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Exploring Human-AI Collaboration in Creative Workflows: A Case Study on Acceptance and Efficiency in Brand Design

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1. **Introduction**
2. Theoretical Foundation
3. Methodology
4. Results
5. Conclusion

INTRODUCTION

Acceptance and Perceived Efficiency of AI in Creative Workflows

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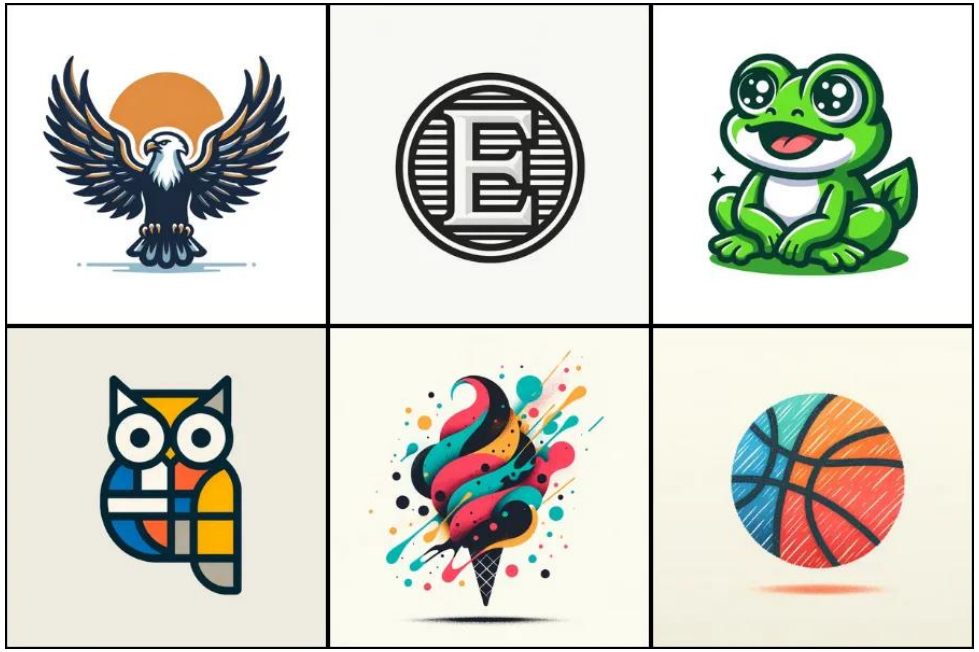
- GenAI tools like **DALL-E 3** are transforming early creative processes, especially **logo design**.
- These tools enable rapid **idea generation from textual prompts**, enhancing inspiration and speed.
- This study investigates the **acceptance and perceived efficiency** of DALL-E 3 in logo ideation.
- Research models used: Technology Acceptance Model (TAM) and Task-Technology Fit (TTF) combined in xTAM-TTF framework.



Logos created with DALL-E 3,
https://www.ebaqdesign.com/blog/dalle3-logo-design

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THEORETICAL FOUNDATION

Related Research: Creative Workflows in the Design Process

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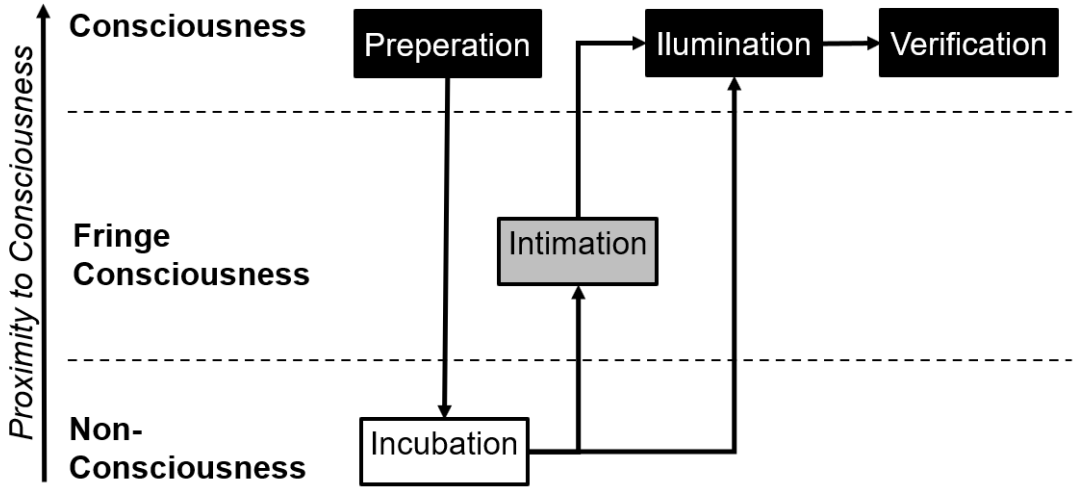
- **Creative workflows** are iterative, dynamic, and shaped by feedback loops (Arias Rosales, 2022; Antonczak & Burger-Helmchen, 2022).
- Traditional model includes **preparation, incubation, illumination, verification,** later extended by an Intimation phase (Wallas, 1926; Sadler-Smith, 2015).
- **Team dynamics, culture, and motivation** significantly influence outcomes (Caniëls et al., 2014; Shao et al, 2019; Malik et al. 2010).
- **Logo ideation** is chosen in our study as it is central to brand identity, involving exploration, visual brainstorming, and refinement.

