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Evaluating the Impact of Generative Artificial Intelligence on Photographic Workflow

ABSTRACT

Recent advances in generative artificial intelligence (GenAI) have significantly transformed photographic post-production by introducing intelligent editing, retouching and image synthesis tools. Although these technologies substantially improve productivity, their influence on image quality, workflow efficiency and user perception remains insufficiently investigated. This study presents an experimental comparison between conventional manual post-production and AI-assisted workflows using Adobe Firefly, ChatGPT and Gemini. Multiple photographic motifs representing different shooting conditions were processed using both conventional and AI-assisted approaches. Workflow efficiency was evaluated through processing time and editing complexity, while image quality was assessed through a user perception study. Additionally, semi-structured interviews with professional photographers were conducted to compare expert opinions with user preferences. The results demonstrate that AI-assisted workflows considerably reduce editing time and simplify several stages of photographic post-production. However, manual editing remains advantageous when precise local adjustments and complete creative control are required. User perception indicates a consistent preference for manually edited photographs, particularly among professional photographers. The findings contribute to a better understanding of the current capabilities and limitations of generative AI within professional photographic production and support informed integration of AI technologies into contemporary photographic practice.

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KEY WORDS
Generative artificial intelligence, photography, image processing, post-production, visual perception

1. Introduction

Post-production is an important part of the photographic workflow because it combines technical correction with aesthetic interpretation (Davis, 2022; Williamson, 2024; Adobe, 2026a; Adobe, 2026b; Adobe, 2026c; Adobe, 2026d; Adobe, 2026e). Conventional workflows rely on the photographer's knowledge and manual control over exposure, white balance, colour, contrast, local adjustments, retouching, sharpening, cropping and export. This approach offers precise control but can be time-consuming, especially when images require detailed local corrections or skin retouching.

Generative artificial intelligence is changing this workflow by allowing image modifications to be initiated through natural-language instructions and automated image synthesis (Tang, 2023; Ryazadzhiyan, 2024; Arvaj, Šubic & Ahtik, 2025; Ekart & Ahtik, 2026). Contemporary systems can remove distracting objects, alter backgrounds, extend images, modify lighting and colour, retouch details, and generate new visual content. This shifts part of the photographer's work from direct manipulation of individual parameters towards describing, selecting and evaluating generated results.

The aim of this study was to evaluate how generative AI affects photographic post-production in terms of processing time, workflow complexity and perceived visual quality. Manual post-production was compared with AI-assisted editing in Adobe Firefly, ChatGPT and Gemini across several photographic motifs and shooting conditions. The study also examined whether visual preferences differ between general users and professional photographers.

The research addressed four propositions:

1. generative AI shortens post-production time compared with manual editing;
2. manually edited photographs may retain an advantage in perceived quality when precision and naturalness are important;
3. professional photographers may evaluate manual edits differently from non-professional viewers; and
4. AI can simplify individual post-production steps but does not replace the photographer as the source of creative and contextual decisions.

2. Methods

2.1. Photographic material and experimental design

The experiment used 16 source photographs covering four motif groups: portraits, group photographs, fashion/artistic figures and products. The material included photographs taken in studio and outdoor conditions so that the workflows could be tested under different lighting and scene characteristics (Figure 1). All reference photographs were saved in a raw file format.

Three approaches were later compared. In the first, the source photographs were edited manually using a conventional Adobe-based workflow.

In the second, the same photographs were edited with generative AI using Adobe Firefly (Image Model 5), ChatGPT (model GPT-5.4) and Gemini (model Gemini 3.1).

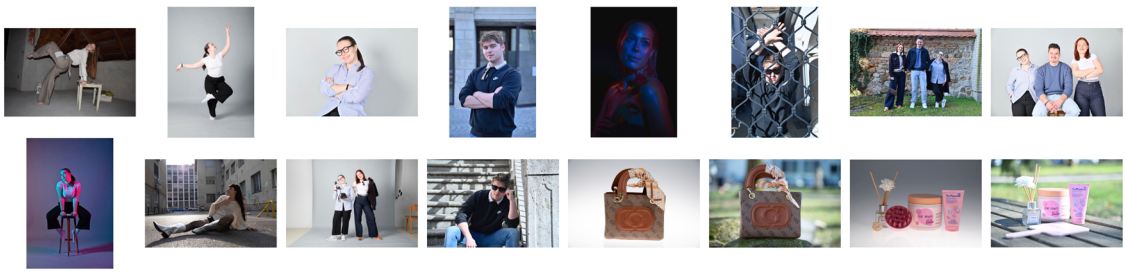
In the third, photographs were generated from detailed text descriptions (prompts) without providing the original image as a reference. This third condition was used to evaluate how closely text-to-image systems could reproduce the intended composition, lighting, colour palette, background and overall aesthetic characteristics of a reference photograph.

