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The Impact of Ai-Based Visualisation Tools on Client Communication and Decision-Making in Interior Design

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Abstract -Artificial intelligence (AI)-based visualisation tools are increasingly being used in interior design to generate interior images, explore alternative design concepts, communicate spatial ideas, and support client participation during the design process. Traditional communication methods, including two-dimensional drawings, material samples, and conventional three-dimensional renderings, may not always enable clients to understand the proposed design or visualise how different elements will appear in a completed space. AI-assisted visualisation may help address this challenge by producing rapid visual alternatives and enabling designers and clients to discuss preferences more concretely.This study aims to examine the perceived impact of AI-based visualisation tools on client communication and decision-making in interior design. A quantitative, cross-sectional survey design is proposed, targeting interior design students, practising interior designers, and individuals who have participated in an interior design or renovation project. The questionnaire will investigate perceived clarity of communication, understanding of design proposals, confidence in decision-making, satisfaction with visual alternatives, trust in AI-generated images, and concerns regarding accuracy and feasibility. The collected data will be analysed using descriptive statistics and exploratory comparisons where appropriate.The study is intended to explore whether AI-based visualisation is perceived as a useful communication aid and to identify the limitations that may influence its responsible application in professional practice. Since the study relies on self-reported responses, the findings will represent participants' perceptions rather than objective proof of improved client outcomes. The research may contribute to understanding how AI can support client-centred interior design while preserving professional judgement, technical accuracy, and transparent communication.

Keywords: Artificial Intelligence, Interior Design, AI-Based Visualisation, Client Communication, Decision-Making, Generative AI, Design Visualisation, Client Satisfaction.

I. INTRODUCTION

Interior design is a collaborative process in which designers interpret clients' needs, preferences, lifestyles, budgets, and functional requirements to develop suitable interior environments. Successful design depends not only on creativity and technical knowledge but also on the designer's ability to communicate proposed ideas clearly. Clients are required to make decisions about layouts, colours, materials, furniture, lighting, finishes, and spatial arrangements, often before the proposed space exists physically.

Communicating these ideas can be challenging because clients may find it difficult to interpret technical drawings or imagine how separate design elements will work together in a completed interior. Conventional methods such as floor plans, elevations, physical material samples, and three-dimensional renderings provide valuable information, but each method has limitations. A two-dimensional plan may communicate dimensions and circulation effectively while offering limited information about atmosphere, material appearance, or the overall visual experience.

Recent developments in artificial intelligence have introduced new approaches to design visualisation. Generative AI tools can transform text descriptions, reference images, and design instructions into visual concepts. Depending on the tool and workflow, these

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systems may help designers explore alternative colour palettes, furniture arrangements, lighting moods, material combinations, and interior styles. AI-assisted tools can also support iterative discussions by making it easier to produce and compare different conceptual directions.

Research on AI and building design has begun to examine how these technologies may support early-stage communication between designers and clients. A 2025 study proposing an AI–Building Information Modeling framework explored the combination of real-time visualisation, generative design, and language-based interaction to improve feedback and early decision-making. Research into generative image AI has also investigated how visual outputs can help architects and clients develop a shared understanding of design intentions.

However, the speed and visual appeal of AI-generated images do not automatically guarantee effective communication. Generated images may contain inaccurate dimensions, inconsistent furniture arrangements, unrealistic materials, or elements that cannot be constructed within the proposed budget. A visually attractive image may also influence a client's expectations beyond what the technical design can deliver. Therefore, designers must distinguish between conceptual inspiration and technically verified design documentation.

From a behavioural science perspective, AI-based visualisation may influence how clients interpret information, express preferences, evaluate alternatives, and feel confident about their decisions. More understandable visual representations may reduce uncertainty and encourage active participation. Conversely, unrealistic or overly persuasive images may create misplaced confidence or misunderstandings.

The present study examines the perceived impact of AI-based visualisation tools on client communication and decision-making in interior design, with particular attention to clarity, trust, confidence, client participation, and the limitations of AI-generated representations.

II. PROBLEM STATEMENT

Communication gaps between interior designers and clients can lead to misunderstandings about spatial layouts, materials, colours, furniture, lighting, and the intended atmosphere of a proposed space. These misunderstandings may result in repeated revisions, delayed approvals, dissatisfaction, and differences between client expectations and the completed design.

