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Article

Evaluating the Role of AI in Interior Design: A Case Study on Coohom

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ABSTRACT

This study explores the integration of Artificial Intelligence (AI) in interior design, with a particular focus on AI-powered tools that enhance the design process. Specifically, it evaluates Coohom, a web-based platform for 3D visualizations and floor plans, to assess its impact on design efficiency and user experience. The research involves implementing Coohom in a real-world design project to measure its influence on accuracy, speed, and creativity. The methodology follows a step-by-step analysis of designing a studio from a floor plan, comparing AI-assisted workflows with traditional methods. The findings highlight how the platform streamlines design processes, reduces manual drafting time, and enhances precision. Furthermore, user feedback on the tool's usability, functionality, and effectiveness is analyzed. The study underscores the growing importance of AI in modern interior design, demonstrating its potential to revolutionize the industry. These insights provide a strong foundation for further research and the continued evolution of AI-driven design tools.

Keywords: AI-driven Design; AI-based 3D Visualization; Smart Interior Planning; Digital Design Innovation; Automated Design Workflow.

1-Introduction

The integration of Artificial Intelligence (AI) in interior design is gaining attention for streamlining workflows, enhancing visualization, and automating processes. Tools like Coohom help designers create accurate 3D models, floor plans, and drawings, improving efficiency and outcomes. Coohom stands out as a leading online floor plan software due to its vast design library, one-click floor plan creation, high-quality rendering engine, AI-powered design assistance, and expert design tips, making it an ideal tool for professionals and beginners alike.[1] While AI enhances speed and accessibility, concerns remain about its precision in execution drawings, customization, and software compatibility. This study examines Coohom's effectiveness by comparing its strengths and limitations to traditional methods, analyzing rendering quality, drawing accuracy, and design flexibility to assess AI's evolving role in interior design.

2-Experimental

This study utilized Coohom, (Figure 1). An AI-powered web-based platform for interior design, available at www.coohom.com. The platform offers tools for creating 3D visualizations, floor plans, and furniture layouts. A personal computer (Intel Core i7, 16GB RAM) with stable internet access was used to operate the platform.

1. **Coohom's Interface**
2. **Floor Planning & Modeling:**
    a. methods of generating floor plans
    b. Coohom's Panel
    c. Floor Plan Tools
3. **Furnishing Resources:**
    a. Public Library-Model
    b. Library
    c. AI Templetes
    d. AI Image Generator
4. **Construction Drawings:**
    a. Floor Plan Drawings
    b. Construction Drawings

Figure 1. Coohom logo. [2]

5. Renders

2-1- Coohom's Interface:

Coohom is a leading 3D home design tool, renowned for its creativity and ease of use. Icons of popular design software like SketchUp, 3ds Max, Revit, AutoCAD, and Adobe highlight Coohom's relevance and competitiveness. The playful illustration adds a touch of creativity and approachability, showcasing Coohom as a versatile alternative to traditional design tools (Figure2).

Figure 2. Coohom Slogan**.** [3]

Coohom's Interface highlights its tools for easy and professional home design, modeling, and visualization, with AI integration. (Figure3).

Key features include project starters and specialized design tools:

1. **Start a Project:** Use "Home Design for Free" or "Book a Demo."
2. **Main Tools:**
    - **3D Home Design:** General 3D interior layouts.
    - **Kitchen & Closet Design:** Specialized tools for kitchen and wardrobe projects.
    - **Photo Studio:** Create marketing visuals easily.
    - **AI Home Design:** Generate design ideas with AI.

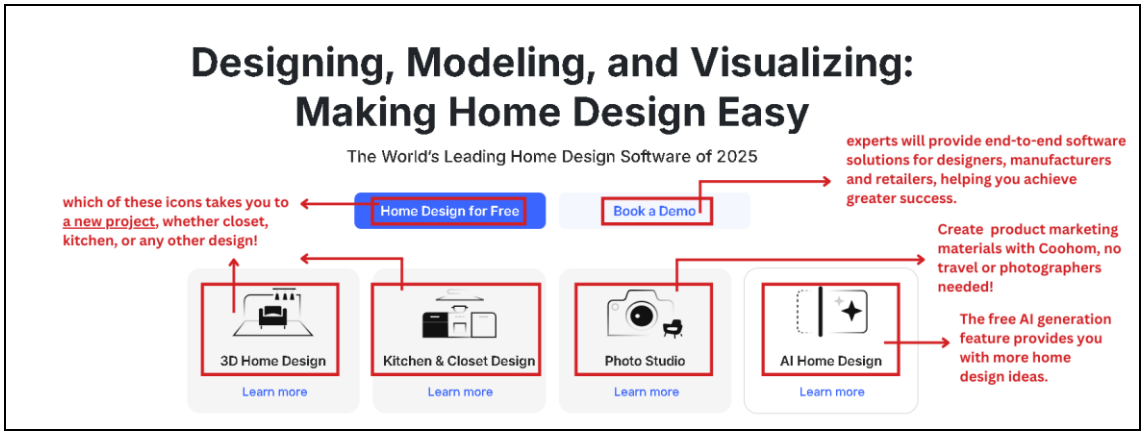

Figure 3. Coohom interface Tools. [3]

A variety of free home design templates on Coohom, covering spaces like living rooms, bedrooms, kitchens, and more (Figure4).

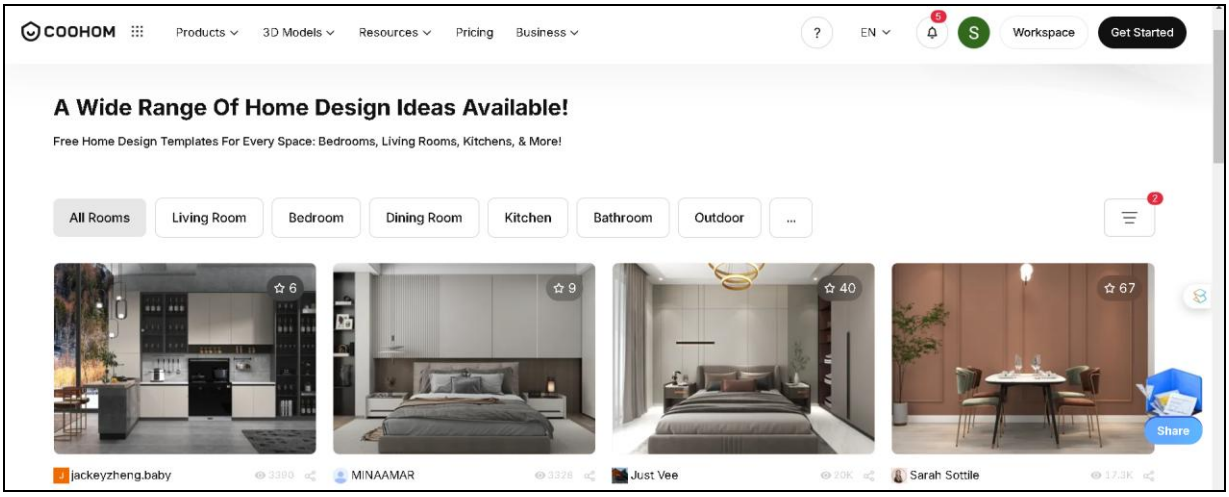

Figure 4. Free Home Design Templates. [3]

Coohom's 3D design training courses, organized into categories like Beginner's Guide, Construction Tools, Kitchen and Bath, and Practical Cases. Each category includes step-by-step lessons to enhance users' skills in specific design areas (Figure5).