The creative process in terms of "degrees of consciousness" according to Wallas



Own depiction based on Sadler-Smith (2015)

THEORETICAL FOUNDATION

Related Research: Human-AI Collaboration

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- HAIC emphasizes **augmentation over automation.** AI supports, but does not replace, human creativity (Rezwana & Maher, 2023).
- AI handles **repetitive or routine tasks**, enabling humans to focus on **strategic and creative thinking** (Lai et al., 2021; Saha et al, 2023).
- Effective collaboration depends on **trust, transparency**, and **human control** over decision-making (Hemmer et al., 2023, Lemus et al, 2022).
- In design contexts, HAIC can **speed up ideation** and generate **visual inspiration**, while **human designers evaluate and refine** the results (Cai et al., 2019).

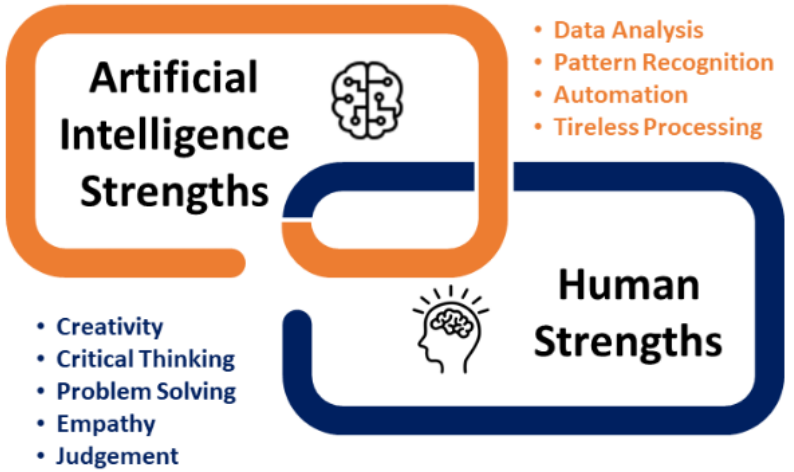

Image source: https://www.a3logics.com/blog/reap-the-benefits-of-human-ai-collaboration/

THEORETICAL FOUNDATION

Related Research: State of Research

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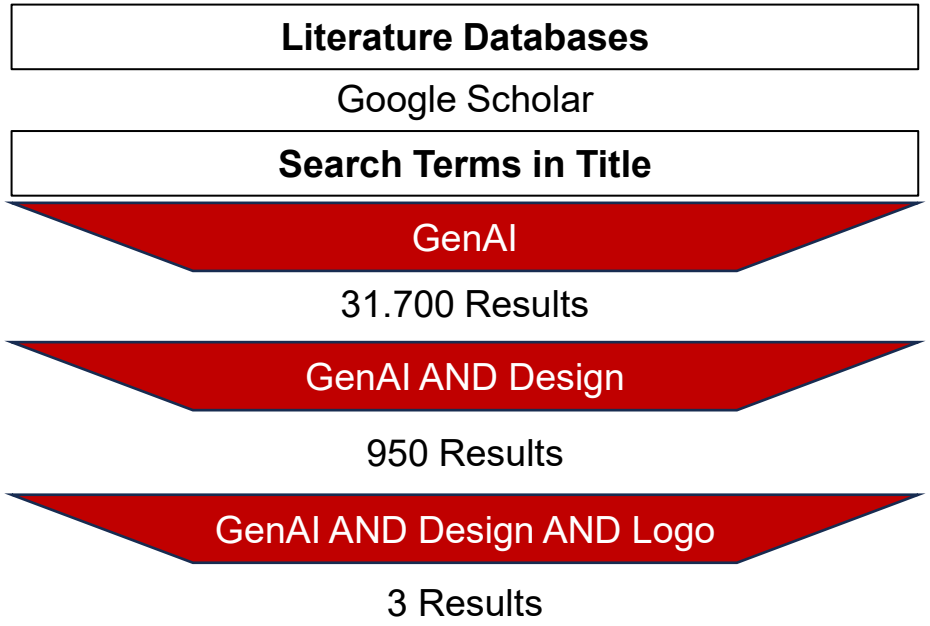
- Most existing studies focus on **technical capabilities** or **general user perceptions** of GenAI (Zhou & Nabus, 2023).
- There is a **lack of empirical research** on how GenAI tools are **integrated into specific design workflows**, especially in **early-stage logo ideation**.
- HAIC research underscores the need for **trust, transparency**, and **task-tool alignment** for successful collaboration (Rezwana & Maher, 2023; Saha et al, 2023).