2.2. Manual post-production workflow

Manual editing was performed through a sequence of global and local corrections aligned with established digital post-production workflows (Davis, 2022; Alessi, 2025; Cambridge in Colour, 2026).

The workflow comprised opening the image in Adobe Camera Raw, correcting white balance and exposure, adjusting texture and skin, performing local retouching with healing and cloning tools, applying dodge and burn where required, carrying out colour correction in Adobe Lightroom, and exporting the final file. The exact number of operations depended on the motif and the condition of the image.

Portrait and group photographs generally required more detailed retouching, while product photographs more often required global corrections to brightness, contrast, and colour (Figure 2).



» **Figure 1:** *References photographs used in the experiment*



» **Figure 2:** *Photographs with manual postproduction*

2.3. AI-assisted post-production

For AI-assisted post-production, each of the 16 reference photographs was processed using Adobe Firefly (Image Model 5), ChatGPT (model GPT-5.4) and Gemini (model Gemini 3.1), resulting in a total of 48 AI-assisted edits (Figures 3–5).

Generative AI tools enable image content to be modified, removed or added while attempting to integrate the generated elements with the existing visual information (Adobe, 2026a; Adobe, 2026b; Adobe, 2026c; Adobe, 2026d; Adobe, 2026e).



» **Figure 3:** *Photographs with postproduction done using ChatGPT*



» **Figure 4:** *Photographs with postproduction done using Gemini*



» **Figure 5:** *Photographs with postproduction done using Firefly*

The editing process was guided by text prompts describing the intended post-production adjustments. These included exposure and white balance correction, colour adjustment, skin retouching, background clean-up, texture enhancement, sharpening, cropping and colour grading. As far as the individual interfaces and capabilities of the three systems allowed, equivalent instructions and editing objectives were used to ensure comparability between the resulting images.

Processing time was recorded for each tool and photograph. The measurement included preparing and entering the prompt, AI processing and generation of the edited result, and completing the image for export. This enabled the efficiency of the three AI-assisted workflows to be compared with conventional manual post-production.

2.4. AI-based image generation

A separate experiment was conducted to evaluate text-to-image generation. Unlike AI-assisted post-production, the original photographs were not provided to the AI systems as visual references. Instead, ChatGPT, Gemini and Adobe Firefly were instructed to generate new images solely from detailed textual descriptions of the original photographs (Figures 6–8). The prompts described the principal visual characteristics of each reference image, including the subject and composition, pose, facial expression, lighting conditions, colour palette, background and overall visual style. The objective was to determine how effectively each system could interpret a textual description and recreate the intended visual characteristics without direct access to the source photograph.



» **Figure 6:** *Images created using ChatGPT*



» **Figure 7:** *Images created using Gemini*



» **Figure 8:** *Images created using Firefly*

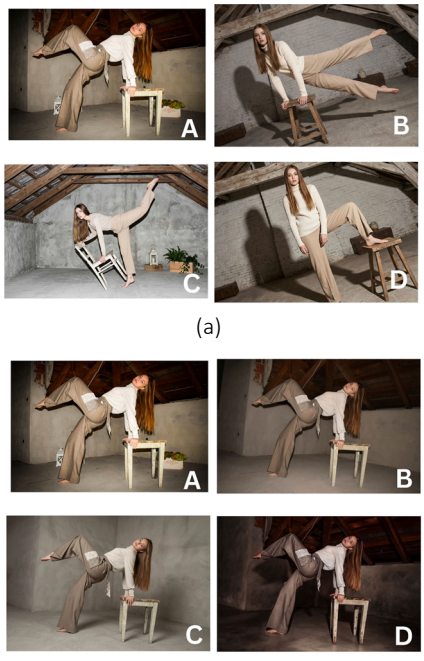
Generation time was measured from the preparation and submission of the prompt to the completion of the generated image.