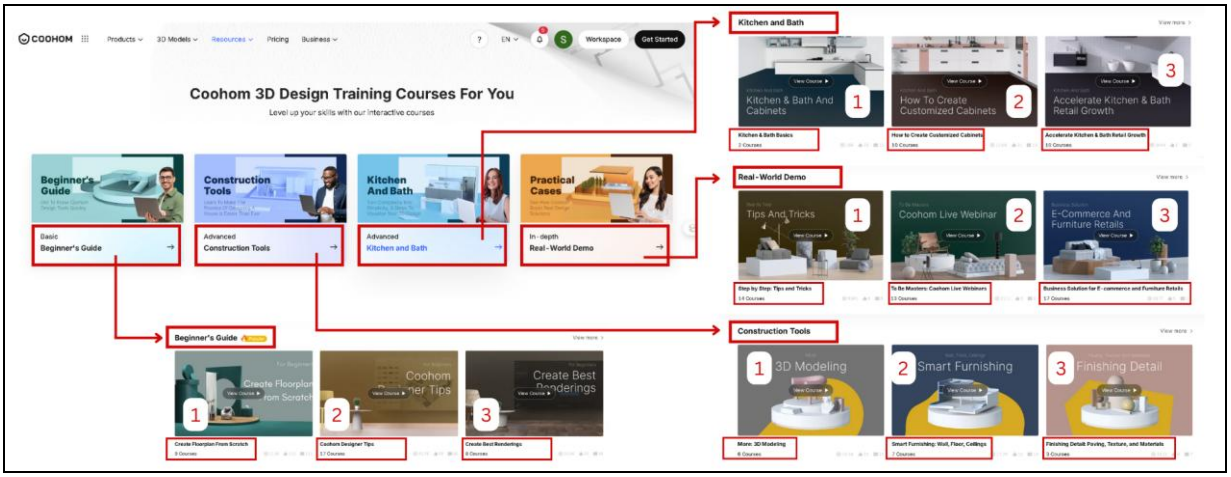

Figure 5. Coohom 3D Design Training Courses. [3]

2-2- Floor planning and modeling:

A. Methods of Generating Floor Plans:

Coohom provides multiple methods for generating floor plans, including uploading a CAD file (**Figure 7**), PDF (**Figure 8**), JPG (**Figure 9**), or PNG. Users can also draw a plan from scratch or use customizable templates with filters for style, space, color, and other design parameters.

For this case study, the floor plan of a studio apartment (**Figure 9**) was imported into Coohom as a JPG image. The measurements were adjusted using the scale ruler tool, setting a bed length of 2000 mm as a reference for scaling. Instead of manual tracing, the **auto-generate** option was utilized for faster and more accurate plan creation (**Figure 9**).

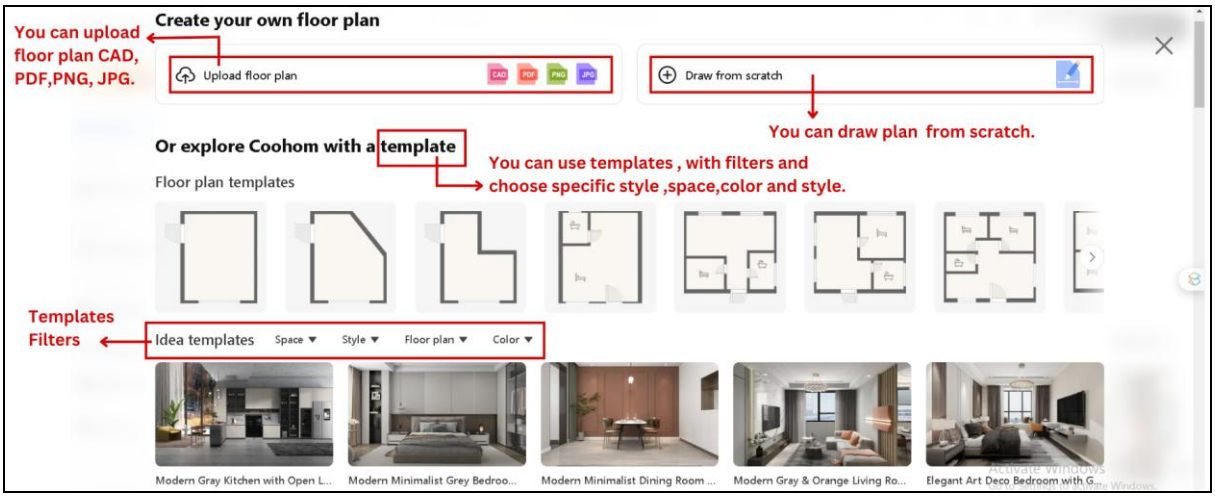

Figure 6. Create Your own Floor Plan. [4]

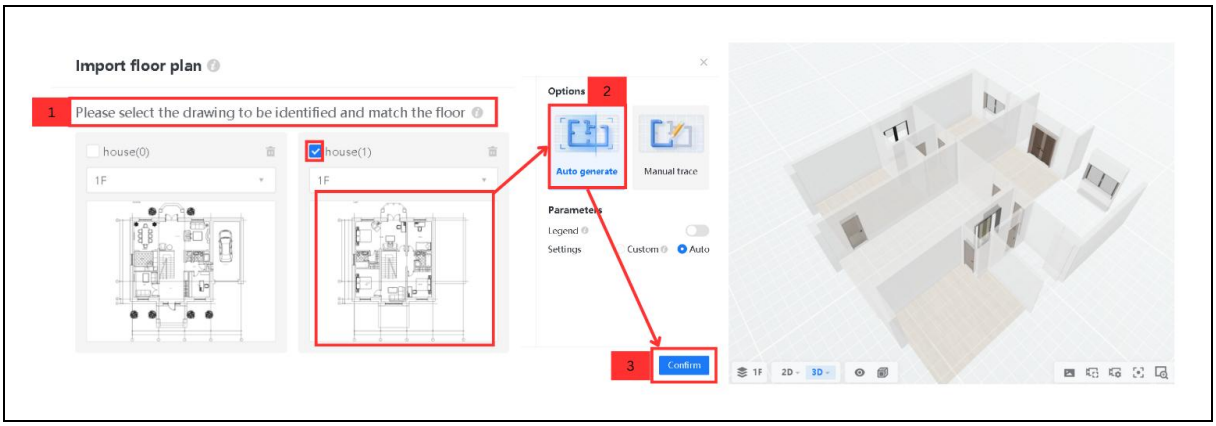

Figure 7. Auto generate floor Plan from CAD drawing. [3]

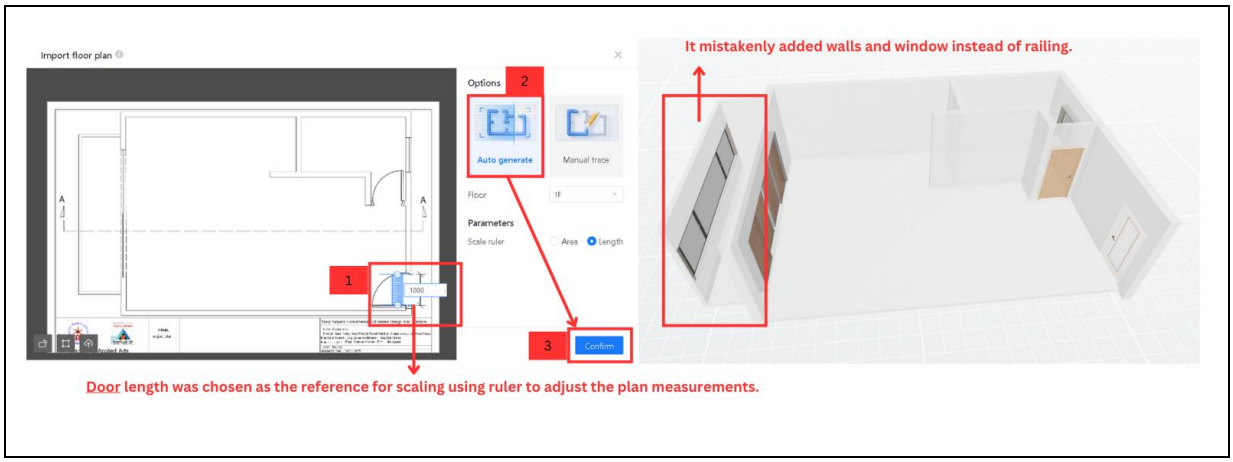

Figure 8. Auto generate floor Plan with reference scale from PDF. [3]

(A) (B)

Figure 9. Auto-generated floor plan using a reference scale from a JPG image. (A) Case study: Studio apartment floor plan [5]. (B) Using a bed length of 2000 mm as a reference scale to generate the floor plan [3].