1. Gual, J., Martínez-Moya, J. A., Amat Cózar, J., & Felip, F. (2025). The Future of Logo Design: Considering Generative AI-Assisted Designs.
2. Ryu, J. S., S. H. Hwang, and B. K. Oh. "Design of Generative AI Fine-Tuning Process for Brand Logo Design-Focusing on the Use of DALL-E." *Design Works* 7.2 (2024): 61-75.
3. Chon, W., & Yeoun, M. H. (2019, April). A Case Study of AI-Driven Generative Logo Design-Compared with the Traditional Logo Design Production. In *Journal Korea Society of Visual Design Forum* (Vol. 63, No. 0, pp. 171-181).

THEORETICAL FOUNDATION

Technology Acceptance Model (TAM)

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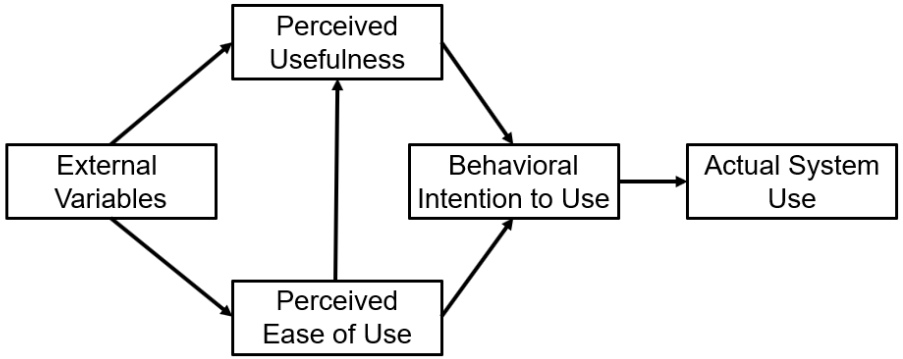
The TAM by Davis (1989) is a foundational framework for **analyzing user acceptance** of new technologies. It builds on the Theory of Reasoned Action (TRA) and focuses on two key constructs:

- **Perceived Usefulness (PU)** acceptance
- **Perceived Ease of Use (PEOU)** (Davis, 1989).

Extended TAM includes social constructs like:

- **Social Influence (SI)**
- **Social Recognition (SR)** (Venkatesh, 2008).

It is widely used in tech adoption studies (e.g., mobile banking, e-learning) (Saputra et al., 2023, Muñoz-Leiva et al., 2017; Pikkarainen et al., 2004).



Technology Acceptance Model (TAM) by Davis (1989)

THEORETICAL FOUNDATION

Task-Technology Fit (TTF)

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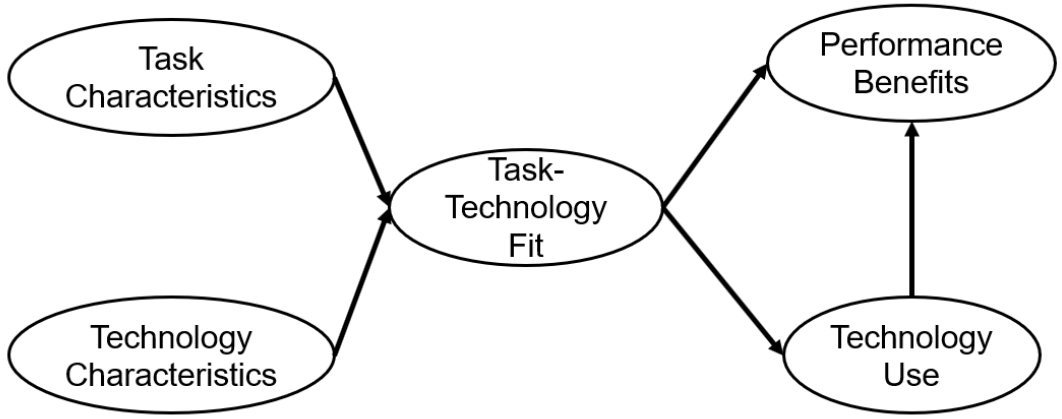
- The TTF model developed by Goodhue (1995) provides a framework to assess how well a technology supports the tasks it is intended to facilitate.
- TTF distinguishes between **Task Characteristics**, such as complexity and cognitive demand, and **Technology Characteristics**, like functionality and usability.

