteristics in Evidence-Based Scanner Selection

To further examine associations between ISO awareness and scanner-selection priorities, participants' ratings of ISO/specification-related criteria were analyzed. Overall, specification-related characteristics received high importance ratings, particularly those concerning scanner performance, quality, and safety (Table 7).

Table 7. ISO/specification-related characteristics as criteria for selecting intraoral scanners.

Criterion	Not at All Important	Slightly Important	Important	Very Important	Most Important	Very/Most Important
Build quality	1 (1.2)	0 (0.0)	9 (10.7)	46 (54.8)	28 (33.3)	74 (88.1)
Impression accuracy	2 (2.4)	0 (0.0)	2 (2.4)	16 (19.0)	64 (76.2)	80 (95.2)
Compliance with specifications	2 (2.4)	7 (8.3)	20 (23.8)	35 (41.7)	20 (23.8)	55 (65.5)
Patient safety	2 (2.4)	5 (6.0)	13 (15.5)	40 (47.6)	24 (28.6)	64 (76.2)
Staff safety	2 (2.4)	5 (6.0)	14 (16.7)	40 (47.6)	23 (27.4)	63 (75.0)
Existing literature	2 (2.4)	11 (13.1)	18 (21.4)	31 (36.9)	22 (26.2)	53 (63.1)

Note. Values are presented as n (%). Valid n = 84. The final column combines responses of "very important" and "most important".

Among the evaluated criteria, impression accuracy received the highest importance rating, with 95.2% of participants rating it as either very important or most important. Build quality was also highly rated (88.1%), followed by patient safety (76.2%) and staff safety (75.0%). Compliance with technical specifications was rated as very or most important by 65.5% of respondents, while existing scientific literature received corresponding ratings from 63.1%. Collectively, these findings indicate that participants assigned considerable importance to quality- and safety-related characteristics when evaluating intraoral scanners. To summarize these criteria, a six-item ISO/specification-related importance index was constructed. The index showed good internal consistency (Cronbach's α = 0.86) and a high overall mean score (M = 4.03, SD = 0.70), indicating a high level of perceived importance across the included criteria (Table 7).

Subsequently, participants who reported awareness of ISO specifications were compared with those who reported no confirmed awareness (Table 8). Dentists familiar with ISO standards assigned significantly greater importance to the overall ISO/specification-related importance index ($p = 0.019$) as well as to the broader technical and clinical importance index ($p = 0.028$). At the individual criterion level, ISO-aware participants placed significantly greater emphasis on compliance with technical specifications ($p = 0.049$), patient safety ($p = 0.017$), and staff safety ($p = 0.045$). In contrast, no statistically significant differences were observed regarding build quality, impression accuracy, or the importance assigned to existing scientific literature.

Table 8. Mann–Whitney U tests comparing ISO-aware and non-ISO-aware/uncertain respondents on specification-related selection criteria.

Variable	Mean Rank: ISO Aware	Mean Rank: Uncertain/No Stated Awareness	U	z	*p*
ISO/specification-related importance index	50.82	37.88	560.50	−2.34	0.019
Technical and clinical importance index	50.32	38.16	575.50	−2.20	0.028
Build quality	46.47	40.30	691.00	−1.24	0.214
Impression accuracy	46.87	40.07	679.00	−1.65	0.099
Compliance with specifications	49.17	38.80	610.00	−1.97	0.049
Patient safety	50.42	38.10	572.50	−2.38	0.017
Staff safety	49.17	38.80	610.00	−2.01	0.045
Existing literature	47.97	39.46	646.00	−1.60	0.110

Note. Total valid analytical n = 84. ISO-aware group: n = 30. Uncertain/no stated awareness group: n = 54. Higher ranks indicate greater perceived importance.

Overall, although reported awareness of ISO specifications was limited, participants reporting such awareness assigned greater importance to selected standardized technical and safety-related criteria.