The auto-generated feature successfully created the walls, doors, and windows. However, a recurring error occurred when generating the balcony railing on the left side in both tested input methods **(JPG and PDF)**. Instead of recognizing the railing correctly, the system mistakenly identified it as a solid wall and added windows instead **(Figure 10)**. This issue arose due to the lack of precise detailing in the original architectural drawing. To prevent such errors, it is crucial to use well-defined floor plans with clear structural distinctions.

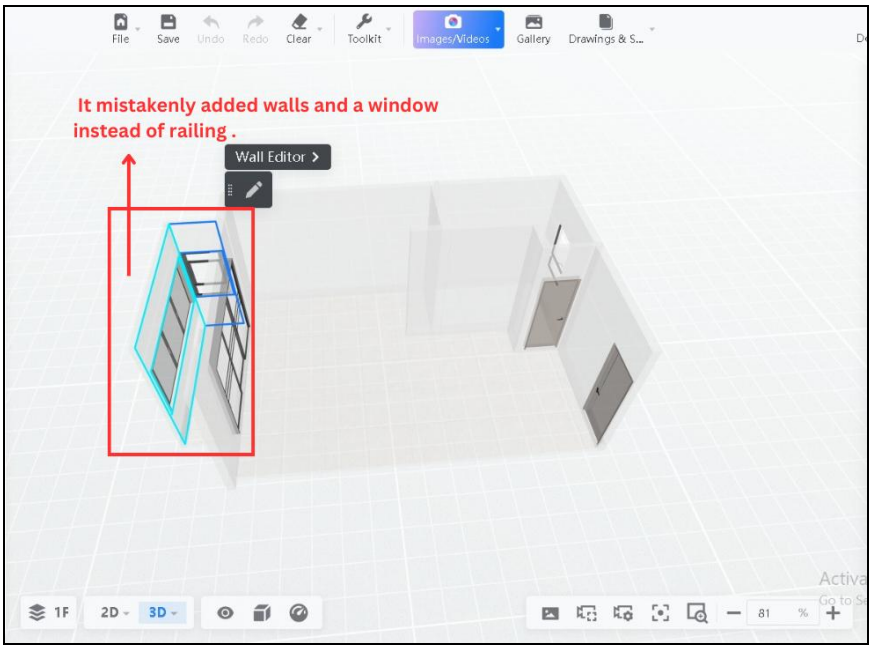

Figure 10. Auto-generated floor plan from a JPG image, showing an error.[3]

B. Coohom's Panel:

- **Left Bar**: Tools for drawing floor plans, adding walls, doors, structures, and libraries.
- **Top Bar**: Options for creating, saving, undoing, and using plan tools (furniture, templates).
- **Right Side**: Floor plan navigator and properties bar for detailed adjustments.
- Bottom features include switching between 2D/3D views, hiding layers, locking elements, and zoom controls (Figure11).

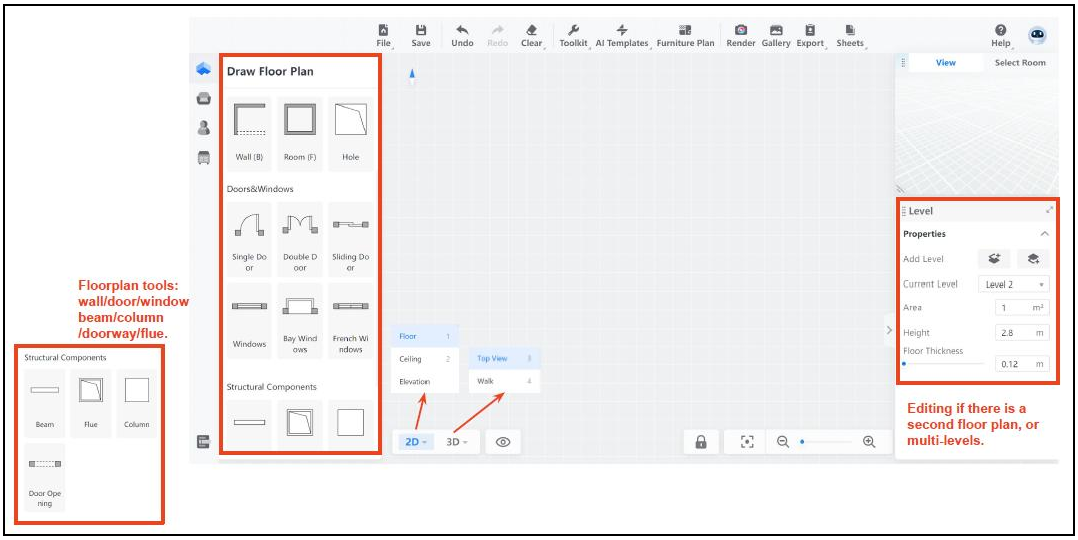

Figure 11. Coohom's Panel. [4]

C. Floor Plan Tools:

The interface of a **Floor Plan Tool** with main features**(Figure12)**:

1. **Floorplan Tools:** Options to draw walls, rooms, doors, windows, beams, and columns This helps in creating detailed and customizable floor plans.**(Figure13)**:
   - **Wall Settings:** Adjust wall measurements (inner/center/outer lines) and thickness.
   - **Drag & Drop Elements:** Add doors, windows, beams, and columns to your plan.
   - **View Options:** Toggle between plans with or without measurements.
   - **Level Properties:** Add levels and set room height.

2. **Draw Floor Plan Panel:** Includes tools for adding walls, doors (single/double/sliding), windows, and rooms.
3. **Structural Components:** Tools to add beams, columns, or draw lines and doorways.
4. **Level Properties:** Allows adding multiple floors, editing level height, and wall thickness.
5. **View Options:** Switch between 2D and 3D views, zoom in/out, and navigate the design. The tool is designed for easy and organized interior design planning.

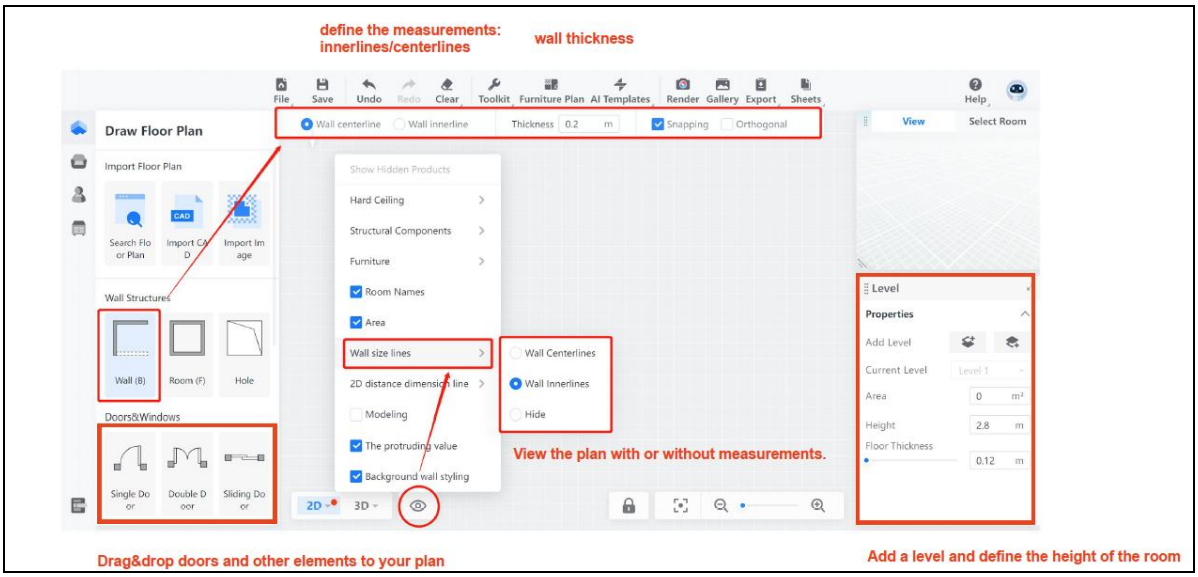

Figure 12. Floor Plan Tools. [4]