TTF can be applied to evaluate whether AI tools support design-specific tasks. It can also be combined with the TAM, resulting in the xTAM-TTF Model, later utilized for the research model.



Task-Technology-Fit Frameworks by Goodhue (1995)

METHODOLOGY
xTAM-TTF

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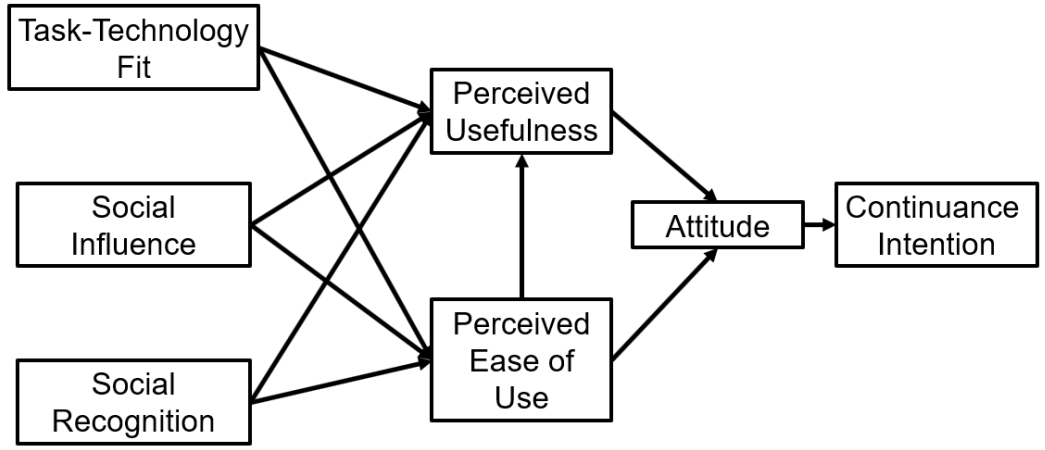
The xTAM-TTF further incorporates SI and SR contributing to social motivation. By integrating these with core constructs of TAM and the TTF, the research model enables an analysis of individual and social acceptance (Vanduhe et al., 2020).

The model comprises the following seven constructs:

- TTF: Perceived alignment between technology features and task requirements
- SI: Influence of the social environment on tool adoption
- SR: Visibility and perceived ease of tool
- PEOU: Perceived effort required to use the tool
- PU: Perceived value in improving productivity or creativity
- AT: Users' general stance toward using the tool
- CI: Intention to keep using the tool over time.



xTAM-TTF Model by Vanduhe et al. (2020)

THEORETICAL FOUNDATION

Research Questions

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Research gap:

- Generative AI tools like DALL-E 3 show promise in creative workflows.
- However, there is limited empirical research on their **acceptance and perceived efficiency** during early-stage ideation, for example, logo design.
- This this study's focus on user attitudes and task alignment, as shown in the following research questions:

RQ1: How do perceived ease of use and usefulness of DALL- E 3 influence its acceptance in the ideation phase of logo design?

RQ2: To what extent does the task-technology fit of DALL-E 3 contribute to efficiency gains in creative workflows?

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METHODOLOGY
Research Model

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Based on the xTAM-TTF (Vanduhe et al., 2020), **ten hypotheses were formulated and adapted** to the object of the study logo design ideation.