The resulting images were then included in the user evaluation alongside the manually processed photographs, enabling comparison between conventional photographic post-production and fully AI-generated visual content.

2.5. User survey and professional interviews

A visual preference survey was conducted using FreeOnlineSurveys, with a total of 150 respondents. The survey contained 32 four-image collages. In the first group (Figure 9a), option A was the manually edited reference, and options B, C and D were images generated by ChatGPT, Gemini and Adobe Firefly, respectively. In the second group (Figure 9b), option A again represented the manual edit, while B, C and D represented AI-assisted edits produced by the same three systems.

Participants were not informed which images were manual or AI-based and answered the same question for each collage: which image they preferred.



(a)

(b)

» **Figure 9:** *One example of survey collage: (a) manual postproduction compared to AI generated images, (b) manual postproduction compared to AI postproduction*

Respondents also reported their age, gender, photographic experience and previous use of AI for image creation or editing. The sample consisted of 71% women and 29% men; 58% were aged 18–25. Sixty-six percent did not practise photography, 32% identified as amateur photographers and 2% as professional photographers. Sixty-three percent had previously used AI for image creation or editing.

To complement the survey, semi-structured interviews were conducted with two professional photographers working in event, portrait and product photography. The interviews addressed image selection, post-production practices, time requirements, software use, AI-assisted functions and perceived limitations of AI in professional work.

3. Results

3.1. Processing time

Manual post-production required approximately 17 minutes per photograph on average, with substantial variation by motif. Group photographs were the most time-consuming, averaging about 22 minutes, followed by fashion and artistic figures (18 minutes), portraits (17 minutes) and products (13 minutes). The number of manual processing steps followed the same general pattern, ranging from an average of 9 steps for product photographs to 16 for group photographs (Table 1).

Table 1
Manual post-production time and average number of steps by photographic motif

Motif	Average time	Minimum	Maximum	Average steps
Portrait	17:00	12:41	23:23	11
Group photograph	22:00	20:25	23:54	16
Fashion/ artistic figure	18:00	10:08	22:52	10
Product	13:00	11:26	16:37	9

AI-assisted editing was markedly faster. Average processing times were 5:05 for ChatGPT, 5:12 for Gemini, and 5:03 for Adobe Firefly. ChatGPT showed the narrowest observed range (4:33–5:53), Gemini ranged from 4:22 to 6:30, while Adobe Firefly varied more substantially (1:55–7:39). The differences between tools were small in average terms, but the variability indicates that task complexity and prompt interpretation affected individual processing times (Table 2).

Table 2
Processing time for AI-assisted post-production

Tool	Minimum	Maximum	Average steps
ChatGPT	4:33	5:53	5:05
Gemini	4:22	6:30	5:12
Adobe Firefly	1:55	7:39	5:03

3.2. Visual characteristics of AI-assisted results

AI-assisted tools were effective for broad corrections and rapid stylistic changes, but their limitations became evident in tasks requiring precise local control. This balance between automation and creative control is also emphasised in discussions of contemporary photographic post-processing (Ryazadzhiyan, 2024; Williamson, 2024).

Portrait retouching was particularly sensitive: the systems sometimes altered skin texture, facial proportions, or identity-related details. Automatic cropping could also change the original composition or reduce surrounding space. These effects were less problematic in product photography, where clearly specified materials, textures, lighting, and background characteristics produced more convincing results.

In the text-to-image condition, the systems generally translated detailed descriptions into visually polished images. However, generated portraits presented new interpretations rather than reproductions of the person in the reference photograph. This limits the method in applications where identity must be preserved. Product imagery was more suitable for generative approaches because the desired object, surface, lighting, and studio appearance could be described more directly.

3.3. Survey results

In the first survey block, which compared the manual reference with fully generated alternatives, the mean share of selections was 21.25% for the manual image, 38.38% for ChatGPT, 24.56% for Gemini, and 24.50% for Adobe Firefly. ChatGPT received the highest share in 8 of the 16 comparisons. Adobe Firefly produced the strongest single result in this block, receiving 73% of selections in one collage, but its performance was less consistent across examples (Table 3).

In the second block, which compared manual editing with AI-assisted editing of the source photographs, mean selection shares were 22.21% for the manual edit, 29.94% for ChatGPT, 21.00% for Gemini, and 26.69% for Adobe Firefly. ChatGPT was the most frequently preferred option in 7 of 16 comparisons.