3.5. Professional Factors Associated with Evidence-Based Decision-Making

To further explore factors associated with evidence-informed decision-making during intraoral scanner selection, differences in the principal decision-making dimensions according to demographic and professional characteristics were examined. Specifically, technical and clinical priorities, evidence- and reputation-related factors, ISO/specification-related criteria, cost, and environmental considerations were evaluated according to participants' gender, educational background, workplace, age, and years of clinical experience. Gender was the only demographic characteristic associated with significant differences in decision-making priorities (Table 9). Female participants assigned significantly greater importance than male participants to the evidence, reputation, and professional influence dimension ($p = 0.008$). They also had higher scores for the technical and clinical importance dimension ($p = 0.046$), although this association was close to the conventional significance threshold. No statistically significant gender differences were observed for the ISO/specification-related importance index, cost, or environmental considerations.

In contrast, educational background was not significantly associated with any of the examined decision-making dimensions (Table 10). Similarly, no significant differences were observed according to workplace setting, including private solo practice, private group practice, and academic or public-sector employment (Table 11).

Table 9. Gender differences in scanner-selection criteria.

Scanner-Selection Criterion	Male Mean Rank	Female Mean Rank	U	z	*p*
Technical and clinical importance index	37.17	47.72	637.50	−2.00	0.046
Evidence, reputation, and professional influence index	35.60	49.58	567.00	−2.64	0.008
ISO/specification-related importance index	38.26	46.43	686.50	−1.55	0.121
Cost	39.91	44.47	761.00	−0.94	0.345
Environmental factors	39.06	45.49	722.50	−1.25	0.211

Note. Mann–Whitney *U* tests were used. Valid analytical n = 83 (male, n = 45; female, n = 38). The participant who selected "Other" for gender (n = 1) was not included in the binary gender comparison. Higher mean ranks indicate greater perceived importance.

Table 10. Educational background differences in scanner-selection criteria.

Scanner-Selection Criterion	Dental School Graduate Mean Rank	Postgraduate Degree Mean Rank	Doctoral Degree Mean Rank	H	df	*p*
Technical and clinical importance index	38.98	45.05	41.39	0.95	2	0.621
Evidence, reputation, and professional influence index	40.82	43.29	42.75	0.15	2	0.928
ISO/specification-related importance index	36.18	46.23	42.05	2.44	2	0.295
Cost	43.68	39.21	47.30	1.95	2	0.377
Environmental factors	41.27	44.20	40.64	0.40	2	0.817

Note. Kruskal–Wallis tests were used. Valid analytical n = 84: Dental School graduate, n = 22; postgraduate degree, n = 40; doctoral degree, n = 22. Higher mean ranks indicate greater perceived importance.

Table 11. Workplace differences in scanner-selection criteria.

Scanner-Selection Criterion	Private Solo Practice Mean Rank	Private Group Practice Mean Rank	Academic/Public/ Other Mean Rank	H	df	*p*
Technical and clinical importance index	39.27	45.57	47.04	1.67	2	0.435
Evidence, reputation, and professional influence index	43.78	39.78	43.81	0.50	2	0.779
ISO/specification-related importance index	40.77	44.00	45.23	0.49	2	0.782
Cost	40.14	41.89	51.77	2.77	2	0.251
Environmental factors	40.91	40.28	52.50	2.77	2	0.251

Note. Kruskal–Wallis tests were used. Valid analytical n = 84: private solo practice, n = 44; private group practice, n = 27; academic/public/other setting, n = 13. Higher mean ranks indicate greater perceived importance.

Finally, neither participants' age nor years of clinical experience was significantly correlated with any of the evaluated scanner-selection dimensions (Table 12). Correlations with technical/clinical priorities, evidence-related factors, ISO/specification-related criteria, cost, and environmental considerations were consistently weak and non-significant.

Overall, most demographic and professional characteristics showed limited associations with scanner-selection priorities. Gender-related differences were observed for the evidence/reputation/professional influence and technical/clinical dimensions, whereas educational background, workplace setting, age, and clinical experience were not significantly associated with the examined criteria.

Table 12. Spearman correlations between age, clinical experience, and scanner-selection criteria.