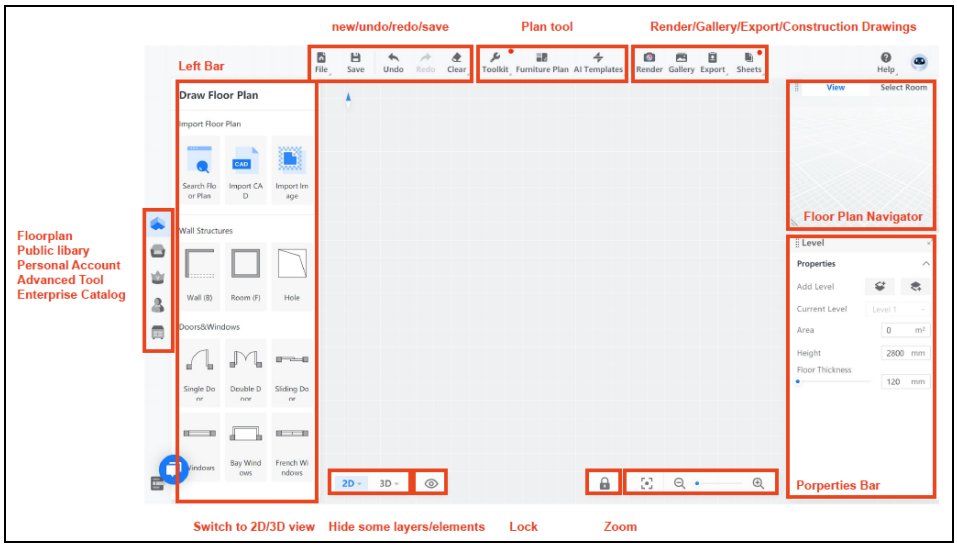

Figure 13. Wall/Door & Window/Beam &Column. [4]

2-3-Furnishing Resources:

A. Public Library

The Public Library in Coohom offers a collection of ready-made 3D models, including furniture, decor, and accessories. It contains free and premium items, making it ideal for quick design work without customization. The library provides various categories **(Figure 14)**, such as Construction & Finishes, Furniture, Lighting, Kitchen & Bathroom, and more**.**

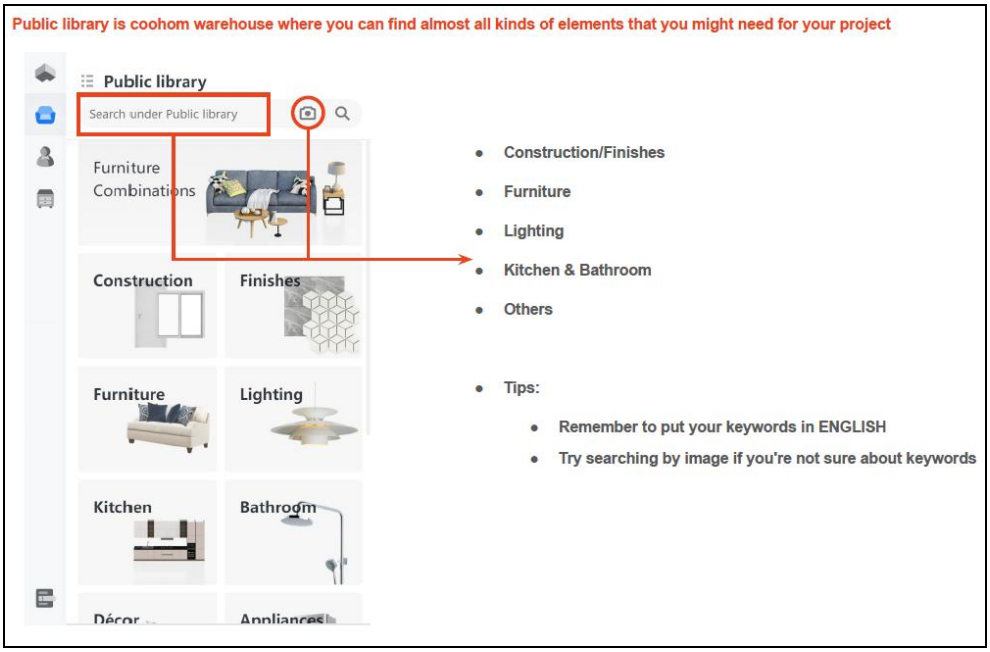

Figure 14, Public Library. [4]

B. Model Library

The Model Library is a private storage space where users can save custom 3D models they create or import from software like SketchUp and 3ds Max. It also provides a collection of categorized individual items, such as a Partition Fence, allowing users to explore and select elements based on style and color. This feature is useful for storing frequently used items in personalized projects. I used the library **(Figure 15)** to search for a balcony railing to correct the mistake in the floor plan generation, where a wall and window were generated instead of a railing.

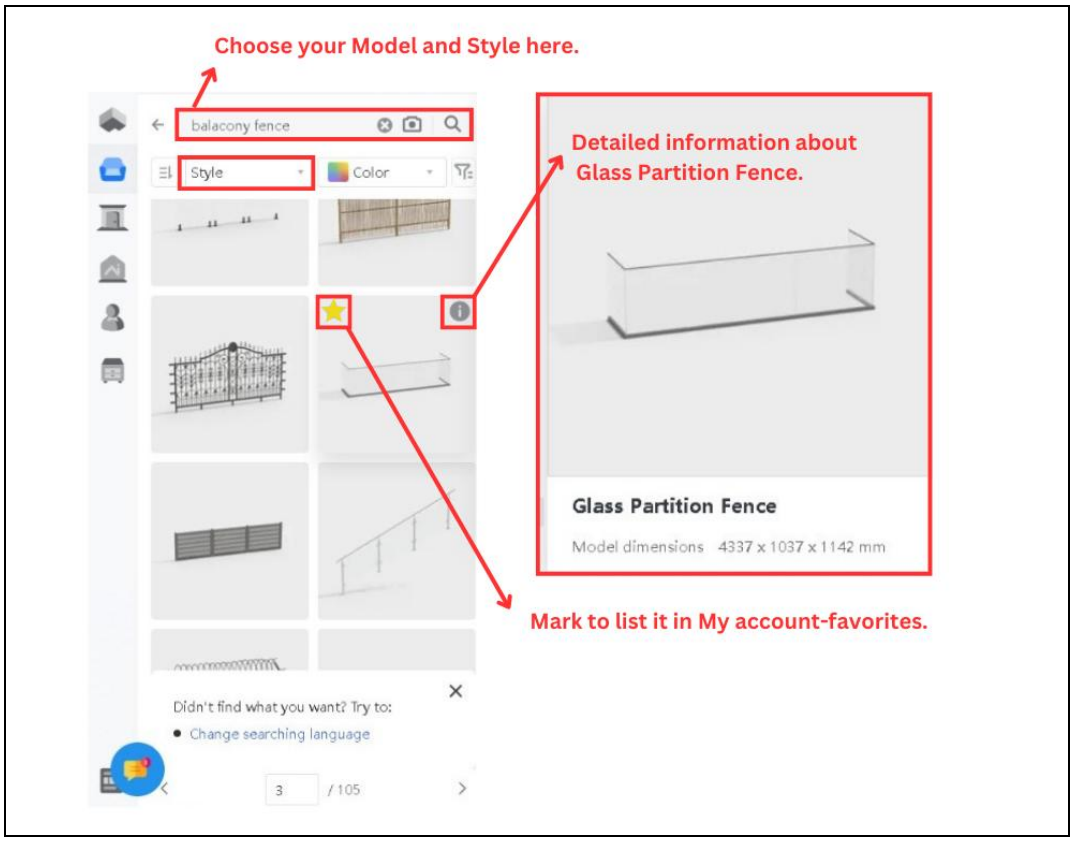

Figure 15, Searching Model Library for balcony fence. [3]

C. AI Templates

AI Templates **(Figure 16)** streamline the room design process by:

- Searching for inspirations in the Public Library based on categories and styles.
- Automatically adapting selected templates to fit the room's dimensions.
- Applying the design with one click, instantly adding all items to the layout.
- This tool simplifies and accelerates the design workflow.

During my trial, the AI identified the **"Living & Dining Room"** from the floor plan text. However, applying an AI Template led to a misplacement, assigning a **living area** setup instead of a **bedroom**. I manually adjusted the furniture, **(Figure17**) while the AI Template worked correctly in the bathroom.