Hypothesis	Relationship	Hypothesis Statement
H1	TTF → PU	Task-Technology Fit positively influences Perceived Usefulness.
H2	TTF → PEOU	Task-Technology Fit positively influences Perceived Ease of Use.
H3	SI → PU	Social Influence positively influences Perceived Usefulness.
H4	SI → PEOU	Social Influence positively influences Perceived Ease of Use.
H5	SR → PU	Social Recognition positively influences Perceived Usefulness.
H6	SR → PEOU	Social Recognition positively influences Perceived Ease of Use.
H7	PEOU → PU	Perceived Ease of Use positively influences Perceived Usefulness.
H8	PU → AT	Perceived Usefulness positively influences Attitude Toward Use.
H9	PEOU → AT	Perceived Ease of Use positively influences Attitude Toward Use.
H10	AT → CI	Attitude Toward Use positively influences Continued Intention to Use.

Based on Vanduhe et al. (2020) and Hair et al. (2022).

METHODOLOGY
Research Model

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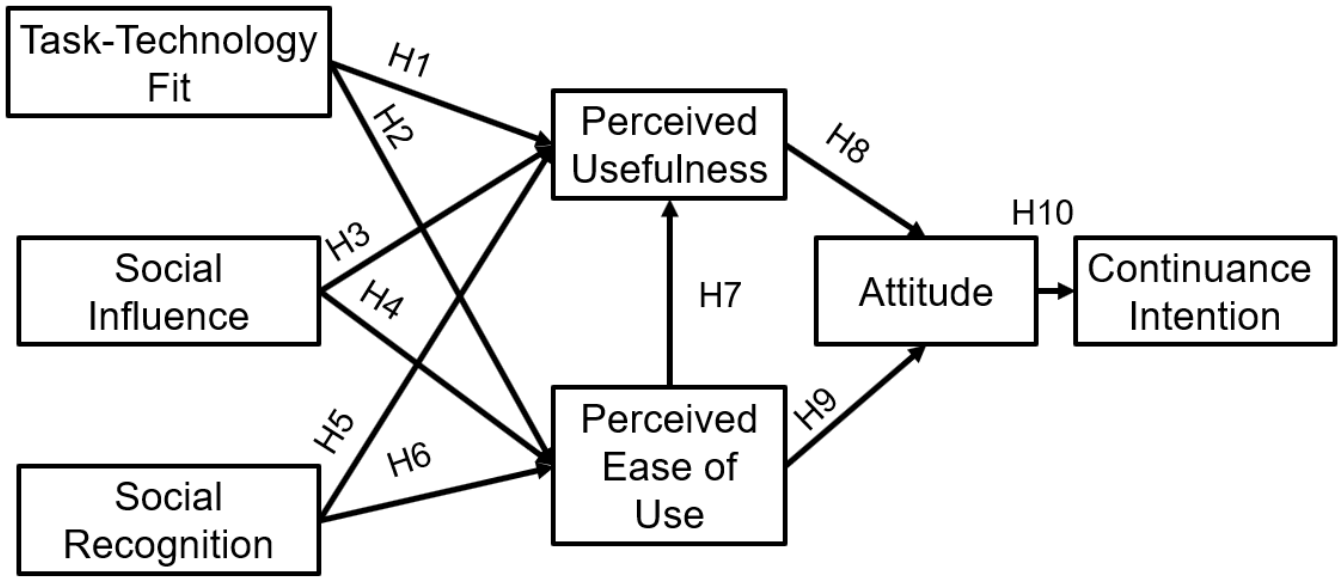
- The xTAM-TTF model applied in our study uses the seven stated constructs and their corresponding measurement items as defined by Vanduhe et al. (2020).
- Vanduhe et al. originally explored how gamification can enhance instructor training in universities.



xTAM-TTF Model based on Vanduhe et al. (2020)

METHODOLOGY

Study Procedure: Use Case & Questionnaire

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- To standardize participants' understanding of the study context, a **design scenario involving using DALL-E 3 for a fictional brand** was presented.
- This was done to align their responses with a consistent **frame of reference**.
- Participants were introduced to the tool via a short explanation and a demonstration video, followed by a detailed use case description. The description reads as follows:

A brand designer has been tasked with creating a logo for a new client. The client is the brand "BubbleBloom", which stands for refreshing, botanical-inspired craft soft drinks made from natural ingredients. The brand is aimed at a young, creative audience that values aesthetics, sustainability, and enjoyment. The logo should appear playful, modern, and authentic. The designer would like to develop initial visual concepts for the logo during the brainstorming phase. To support his creative approach, he decides to use Dall-E.

Example image, generated for survey.