These results indicate that the general survey sample often responded positively to the immediate visual impact of AI-based outputs (Table 3).

Table 3
Mean preference shares in the two survey blocks

Survey block	Manual (A)	ChatGPT (B)	Gemini (C)	Firefly (D)
Generated images	21.25%	38.38%	24.56%	24.50%
AI-assisted edits	22.21%	29.94%	21.00%	26.69%

3.4. Professional versus non-professional perception

The professional subgroup showed a different pattern of preferences. Across the analysed comparisons, professional photographers selected the manually edited option in 59.38% of cases, compared with 15.63% for ChatGPT, 9.38% for Gemini and 15.63% for Adobe Firefly. During evaluation, professionals paid closer attention to facial characteristics, natural skin appearance, expression, background distractions, exposure and colour balance. Non-professional viewers tended to decide more quickly and relied more heavily on the overall visual impression. Because only three respondents in the survey identified as professional photographers, this comparison should be interpreted as exploratory rather than as a population-level estimate.

4. Discussion

The results support the proposition that generative AI can substantially reduce the time required for photographic post-production, consistent with the broader shift towards automated and AI-supported image-processing workflows described in the literature (Intihar, 2023a; Intihar, 2023b; Tang, 2023; Ryazadzhiyan, 2024). In this experiment, AI-assisted editing took approximately five minutes per image, compared with an average of approximately 17 minutes for manual editing. The largest efficiency gains are therefore likely to occur in repetitive or broadly defined tasks such as exposure balancing, colour adjustment, background clean-up and the removal of distracting elements.

Efficiency, however, did not imply complete equivalence between workflows. Conventional post-production remains closely connected to deliberate, photographer-controlled adjustments and creative decision-making (Williamson, 2024; Alessi, 2025). Manual editing retained an advantage where the desired outcome depended on precise local corrections, preservation of facial identity, natural skin texture, controlled composition and repeatable creative decisions. AI systems could produce visually attractive results rapidly, but they also introduced unpredictable changes. This distinction is especially relevant in professional contexts, where technical consistency and fidelity to the photographed subject can be more important than immediate visual impact.

The survey demonstrates that perceived quality depends on the observer and the evaluation criterion. The overall sample frequently preferred AI-generated or AI-edited variants, while the very small professional subgroup showed a stronger preference for manual edits. This suggests a difference between rapid aesthetic appeal and professional evaluation based on technical detail, naturalness and control. The finding should not be generalised beyond the present sample, particularly because the professional subgroup consisted of only three respondents.

The interviews reinforce this interpretation. Existing AI-enabled photography tools likewise position automation around selected tasks such as culling, generative fill, detail enhancement and image correction rather than around the complete replacement of photographic decision-making (Aftershoot, 2025; Adobe, 2026a; Adobe, 2026b; Adobe, 2026c; Adobe, 2026d; Adobe, 2026e; Topaz Labs, 2026). Both professional photographers described AI primarily as a supporting tool for selected tasks rather than a replacement for the complete photographic workflow. Their current use focused on functions such as object removal, generative fill and basic corrections, while image selection, contextual judgement and final aesthetic decisions remained human-led. The interviews also highlighted that professional workflow efficiency depends strongly on good capture practice and on the volume and type of assignment.

The study has several limitations. It used a limited set of photographs and three AI systems, and the visual survey sample consisted mainly of young, non-professional respondents. The professional comparison drew on only three survey participants, supplemented by two interviews. In addition, generative AI systems develop rapidly, so performance observed during the experiment may change as models and interfaces are updated.

Future work should therefore involve larger and more balanced expert samples, additional photographic genres and tools, controlled image-quality criteria, and repeated testing across model versions.

5. Conclusions

Generative AI can significantly accelerate photographic post-production and streamline several routine editing stages. Across the tested tools, AI-assisted editing required roughly five minutes per image, compared with approximately 17 minutes for conventional manual editing.

The technology was particularly effective for global corrections, background modifications and rapid visual enhancement.

At the same time, manual post-production remained more controllable for demanding local adjustments, facial retouching, identity preservation and deliberate composition. The survey showed that AI outputs can be highly appealing to general viewers, whereas the professional subgroup more frequently selected manual edits and evaluated details more critically. Taken together, the results support a hybrid workflow in which generative AI is used to accelerate suitable operations, while the photographer retains responsibility for selection, creative direction, quality control and the final image.

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