Figure 16, AI Templates. [3]

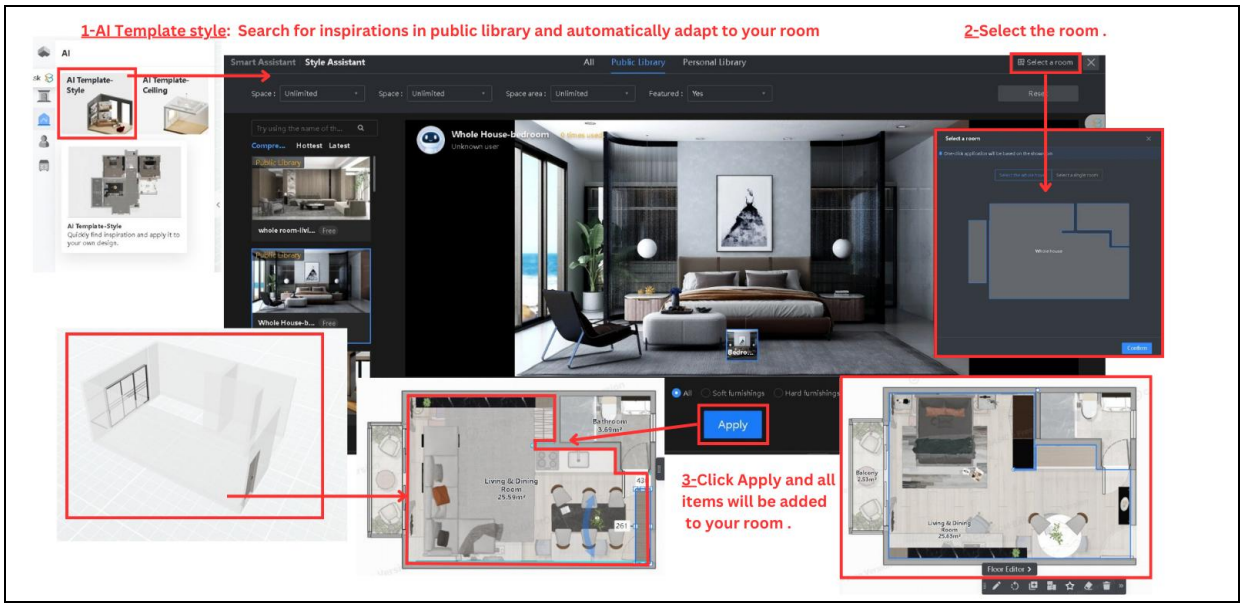

Figure 17, Room after adding AI Templates. [3]

D. AI Image Generator:

➢ **<u>First, by using an empty room with a reference style image generated by ChatGPT:</u>**

(Figure 18) with the following prompt: "Design a cozy studio bedroom with a subtle Egyptian heritage touch. Use warm earthy tones, gold accents, and natural materials like wood and linen. Incorporate geometric patterns and artisanal details for a modern yet culturally rich feel. Add soft lighting and decorative hints to create an inviting, timeless

ambiance." One of the three generated images was selected as a style reference for the empty room.

Figure 18, AI Generated References **(Generated using ChatGPT, 2025)**. [6]

❖ **Analysis of the Four AI-Generated Images in Coohom (Figure 19)**

Strengths:

- High-quality images with well-balanced lighting and realistic shadows.
- Maintains the warm earthy tones, gold accents, and natural materials as in the reference.
- Successfully incorporates Egyptian heritage elements, geometric patterns, and artisanal details.
- Different angles provide diverse perspectives on the interior space.

Limitations:

- Some window proportions may need adjustment for better realism.
- Shadows and lighting could be fine-tuned for enhanced accuracy.
- Wall decorations could be more detailed for higher precision.

Conclusion:

Coohom's AI Image Generator effectively recreates the reference style, delivering a warm, culturally rich, and aesthetically pleasing design. Some minor refinements in geometry and lighting could further improve accuracy.

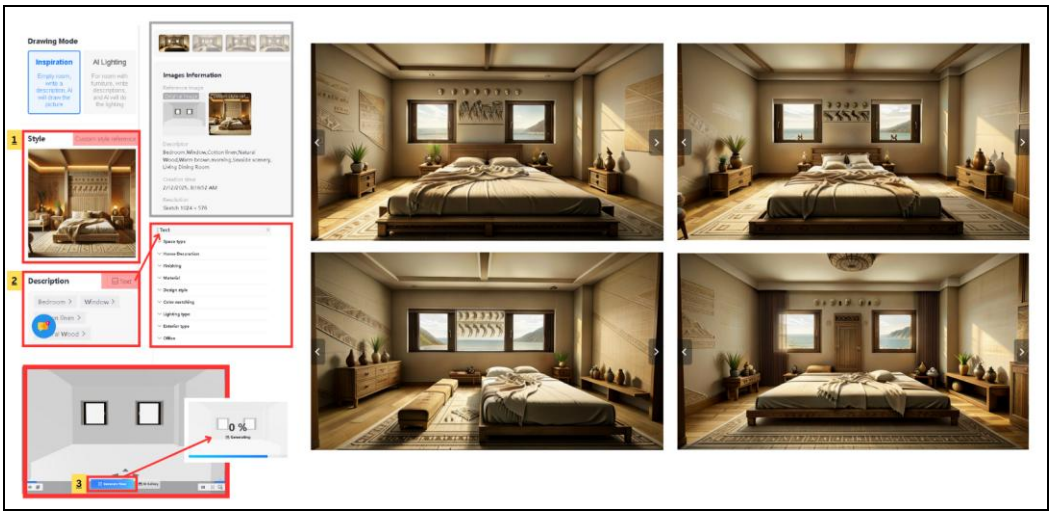

Figure 19, AI Generated Image with AI References. [3]

- **<u>Second, by using a pre-modeled room created with the AI Template</u>**

  The AI Image Generator in Coohom transforms a basic model into high-quality rendered images, accurately handling materials, colors, and lighting based on the selected style in seconds. The final output includes four variations. (Figure 20) illustrates the AI Image Generator tool and the process:

  - Select a Room, choose a style and Generate Now.

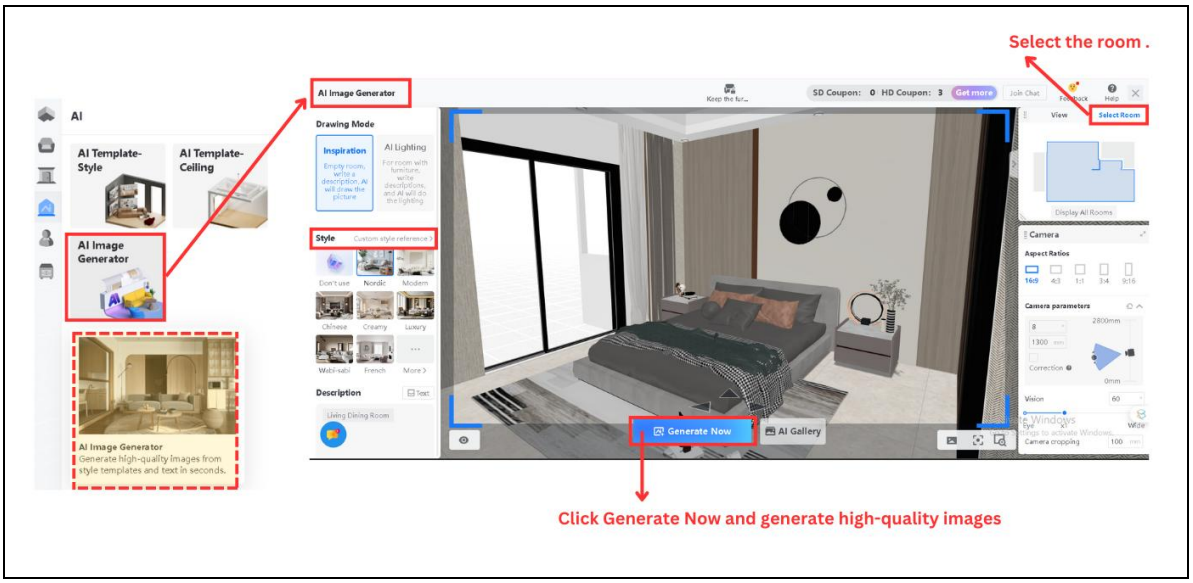

Figure 20, AI Image Generator Process. [3]

❖ **Shots Analysis:**

1-First Shot (Bed View) (Figure 21)

Figure 21, First Shot (Bed View) AI Image generator. [3]

- **Strengths:**
  - Well-balanced lighting that highlights design details.
  - Good material quality, with clear fabric and wood details.
- **Limitations:**
  - Some modeling inaccuracies, such as inconsistent or slightly unrefined edges.
  - Minor details like shadows and light reflections could be improved.