Scanner-Selection Criterion	Age ρ	*p*	Clinical Experience ρ	*p*
Technical and clinical importance index	0.017	0.879	−0.036	0.743
Evidence, reputation, and professional influence index	0.184	0.093	0.104	0.346
ISO/specification-related importance index	0.059	0.596	0.021	0.853
Cost	0.024	0.830	−0.041	0.713
Environmental factors	0.154	0.163	0.098	0.376

Note. Spearman's rho was used. Valid n = 84 for all correlations.

3.6. Patterns of Scanner Preference, Education, and Technology Adoption

Additional descriptive analyses provided further insight into current patterns of intraoral scanner adoption and professional learning (Figure 1A–D). Among intraoral scanner users, 3 Shape Trios was the most frequently reported system, followed by other commercially available scanners (Figure 1A). Professional education regarding IOS technology was obtained predominantly through conferences, congresses, webinars, and other continuing education activities, whereas manufacturer-organized seminars and peer learning represented secondary educational sources (Figure 1B). Participants consistently identified impression accuracy as the most desirable characteristic of an ideal intraoral scanner (Figure 1C), while immediate communication with the dental laboratory, improved quality control during tooth preparation, and greater ease of impression-taking represented the principal motivations for scanner acquisition (Figure 1D). These descriptive findings further support the central observation that clinicians primarily value technical performance, workflow efficiency, and continuing professional education during technology adoption.