METHODOLOGY

Study Procedure: Use Case & Questionnaire

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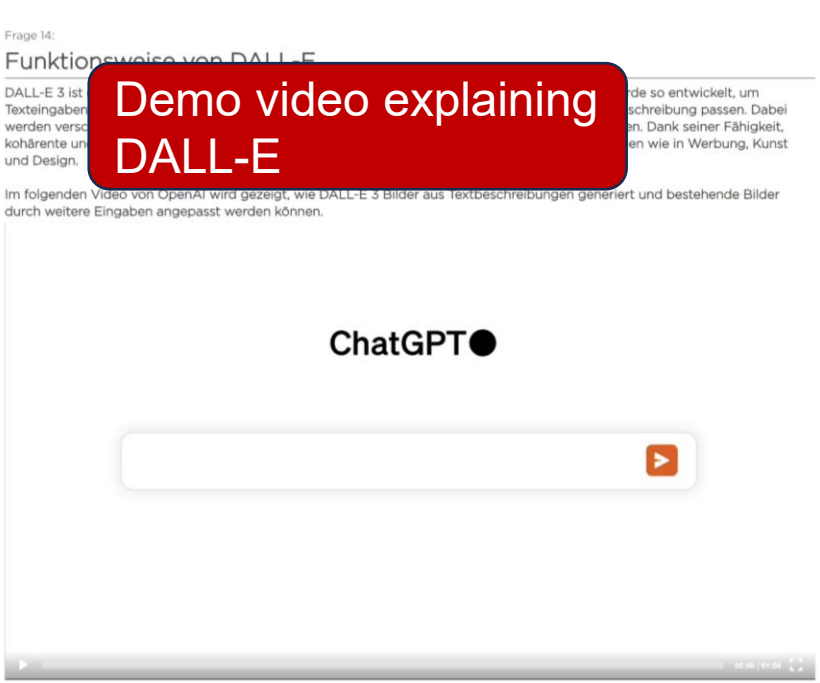
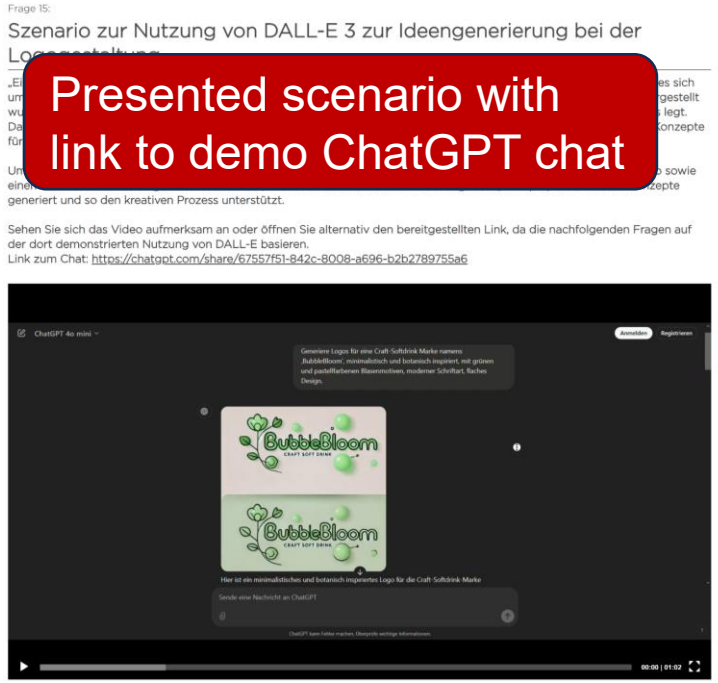
To ensure a point of reference in the scenario-based example, a demo video and a documented ChatGPT conversation illustrated how DALL-E 3 was used to generate and iteratively refine logo design ideas for the fictional *Bubble Bloom* brand.





METHODOLOGY

Study Procedure: Use Case & Questionnaire

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Questionnaire Structure

- **Part 1:** Demographic questions, prior experience with brand design, perception of and collaboration with GenAI tools.
- **Part 2:** Validated items adopted from the xTAM-TTF model by Vanduhe et al. (2020) to evaluate factors for HAIC acceptance of DALL-E.
- **Part 3:** Additional questions to access the expected efficiency of using DALL-E in the design process based on Caniëls et al. (2014)

To assess efficiency, the aspects concerning the logo design process simplicity (Lufarelli et al., 2019), memorability (Liang et al., 2020), relevance (Salgado-Montejo et al., 2014), versatility (Williams & Son, 2021) and uniqueness (Xiong, 2023) were applied. All on a Likert scale (1-5) per dimension.