2-Second Shot (TV View) (Figure22)

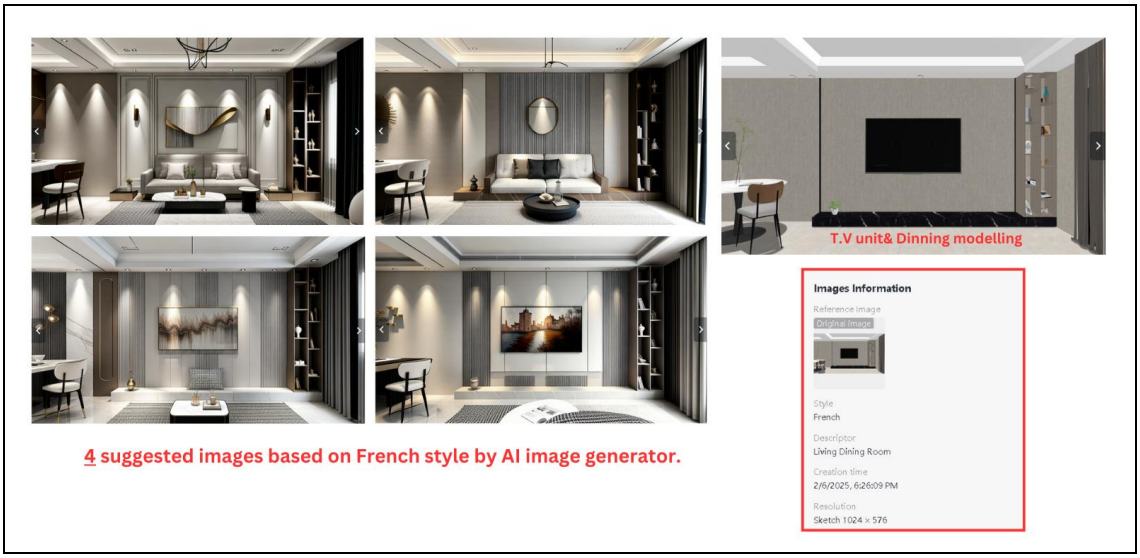

Figure 22, Second Shot (**TV** View) AI Image generator. [3]

- **Strengths:**
    - The spatial composition is clear and functionally logical.
    - Lighting enhances contrast between different elements.
    - Wall and furniture materials appear well-rendered.
- **limitations:**
    - The AI replaced the TV unit with a sofa and added picture frames instead of the TV, altering the intended design.
    - Reflections are not perfectly handled, affecting realism.

3-Third Shot (Bed & Wardrobe View) (Figure23)

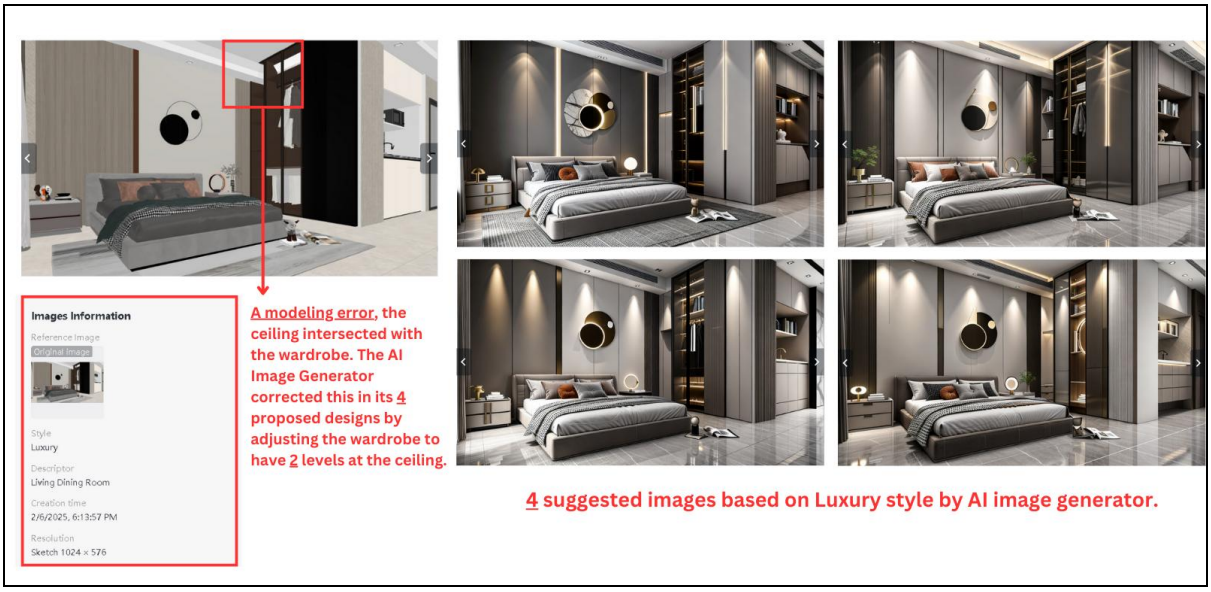

Figure 23, Second Shot (**TV** View) AI Image generator. [3]

- **Strengths:**
    - Clear improvement in modeling, fixing the ceiling overlap issue with the wardrobe.
    - Enhanced lighting and materials compared to previous shots.
    - Better integration of elements, making the scene more cohesive.
- **limitations:**
    - Some elements still require higher precision in modeling, especially at transitions between furniture and walls.
    - Fine details like soft shadows and reflections could be improved for better realism.

The AI Image Generator in Coohom enhances design quality by correcting modeling flaws, improving lighting, and refining material integration. While it offers noticeable improvements over AI templates, some geometric inaccuracies and shadow inconsistencies remain. Further adjustments can enhance realism and precision.

2-4- Drawing and Schedules:

A. **Floor Plan drawings:** is a part of the **Drawings & Schedules** tool in Coohom, enabling users to generate professional documentation efficiently, for quick visualization and customization of different rendering styles, optimizing the design process:

- **Full Color (Figure 24):** A highly detailed, realistic representation of space, ideal for client presentations and marketing.
- **Texture Color Map (Figure 25):** Incorporates material textures and finishes, enhancing visual communication for design presentations.
- **Wireframe (Figure 25):** Displays only structural outlines, making it suitable for technical drawings and construction documentation.

Strengths:

- **Enhanced Visualization:** Users can seamlessly switch between rendering styles, whether for technical documentation, design development, or client presentations.
- **Time Efficiency:** The automated generation of multiple rendering styles minimizes manual drafting efforts, streamlining the workflow.
- **Professional Output:** The HD export feature ensures high-quality visual presentations and precise documentation.

This feature significantly enhances the workflow for architects, designers, and project managers by enabling tailored presentations that align with client expectations and construction requirements.