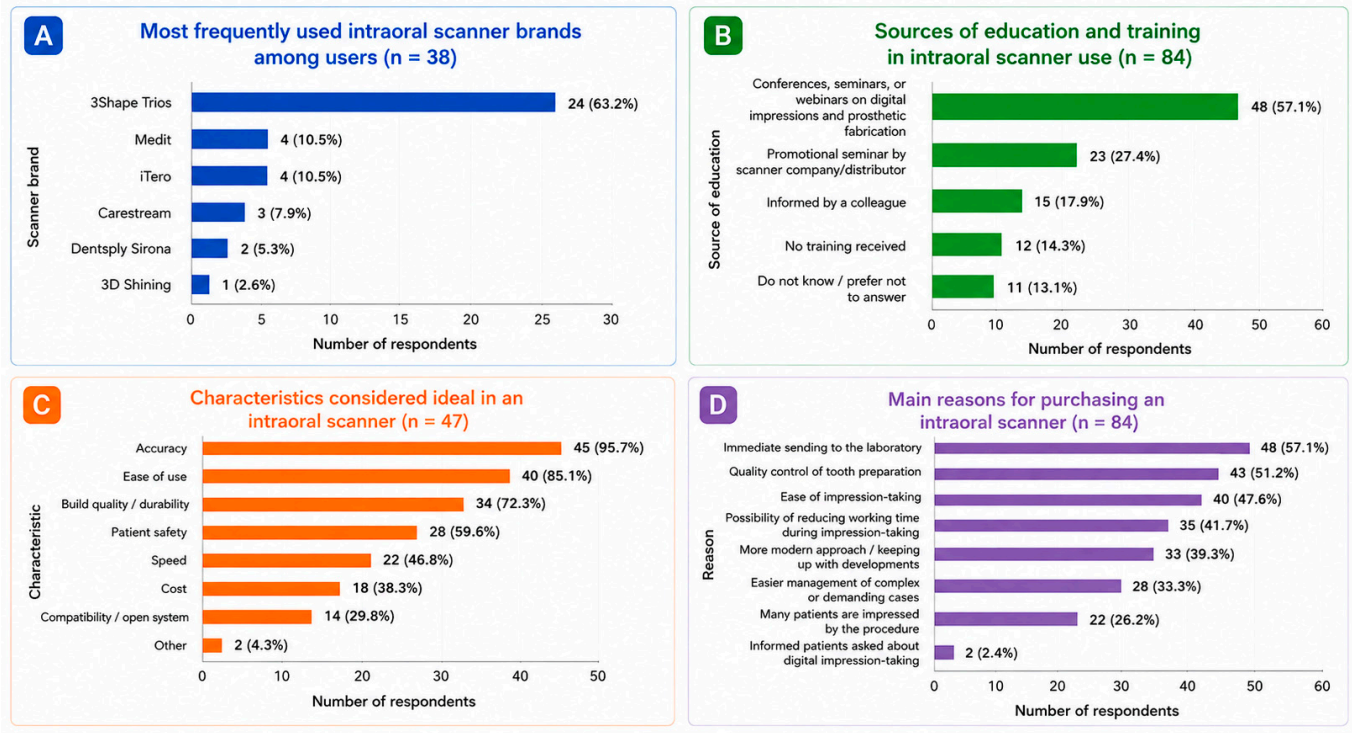


Figure 1. Descriptive overview of intraoral scanner adoption and professional learning among participating dentists. (**A**) Distribution of intraoral scanner brands among current scanner users (valid n = 38). (**B**) Sources of education and training related to intraoral scanner use (valid n = 84).

(**C**) Characteristics considered ideal in an intraoral scanner (valid n = 47). (**D**) Principal reasons reported for purchasing an intraoral scanner (valid n = 84). Data are presented as frequencies and percentages of valid cases. Panels (**B**–**D**) include multiple-response items; therefore, percentages do not necessarily sum to 100%. Panel-specific valid sample sizes are reported because the four panels derive from different questionnaire items and respondent subsets. (Created in BioRender. Antoniadou, M. (2026) https://BioRender.com/4c695j2, accessed 7 August 2026).

4. Discussion

The present study suggests that intraoral scanner selection may extend beyond a purely technological or purchasing decision and can be considered within a broader, multidimensional evidence-informed decision-making context. Although previous investigations have primarily focused on scanner accuracy, clinical performance, user satisfaction, or adoption rates, comparatively less attention has been given to how clinicians consider scientific evidence, technical performance, professional experience, and educational background when evaluating digital technologies for clinical practice [36–39,75–80]. The present findings contribute to this emerging perspective by identifying associations across several technical, educational, professional, and evidence-related dimensions, supporting the conceptualization of intraoral scanner selection as a multifactorial process rather than one determined by a single factor.

4.1. Principal Findings

The principal findings of the present study suggest that technical and clinical performance criteria received the highest importance ratings in intraoral scanner selection, particularly impression accuracy, build quality, workflow efficiency, and safety-related characteristics. A notable discrepancy was also observed between participants' relatively high perceived familiarity with IOS technology and their more limited awareness of relevant ISO specifications, with reported ISO awareness being associated with greater emphasis on selected specification- and safety-related criteria. Continuing professional education emerged as the predominant source of IOS-related knowledge, while participants generally reported favorable experiences with digital impression workflows. Taken together, these findings suggest that IOS selection may involve multiple technical, evidence-related, educational, and professional considerations, providing the exploratory basis for the preliminary EBIOS Pilot Framework presented later in the Discussion.

4.2. Technical Performance as a Key Consideration in Scanner Selection

Our findings suggest that technical performance represents a key consideration in intraoral scanner selection among the participating dentists. Participants consistently prioritized impression accuracy, build quality, workflow efficiency, and safety-related characteristics over commercial, promotional, or patient-driven considerations, suggesting that expected clinical performance was given greater importance than external influences in participants' reported selection priorities. This observation is consistent with the increasing maturation of digital dentistry, where the clinical success of digital workflows depends fundamentally on the quality and reliability of digital data acquisition [5,75,76].

Among the evaluated criteria, impression accuracy received the highest importance rating. This finding is consistent with the extensive body of evidence demonstrating that trueness and precision remain the cornerstone of successful digital restorative workflows, directly influencing marginal adaptation, occlusal accuracy, prosthesis fit, and the long-term clinical performance of indirect restorations [11–15]. Numerous systematic reviews have further demonstrated that scanner accuracy is affected by scanner technology, scanning strategy, operator experience, clinical conditions, and arch configuration, emphasizing that optimal clinical outcomes depend not only on the scanner itself but also on appropriate