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RESULTS

Sample & Demographic Data

- Online survey conducted from **December 16, 2024, to January 10, 2025,** on Unipark
- **Recruiting:** University mailing lists, learning platforms, Social media, design communities and Slack groups (Convenience Sample).
- **Inclusion criteria:** Ongoing or completed studies in design-related fields or current or past employment in visual/brand design.

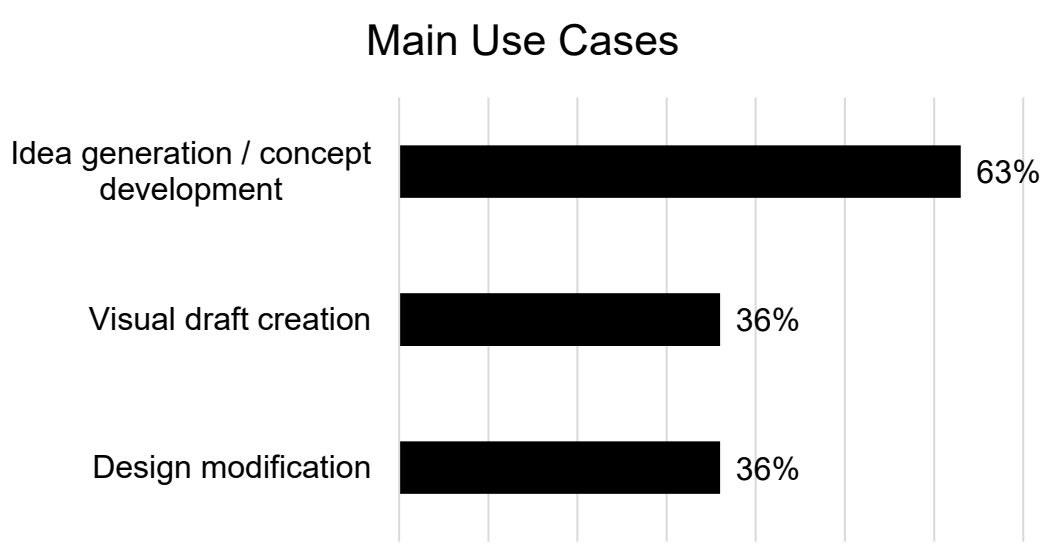
→ **83 participants** within the sample were selected for further analysis.

Category	Attribute	Count
Gender	Female	46
	Male	37
	Diverse	0
Age Group	18–24 years	26
	25–34 years	29
	35–44 years	15
	45–54 years	6
	55+ years	7
Occupation	Working in design-related field	40
	Studying design-related subject	29
	Neither	14
Study Field	Media Management	13
	Media Design	9
	UX/UI Design	2
	Other / No response	5
Job Field	Graphic Design	10
	UX/UI Design	9
	Illustration	7
	Branding / Corporate Design	4
	Product Design	4
	Fashion / Textile Design	3
	Other Design-Related	3

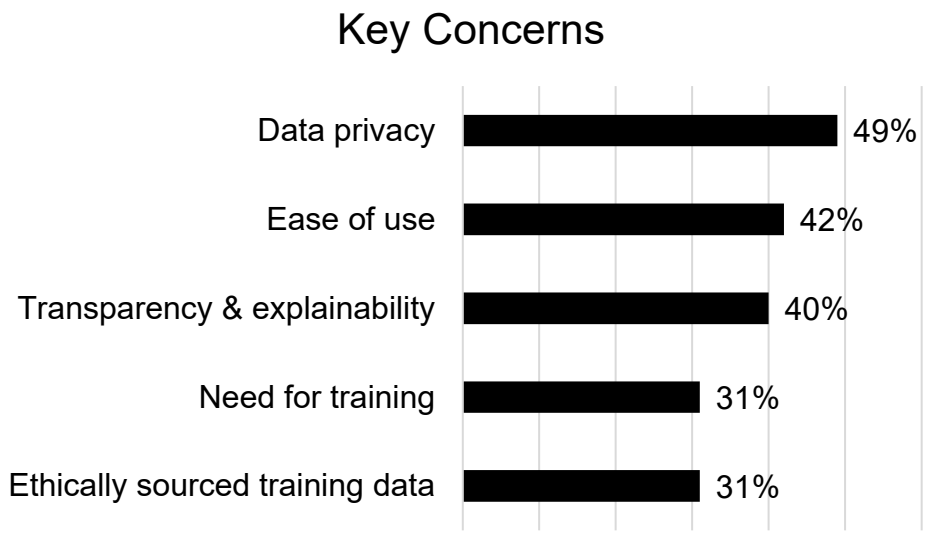
RESULTS

Main Use Cases and Concerns on GenAI Usage

Nearly half of the participants had already used DALL-E 3 (43%), followed by Adobe Firefly (40%). The top **main use case** was **Idea generation / concept development** (63%), while the top **key concern** was **data privacy** (49%).