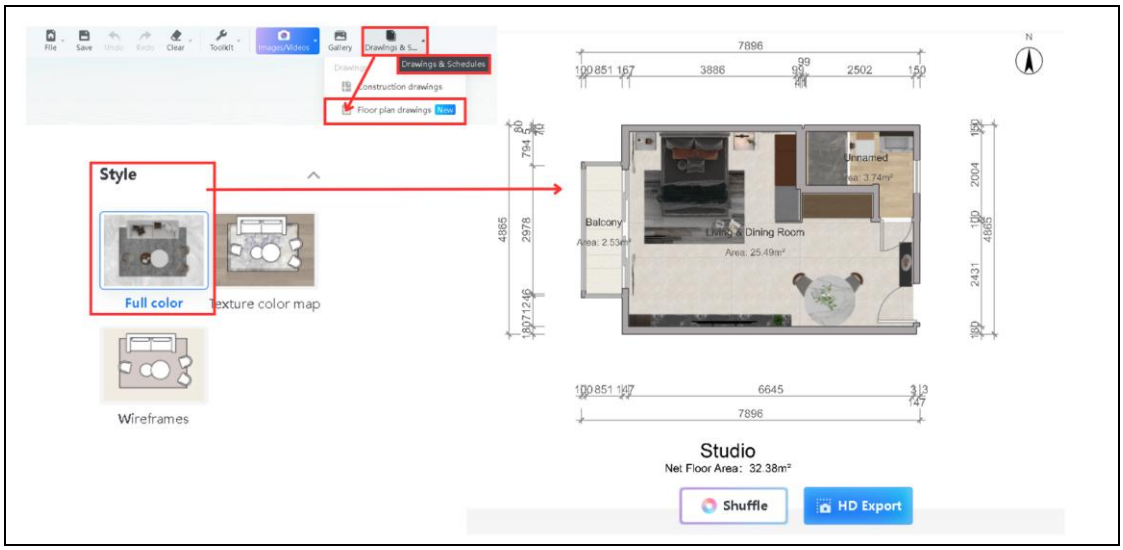

Figure 24, The Floor Plan Drawings feature in **Full Color** style. [3]

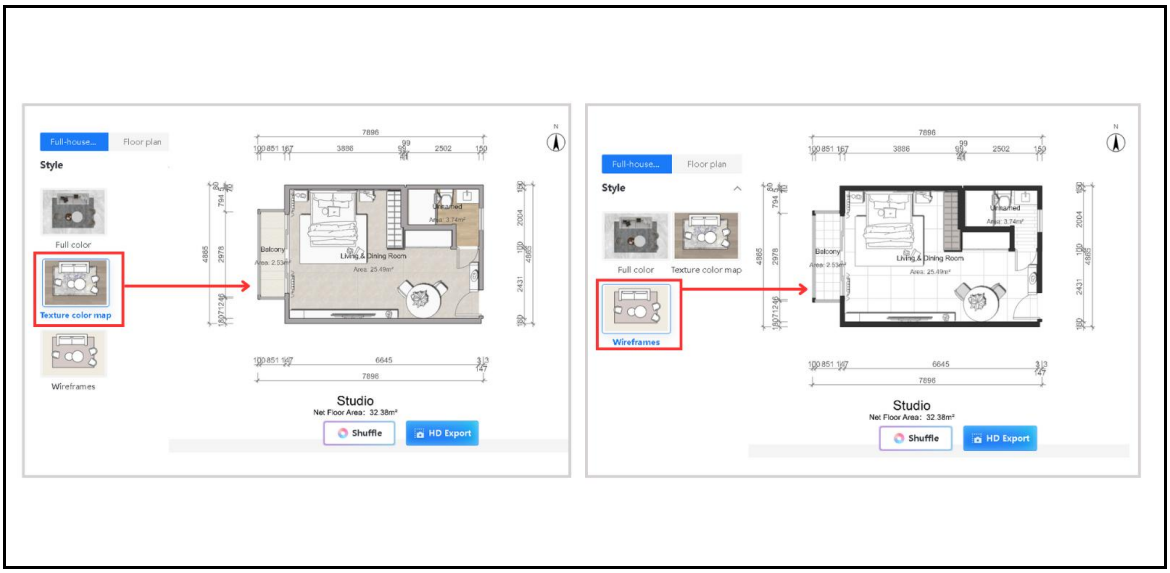

Figure 25, The Floor Plan Drawings feature displays the **Texture Color Map** style on the left and the **Wireframe** style on the right. [3]

B. **<u>Construction Drawings:</u>** professional execution drawings, aiding in the preparation of technical documentation. As shown in **Figure 26** and **Figure 27**, the tool provides detailed **floor plans** and **elevation views**, streamlining the design workflow.

1. **Floor Plan Drawings (Figure 26)**

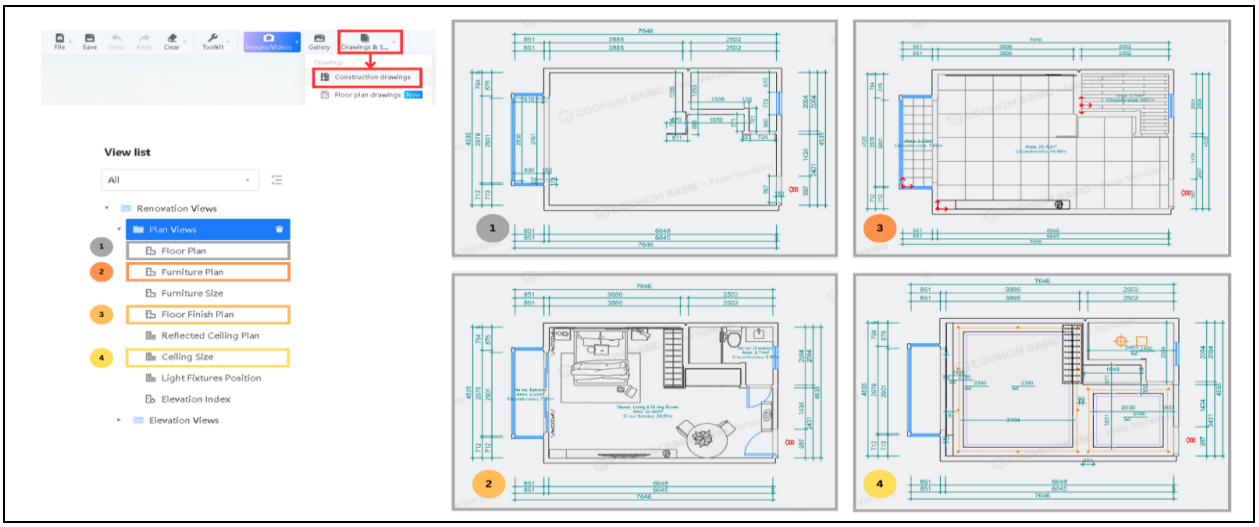

Figure 26, illustrates the Floor Plan Drawings, showcasing different views such as the Floor Plan, Furniture Plan, Floor Finish Plan, and Ceiling Size [3].

The first image highlights **Plan Views** within Coohom's **Drawings & Schedules** tool, where users can generate different types of floor plans, including:

- **Floor Plan** – the basic architectural layout.
- **Furniture Plan** – arrangement of furniture within the space.
- **Floor Finish Plan** – detailing flooring materials and patterns.
- **Ceiling Size** – specifying ceiling dimensions and features.

The four drawings on the right illustrate these plan types with precise **measurements** for walls, windows, and doors, facilitating **accurate construction documentation**.

2. **Elevation Views (Figure 27)**

Figure 27, illustrates the Elevation Views section, showcasing different views such as the Living & Dining Room Elevations [3].

The **Elevation Views** section, which includes multiple **vertical section drawings** of rooms such as the **Living & Dining Room Elevations**. These drawings integrate:

- **Detailed dimensions of walls and finishes**
- **Turning lines** indicating transition points in the design
- **Realistic rendering combined with measurements** to bridge the gap between design and execution

Coohom's Construction Drawings tool enhances communication between designers and contractors by automating execution drawings and offering multiple view options for efficient workflows. While it provides high-quality documentation and user-friendly experience, improvements in customization, CAD integration, and technical controls are needed. Expanding dimensioning options, supporting BIM workflows, and adding standard CAD exports would enhance its usability for architects and designers.

2-5- Render Studio:

Coohom's rendering enables highly realistic visualizations, as in **(Figure 28)**.

Figure 28, Final design visualization by designer Zahraa Saada using Coohom. [7].

1. **Camera Settings in Coohom (Figure 29):**

   This section includes tools for adjusting the camera and enhancing rendering quality:

   1. **Basic Info Bar** – Displays camera settings details.
   2. **Resolution Options** – Includes HD and 4K for high-quality rendering.
   3. **Pre-set Light Modes** – Offers predefined lighting setups with auto-exposure.
   4. **2D-3D Toggle** – Switch between 2D and 3D views.
   5. **Render Mode** – Choose between Plan, Perspective, or Panorama views.

6. **Render Preview** – Quickly preview before final rendering.
7. **Camera Settings (Field of View - FOV)** – Adjusts viewing angle.
8. **Rendered Images Section** – Displays previously rendered images.