clinical implementation [21–25]. Interestingly, participants also assigned considerable importance to workflow efficiency and build quality, reinforcing the concept that scanner selection extends beyond isolated measures of technical accuracy. Digital impression systems have become integral components of comprehensive CAD/CAM ecosystems, where interoperability, software integration, ease of use, and efficient communication with dental laboratories substantially influence everyday clinical practice [1,7–9]. Consequently, the findings suggest that participants considered the contribution of intraoral scanners to the broader digital workflow alongside their technical specifications. In line with other studies, it is highlighted that the successful implementation of IOS technology depends not only on technical accuracy but also on workflow integration, operator training, patient-centered outcomes, and evidence-based clinical decision-making [81,82]. Agreement was more moderate for extensive restorations, reflecting greater uncertainty in complex clinical scenarios. This finding is consistent with the literature, which reports reduced accuracy and increased cumulative errors in full-arch scans and implant-supported rehabilitations, particularly due to stitching limitations and sensitivity to scanning protocols [27–29,67]. Although recent technological advancements have improved performance, especially with optimized scanning strategies and photogrammetry-assisted systems, variability remains clinically relevant in demanding indications [16–19]. Taken together, these findings suggest a differentiated perception of IOS performance among participants, with greater confidence in routine restorative applications and a more cautious assessment of complex rehabilitative indications, consistent with previous reports [36–44]. The partial alignment between participants' perceptions and the existing evidence base suggests that standardized concepts of digital accuracy may not yet be uniformly incorporated into clinical technology evaluation. Compared with previous cross-sectional surveys primarily addressing IOS use and adoption [36–48], the present study extends the focus toward the analysis of factors associated with scanner-selection decision-making.

It should also be noted that promotional activities, colleague recommendations, and patient requests were assigned relatively limited importance in reported purchasing decisions. Although previous studies have shown that social influence, brand perception, and marketing strategies may affect technology adoption, particularly during the early stages of innovation diffusion [55,58–60,68], the present findings suggest that participating dentists assigned greater importance to clinically oriented criteria than to promotional or socially driven considerations. From a broader perspective, these findings support the concept that intraoral scanner selection represents a complex evaluation process balancing technological capability with clinical applicability. Similar decision-making patterns have been described in the medical device literature, where healthcare professionals simultaneously evaluate technical performance, patient safety, workflow integration, usability, organizational requirements, and long-term clinical value before adopting new technologies [54,56,63]. Rather than representing an isolated purchasing decision, intraoral scanner selection may therefore be better conceptualized as a multidimensional assessment involving technical performance, clinical applicability, safety, workflow, and organizational considerations. Our findings suggest that specification-related characteristics represent relevant considerations in intraoral scanner selection. The results further indicate that dentists reporting awareness of ISO specifications tended to assign greater importance to specification-related, safety-related, and technical/clinical selection criteria.

4.3. Bridging the Gap Between Perceived Knowledge and Evidence-Based Practice

A relevant finding of the present study was the discrepancy between participants' relatively high self-perceived knowledge of intraoral scanner technology and their limited awareness of relevant ISO specifications. This distinction is important because famil-

iarity with digital technology does not necessarily imply familiarity with standardized approaches to its evaluation [61,65]. Participants reporting ISO awareness assigned greater importance to selected specification- and safety-related criteria, indicating an association between standards awareness and greater emphasis on these aspects of scanner evaluation. Similar educational gaps regarding scanner accuracy, calibration, and standardized assessment have been reported in previous international studies [41–43,46,83,84].

More broadly, contemporary clinicians are required to evaluate rapidly evolving digital technologies within an environment characterized by extensive commercial information and continuously developing scientific evidence. Familiarity with standardized testing principles and critical appraisal of scientific literature may therefore support more informed technology assessment [5,65,70]. Notably, previous surveys of IOS knowledge and adoption have rarely examined awareness of relevant ISO standards directly [36–53], highlighting an area that warrants greater attention in digital dentistry education and future research.