AI-based visualisation tools may help designers communicate concepts more quickly and present alternatives in an accessible visual format. Nevertheless, their actual usefulness depends on whether clients understand the images correctly, trust the proposed representations, and can distinguish visual concepts from technically feasible solutions.

The problem addressed in this study is the limited understanding of how AI-based visualisation tools are perceived to influence client communication and decision-making in interior design, including their benefits, risks, and implications for designer–client collaboration.

1. Aim Of The Study

To examine the perceived impact of AI-based visualisation tools on client communication and decision-making in interior design.

2. Research Objectives

- To identify the AI-based visualisation tools used or encountered in interior design practice.
- To examine how participants perceive the role of AI-generated visuals in understanding design concepts.
- To investigate the perceived influence of AI visualisation on client confidence and decision-making.
- To explore whether AI-generated alternatives are perceived to improve communication of colours, materials, furniture, layouts, and spatial atmosphere.
- To examine concerns regarding visual accuracy, trust, feasibility, and unrealistic client expectations.
- To suggest responsible practices for integrating AI-based visualisation into interior design workflows.

3. Research Questions

- ***RQ1*:** How do participants perceive the influence of AI-based visualisation tools on communication between interior designers and clients?

- ***RQ2*:** To what extent do AI-generated visualisations help participants understand proposed interior design concepts?
- ***RQ3*:** How do participants perceive the influence of AI visualisation on confidence in design-related decisions?
- ***RQ4:*** What factors influence trust in AI-generated interior visualisations?
- ***RQ5*:** What challenges and risks are associated with using AI-based visualisation during client consultations?
- ***RQ6*:** How can designers use AI visualisation while maintaining technical accuracy and realistic client expectations?

III. REVIEW OF LITERATURE

1. Ai And Early-Stage Designer–Client Communication

The early stages of interior design involve interpreting client requirements and translating abstract preferences into a spatial concept. Traditional discussions may rely on verbal descriptions, sketches, reference images, and preliminary drawings, which can lead to different interpretations of the same idea.

A 2025 study published in *Buildings* proposed an AI–BIM framework combining real-time building visualisation, generative design, and large language models to support early-stage architect–client communication. The study discussed the potential of integrated workflows to improve feedback, alignment between client needs and design outputs, and early decision-making. It also recognised technical and ethical challenges associated with implementation.

This research provides a basis for investigating whether more interactive and accessible visual communication can improve the design discussion. However, the effectiveness of a particular workflow should not be assumed to apply equally to every AI tool or interior design project.

2. Ai-Based Visualisation And Client Understanding

AI-based visualisation can produce alternative representations of interior concepts from textual instructions and reference material. Such outputs may help clients communicate their preferences by providing concrete visual examples rather than relying exclusively on verbal descriptions.

Nour and colleagues (2026) investigated a questionnaire-driven generative AI framework for creating preference-oriented residential interior visualisations. Their study evaluated generated interiors through participants' perceptions of atmospheric coherence, emotional comfort, overall satisfaction, and alignment with expectations. The results provide recent evidence that structured user preferences can be incorporated into AI-assisted visualisation workflows.

Nevertheless, perceived suitability of an image is different from proof that the design is dimensionally accurate, functional, affordable, or buildable. Client communication must therefore involve both visual interpretation and technical verification.

3. Immersive Visualisation And Decision-Making

Augmented reality (AR), virtual reality (VR), and mixed reality (MR) enable users to examine design proposals through different levels of interaction with virtual representations of physical spaces. AR can overlay digital furniture or objects onto a view of an existing room, while VR can provide an immersive experience of a proposed environment.

Vo (2025) investigated the adoption of AR, VR, and MR in the architecture, engineering, and construction sector using a questionnaire completed by 59 professionals and three expert interviews. Design visualisation and client presentations were among the leading applications reported by participants. The study identified perceived benefits such as improved design assessment and client satisfaction, while also discussing challenges associated with cost, training, and adoption.