These features help users achieve high-quality, professional designs.

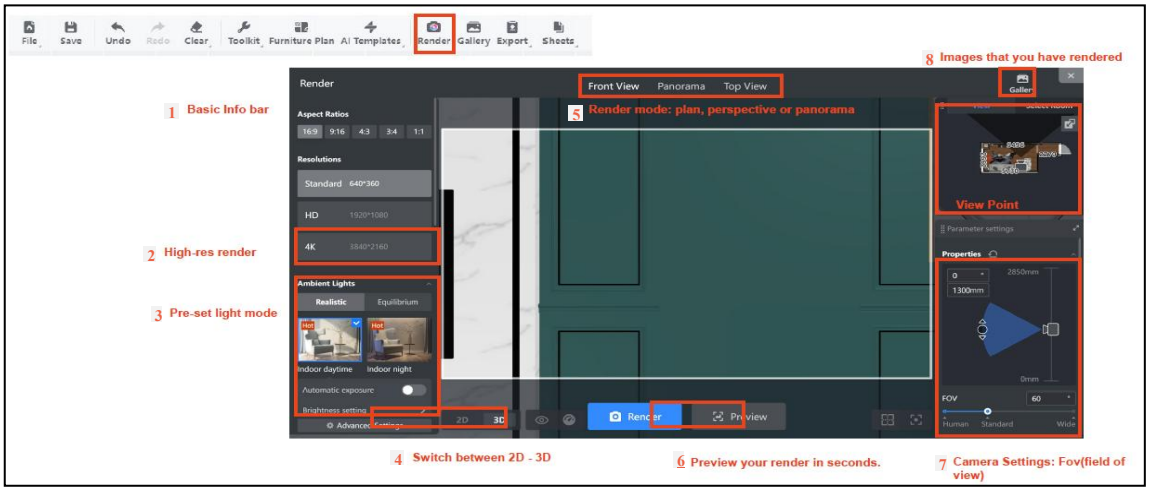

Figure 29, Camera Setting in Coohom. [4].

2. **Evaluation of Coohom's Rendering Capabilities**:

The rendered images **(Figure 30)** demonstrate Coohom's ability to produce high-quality visualizations, effectively simulating lighting, textures, and spatial organization. However, while the software facilitates quick design iterations, its precision in execution drawings and customization options may require further enhancements.

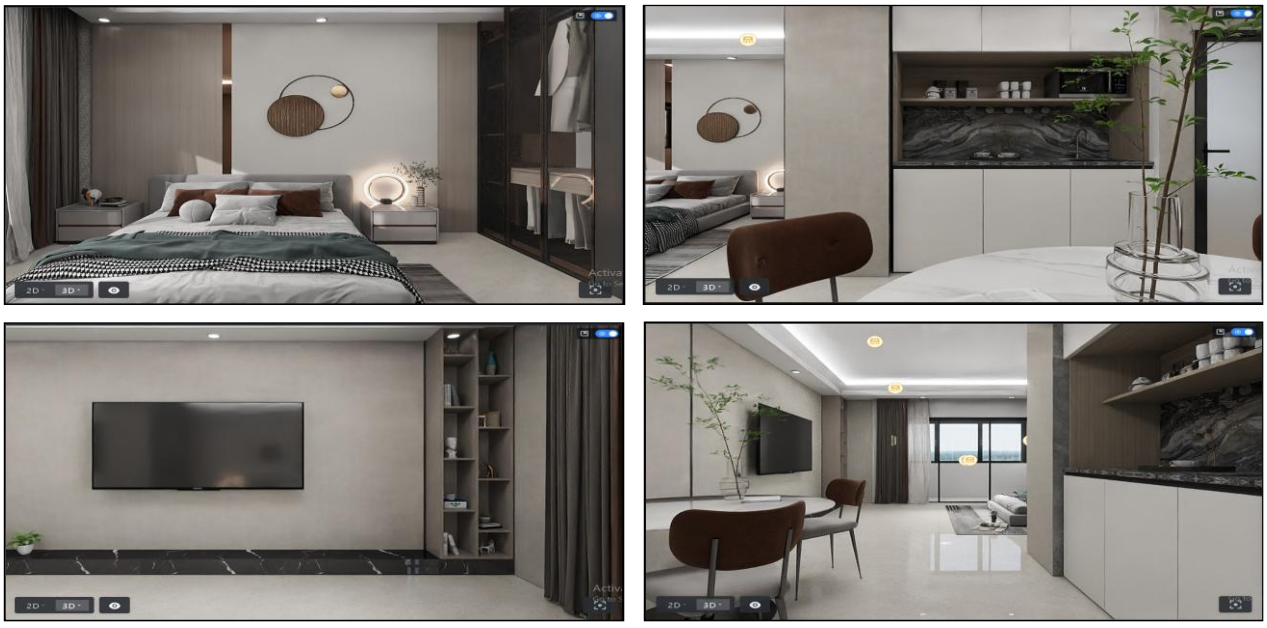

Figure 30, 3D renderings of a studio apartment designed using Coohom, showcasing different perspectives of the interior space [3].

3- Results and Discussion

To assess the effectiveness of Coohom as an AI-powered interior design tool, a SWOT analysis was conducted, evaluating its strengths, weaknesses, opportunities, and threats across different aspects, including interface, floor planning, furnishing resources, construction drawings, and rendering capabilities.

3-1- Strengths

- **User-Friendly Interface:** Coohom provides an intuitive and accessible platform, allowing designers of all levels to create and modify interior spaces efficiently.
- **Versatile Floor Planning & Modeling:** The platform supports multiple methods for generating floor plans, including AI-assisted layouts and templates, improving workflow efficiency.
- **Rich Furnishing Resources:** A vast public model library and AI templates offer diverse design elements, reducing manual modeling efforts.
- **AI Image Generator:** Enables rapid style application and design iterations, offering realistic visualizations.
- **Execution Drawings:** One of the few AI-powered tools generating technical drawings like floor plans and elevations, aiding project execution.
- **Advanced Rendering & VR Integration:** 720° walkthroughs and Kool VR provide immersive visualization experiences, enhancing client presentations.

3-2- Weaknesses

- **Limited Customization & Freehand Modeling:** While the furnishing library is extensive, the inability to create custom models or draw freely restricts design flexibility.
- **Accuracy Issues in AI Image Generation:** Errors occur when insufficient reference data is provided, leading to misplaced elements or unrealistic proportions.
- **Execution Drawings Lack Precision:** While useful, construction drawings still have inaccuracies in dimensions and structural details, making them unsuitable for complex technical applications.
- **Export & Compatibility Limitations:** The absence of standard CAD formats (DWG, DXF) reduces interoperability with professional architectural software.
- **Internet Dependency:** As a cloud-based tool, Coohom's performance relies on a stable internet connection, which may impact workflow consistency.

3-3- Opportunities

- **BIM & CAD Integration:** Expanding compatibility with software like AutoCAD, Revit, or SketchUp could enhance its professional applications.
- **AI-Driven Design Enhancement:** Improving AI accuracy in generating floor plans and object placements would refine its usability for technical execution.
- **Expansion into VR & AR:** Leveraging virtual and augmented reality could provide more immersive and interactive client experiences.
- **Cloud-Based Collaboration:** Enhancing real-time collaboration features could make it a more viable option for professional design teams.

3-4- Threats

- **Competition from Established Software:** Industry leaders like AutoCAD, 3ds Max, and Revit offer more advanced technical features, posing a challenge to Coohom's adoption in professional settings.
- **User Skepticism Towards AI-Generated Designs:** Some designers prefer full manual control over design elements rather than relying on AI-generated solutions.
- **Subscription Model & Pricing Changes:** Adjustments in pricing plans or feature limitations in free versions could affect user retention.

4- Conclusion

Coohom stands out as a fast, AI-powered tool that streamlines interior design, from concept development to execution. Its strengths lie in its user-friendly interface, automation, and immersive visualization capabilities. However, limitations in accuracy, customization, and technical drawing precision must be addressed to meet professional standards. With future improvements in CAD integration, AI refinement, and enhanced collaboration features, Coohom has the potential to become a more comprehensive solution for designers and architects.

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Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this study.

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