4.4. Continuing Professional Education and Evidence-Informed Technology Adoption

Continuing professional education emerged as an important source of knowledge regarding intraoral scanner technology. Most participants reported acquiring IOS-related knowledge primarily through conferences, congresses, webinars, and other continuing education activities rather than through undergraduate dental education. This pattern may reflect the rapid evolution of digital dentistry, where technological developments can outpace curricular updates and create an ongoing need for professional learning [5,77]. Consistent with previous international studies, greater educational exposure has been associated with increased confidence in IOS use, higher adoption of digital workflows, and broader integration of CAD/CAM technologies into clinical practice [39,41,42,46,79]. Conversely, inadequate education, limited clinical training, and insufficient familiarity with digital technologies remain commonly reported barriers to implementation [50,51,53].

Beyond technical proficiency, continuing professional education may also support clinicians' ability to critically evaluate emerging technologies by strengthening scientific evidence appraisal and familiarity with standardized evaluation criteria. This has implications for undergraduate, postgraduate, and continuing dental education, which should extend beyond operational training to include critical technology assessment, interpretation of scientific evidence, and informed clinical decision-making [5,75]. From this perspective, digital competence may be better regarded as an evolving professional competency that combines technical skills with evidence-informed evaluation and continuous knowledge updating, supporting the responsible integration of emerging technologies into contemporary dental practice.

4.5. The Preliminary EBIOS Pilot Framework for Intraoral Scanner Selection

The findings of the present study suggest that intraoral scanner selection may be conceptualized as a multidimensional process involving technical, educational, professional, and organizational considerations. While previous studies have primarily examined individual aspects such as scanner accuracy, user experience, or technology adoption, the present findings provide an exploratory basis for considering these dimensions within a broader evidence-informed decision-making context [36,38,39,75]. Accordingly, we propose the Evidence-Based Intraoral Scanner Selection (EBIOS) Pilot Framework (Figure 2) as a preliminary conceptual synthesis of five domains potentially relevant to scanner selection and clinical integration. The framework is intended to organize the observed dimensions within a coherent structure and should not be interpreted as demonstrating causal pathways or empirically validated relationships among them. Rather, the proposed relationships are

hypothesis-generating and require further evaluation and validation in larger, independent, and multicenter populations.