Although immersive visualisation is not identical to generative AI image creation, both approaches are relevant to understanding how digital representations may influence client participation and design evaluation. Their benefits and limitations should be examined according to the specific technology and task.

4. Client Confidence, Trust, And Visual Accuracy

Client decision-making depends on the quality of the information presented, the ability to understand alternatives, and confidence in the designer's recommendations. AI-generated images can make design concepts more accessible, but their realism may lead viewers to assume that every depicted element can be reproduced exactly.Differences between generated

images and technical drawings may create unrealistic expectations about room proportions, construction details, lighting performance, materials, and furniture availability. Consequently, trust in AI-based visualisation should be considered alongside the accuracy and transparency of the design process.Designers should explain when an image is conceptual, identify elements that require verification, and communicate any changes between the visual concept and the final technical proposal.

5. Research Gap

Existing literature has investigated AI–BIM communication frameworks, preference-based AI visualisation, and immersive digital technologies in the built environment. These studies demonstrate the relevance of visual communication and user participation in design.However, the perceived relationship between AI-generated visualisation, client communication, decision-making confidence, and trust remains a useful area for further investigation, particularly when these factors are examined together within interior design practice.The present study addresses this area through an exploratory survey of participants with relevant design-learning, professional, or client experience. Its focus is on perceived usefulness, communication clarity, and decision-making confidence rather than a causal claim that AI visualisation necessarily improves project outcomes.

IV. RESEARCH METHODOLOGY

1. Research Design

The study will use a quantitative, cross-sectional survey design. Participants will complete a structured questionnaire at a single point in time to report their experiences and perceptions of AI-based visualisation in interior design.

2. Study Population

The target population will include:

- Interior design students who have used or encountered AI visualisation tools.
- Practising interior designers or design professionals who participate in client presentations.
- Clients or individuals who have participated in an interior design, renovation, or furnishing project and have experience with digital visualisation.

Including different participant groups may help capture both the designer's and the client's perspectives. Responses should be categorised by participant role during analysis.

3. Sampling Technique And Sample Size

Convenience sampling will be used because of the limited time and accessibility of participants. An initial target of approximately 40–60 completed responses may be practical for an exploratory student project, subject to participant availability.

The sample size will not automatically make the results representative of the wider interior design industry. If the number of responses is small, the analysis will focus on descriptive findings and avoid unsupported generalisations.

4. Research Instrument

Primary data will be collected through a structured online questionnaire. The instrument will include questions about participants' roles, exposure to AI visualisation, perceived communication clarity, confidence in design decisions, trust in visual outputs, and concerns about technical accuracy.

Five-point Likert-scale items will be used, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Participants without experience of AI-based visualisation will be given an appropriate "Not applicable / No experience" option where needed.

5. Data Collection Procedure

The questionnaire will be shared electronically with eligible participants after any required faculty or institutional permission has been obtained. The introduction to the survey will explain its purpose, the voluntary nature of participation, and how responses will be used.

The survey will avoid collecting names, client contact details, project addresses, or other unnecessary identifying information. Responses will be exported to a spreadsheet for cleaning and analysis.

6. Data Analysis

The data will be analysed using descriptive statistics, including response frequencies, percentages, and item-level average ratings where appropriate.

Responses will be examined by topic, including:

- Participant background and experience with AI visualisation.
- Perceived clarity of design communication.
- Perceived understanding of design concepts.
- Confidence in comparing and selecting alternatives.
- Trust in AI-generated images and awareness of their limitations.
- Concerns about feasibility and differences between visual concepts and final designs.

Exploratory comparisons between participant groups may be considered if sufficient responses are available. Any statistical tests will be selected according to the actual data and research questions. No results will be assumed in advance.

7. Ethical Considerations

Participation will be voluntary and based on informed consent. Participants will receive information about the purpose of the study before deciding whether to participate.

No unnecessary personal or confidential project information will be collected. Responses will be stored securely, used for the stated academic purpose, and reported in aggregate form. Required institutional permission or ethics approval will be obtained before data collection.

The study will avoid fabricated responses, misleading reporting, and unsupported claims. AI-assisted drafting and analysis will be disclosed when required by the institution or journal.

V. RESULTS AND ANALYSIS

This section must be completed after the survey has been conducted and the actual responses have been analysed. No primary findings are reported at this stage.