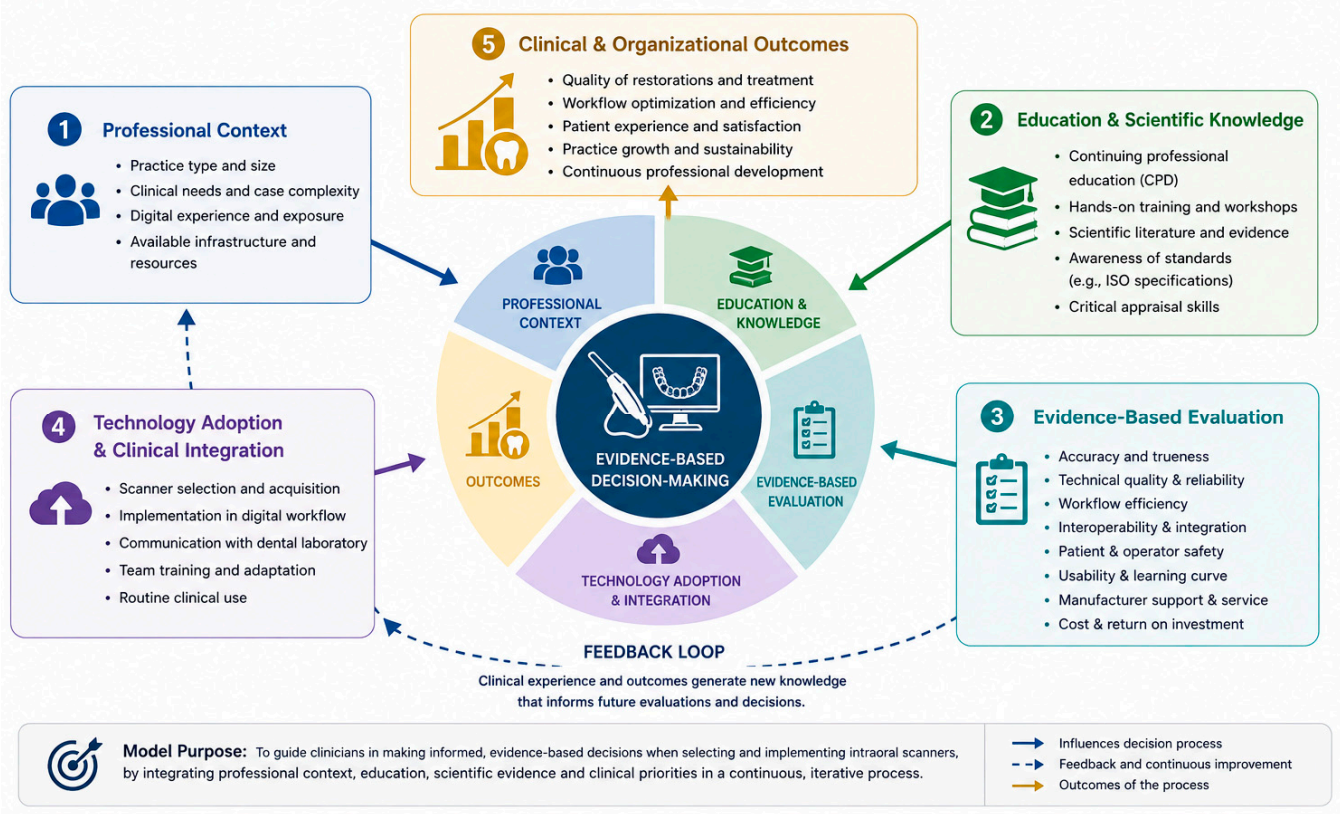


Figure 2. Preliminary Evidence-Based Intraoral Scanner Selection (EBIOS) Pilot Framework. The framework conceptually organizes five domains potentially relevant to evidence-informed intraoral scanner selection: (1) Professional Context, including practice characteristics, clinical needs, and digital experience; (2) Education and Scientific Knowledge, including continuing professional development, scientific literature, awareness of international standards, and critical appraisal skills; (3) Evidence-Based Evaluation, encompassing technical performance, workflow, safety, usability, manufacturer support, and economic considerations; (4) Technology Adoption and Clinical Integration, including scanner acquisition, integration into digital workflows, laboratory communication, and routine clinical use; and (5) Clinical and Organizational Outcomes, including treatment quality, workflow efficiency, patient experience, practice sustainability, and continuing professional development. The arrows represent proposed conceptual links between domains and the iterative flow of information across the decision-making process, while the feedback arrow indicates that experience and outcomes may inform subsequent technology evaluation and decision-making. These directional links are conceptual and hypothesis-generating and should not be interpreted as empirically validated causal relationships. The framework integrates the exploratory findings of the present study with the existing literature and requires further external validation. (Created in BioRender. Antoniadou, M. (2026) https://BioRender.com/4c695j2, accessed 7 August 2026).

The proposed domains represent complementary dimensions of evidence-informed technology selection. Professional context and digital experience provide the setting within which clinicians evaluate new technologies, while education, continuing professional development, scientific literature, and awareness of standards may support critical technology appraisal. Within the evidence-based evaluation domain, technical performance, workflow compatibility, safety, usability, manufacturer-related factors, and economic considerations are assessed alongside professional judgement. Technology adoption and clinical integration subsequently reflect the practical implementation of these considerations within digital workflows. Clinical and organizational outcomes, including treatment quality, workflow

efficiency, patient experience, and professional development, may in turn provide experience relevant to subsequent technology evaluation [36,38,39,83–86]. These proposed links should be understood as conceptual and iterative rather than as empirically established directional or causal relationships.

The EBIOS Pilot Framework therefore provides a preliminary conceptual synthesis of technical performance, scientific evidence, ISO awareness, education, professional context, and clinical integration within a common decision-making structure. Given that it was informed by exploratory cross-sectional and primarily bivariate findings, the framework should be regarded as hypothesis-generating rather than validated or predictive. Future multicenter studies involving larger and more diverse populations, together with advanced multivariable approaches such as confirmatory factor analysis and structural equation modelling, are required to test, validate, and refine the proposed relationships across different clinical settings.

4.6. Strengths and Limitations

The present study has several strengths. To our knowledge, it is among the first investigations to examine intraoral scanner selection from an evidence-based decision-making perspective by integrating clinicians' technical priorities, educational background, awareness of ISO specifications, and professional characteristics within a single analytical framework. These findings were synthesized into the EBIOS Pilot Framework, providing a preliminary conceptual approach to evidence-informed technology selection in contemporary dental practice. The use of internally consistent, study-specific composite indices, together with complementary statistical analyses, further strengthens the methodological coherence of the study. Nevertheless, several limitations should be considered. The cross-sectional design precludes causal inference, while the relatively small convenience sample, restricted to dentists practicing in Greece, may limit statistical power, representativeness, and external validity. The recruitment strategy and response rate may also have introduced selection and non-response bias, particularly if dentists with greater interest or experience in digital dentistry were more likely to participate. Furthermore, the primarily bivariate analyses did not account for potential confounding, and multiple statistical comparisons without formal adjustment may have increased the risk of type I error; therefore, significant associations should be interpreted as exploratory and hypothesis-generating. Finally, reliance on self-reported data may have introduced recall and response bias.

Future multicenter studies involving larger and more diverse populations are needed to externally validate and refine the proposed EBIOS Pilot Framework across different clinical, educational, and healthcare settings. Confirmatory factor analysis and structural equation modelling could be used to examine the underlying structure and interrelationships among its proposed dimensions, while longitudinal studies could assess whether changes in education, evidence awareness, and professional experience are associated with subsequent technology-selection decisions. Further research should also evaluate the applicability of the framework across different countries and professional contexts and determine its potential value as a structured approach to evidence-informed technology selection in dentistry.

5. Conclusions

Within the limitations of this exploratory cross-sectional study, technical and clinical performance criteria received the greatest importance in dentists' reported intraoral scanner selection decisions. Reported awareness of ISO-related standards was relatively limited and was associated with greater emphasis on selected specification- and safety-related criteria. These findings support the view that IOS selection involves multiple clinical, technical,

educational, and organizational considerations rather than technical performance alone. The proposed EBIOS Pilot Framework provides a preliminary conceptual synthesis of these dimensions and should not be interpreted as a validated predictive model. Further external validation in larger, multicenter populations, using validated measurement instruments and advanced multivariable approaches such as structural equation modelling, is required to test and refine the proposed framework.

Supplementary Materials: The following supporting information can be downloaded at https://www.mdpi.com/article/10.3390/prosthesis8090090/s1, Supplementary File S1. The questionnaire of the study.

Author Contributions: Conceptualization, S.T. and M.A.; methodology, S.T. and M.A.; software, S.T., G.C. and M.A.; validation, E.-I.T., A.P. and M.A.; formal analysis, S.T., G.C., A.P. and M.A.; investigation, S.T., E.-I.T. and M.A.; resources, S.T., G.C., E.-I.T. and M.A.; data curation, S.T., G.C. and A.P.; writing—original draft preparation, S.T., G.C., E.-I.T., A.P. and M.A.; writing—review and editing, S.T., G.C., E.-I.T., A.P. and M.A.; visualization, S.T. and M.A.; supervision, M.A.; project administration, M.A.; funding acquisition, M.A. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethics and Deontology Committee of the Department of Dentistry, School of Health Sciences, National and Kapodistrian University of Athens (protocol number 86704/11.09.2024) approved on 11 September 2024.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study. Written informed consent has been obtained from the patients to publish this paper.

Data Availability Statement: The original contributions presented in this study are included in the article. Further inquiries can be directed to the corresponding author.

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

Abbreviations

The following abbreviations are used in this manuscript:

EBIOS Framework	EBIOS-Evidence-Based Intraoral Scanner Selection
IOS	Intraoral scanner
CAD/CAM	Computer Assisted design/computer assisted manufacture
ISO	International Organization for Standardization
Q	Question
SD	Standard deviation
IQR	Interquartile range
OD	Odds ratio
CI	Confidence interval
AUC	Area under the receiver operating characteristic curve
HTA	Health technology assessment
BWS	Best-worst scaling
DCE	Discrete choice experiment

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