The results will be organised into the following categories:

- Participant profile and experience with interior design.
- Awareness and use of AI-based visualisation tools.
- Perceived clarity of communication between designers and clients.
- Perceived understanding of layouts, materials, colours, and spatial atmosphere.
- Confidence in comparing alternatives and making design decisions.
- Trust in AI-generated images and awareness of technical limitations.
- Differences in perceptions between students, professionals, and clients, if the data permit.

Tables and graphs will present actual response counts and percentages. The denominator for each percentage will be stated where responses are missing or not applicable. Results will not be presented as representative of all designers or clients unless the sampling method and evidence support that conclusion.

VI. DISCUSSION

The discussion will interpret the collected findings in relation to the research questions and the existing literature. Particular attention will be given to whether participants perceive AI-generated visuals as helpful for communicating abstract design concepts, expressing preferences, and comparing alternatives.

If participants report greater clarity or confidence when viewing AI-generated alternatives, these findings will be discussed as perceived benefits rather than proof of improved objective decision quality. If participants express concerns about inaccurate dimensions, material appearance, or unrealistic expectations, these concerns will be considered alongside the visual and communication advantages of AI tools.

The findings will be compared with existing work on AI–BIM communication, preference-driven visualisation, and digital visualisation technologies. Differences in research design, participant groups, and the specific tools investigated will be acknowledged.

The discussion will also consider the designer's role in interpreting client feedback, checking technical feasibility, and explaining the distinction between concept images and final design documentation. AI visualisation should be understood as a support for professional communication, not as a substitute for design expertise or informed client consent.

VII. RECOMMENDATIONS

Subject to the evidence collected, the study may support the following recommendations:

- Use AI-generated images as conceptual aids rather than as final construction documentation.

- Present alternative visualisations that reflect the client's stated preferences and functional requirements.
- Clearly label conceptual or AI-generated images and explain which elements require technical verification.
- Confirm dimensions, circulation, ergonomics, materials, lighting, and budget through appropriate drawings, specifications, and professional checks.
- Encourage clients to provide feedback on specific design elements rather than relying solely on overall visual impressions.
- Maintain a record of agreed design decisions and revisions to reduce misunderstandings.
- Combine AI visualisation with plans, elevations, material samples, and conventional 3D models where appropriate.
- Consider accessibility, digital familiarity, software costs, privacy, and the risk of unrealistic expectations when selecting tools.

These recommendations will be refined after reviewing the actual survey results.

VIII. LIMITATIONS OF THE STUDY

The study will have several limitations. Convenience sampling may limit the generalisability of the findings. Responses will reflect participants' perceptions and may not accurately represent their actual decision-making behaviour. Participants may also differ in design experience, digital literacy, familiarity with AI tools, project complexity, and exposure to different visualisation methods.

The cross-sectional design will not establish cause-and-effect relationships. Furthermore, the study may combine different technologies, including generative image tools, AR, and VR, which have distinct capabilities and limitations. The final analysis must therefore identify which technologies participants have actually encountered rather than treating all visualisation tools as interchangeable.

A larger future study could compare AI-assisted and conventional design presentations using the same interior project, measuring comprehension, decision confidence, revision requirements, and the accuracy of participants' expectations.

IX. CONCLUSION

AI-based visualisation tools offer new possibilities for communicating interior design concepts and involving clients in design decisions. By generating visual alternatives and making abstract ideas more tangible, these tools may help designers and clients discuss preferences, compare options, and develop a shared understanding of the intended interior.

However, visual attractiveness alone does not guarantee accurate communication or sound decision-making. AI-generated images may misrepresent dimensions, materials, construction details, or practical constraints, potentially creating expectations that differ from the final design. Responsible use therefore requires transparency, technical verification, and continued involvement of the interior designer.

This study proposes an exploratory survey to examine participants' perceptions of AI-based visualisation in relation to communication clarity, decision-making confidence, trust, and technical accuracy. Its final conclusions will depend on the genuine responses collected and will be interpreted in the context of existing research.

Ultimately, AI should support a collaborative, client-centred design process in which visual communication improves understanding without replacing professional judgement or realistic expectations.

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