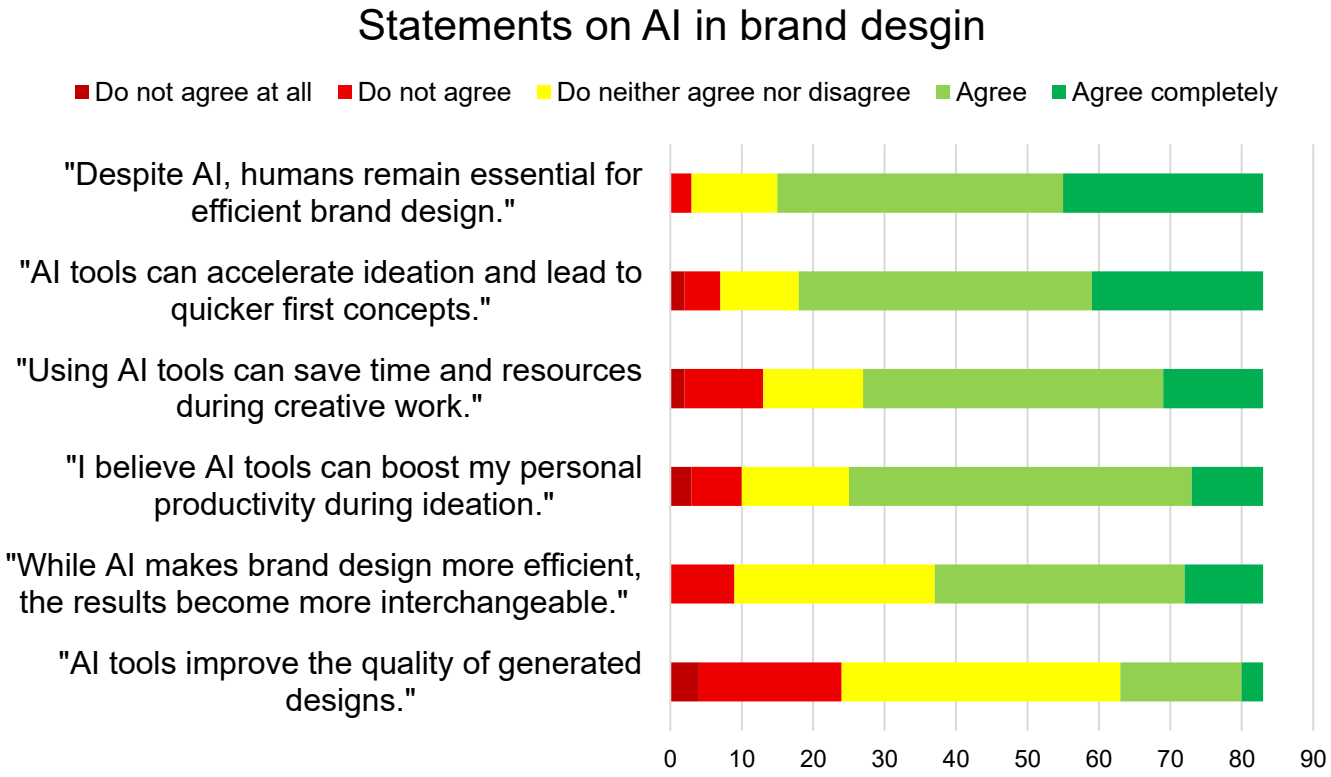
Percentage of key concerns; multiple selection, n=83



Percentage of key concerns; multiple selection, n=83

RESULTS
AI & Efficiency

- **Human value** in brand design is still seen.
- However, AI can improve the **speed** and **productivity** in the ideation phase.
- Also, **costs can be reduced**, due to less ressources needed**.**
- An increase in **quality** is **not** seen as clearly.



Results of “Please assess the following statements“, based on Likert scale (1-5), n= 83

RESULTS

Evaluation of the Measurement Model (1/5)

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Indicator reliability was evaluated by standardized outer loadings, all exceeding recommended threshold of **0.708** (Hair et al., 2022).

AVE = Average Variance Extracted,
CI = Continued Intention,
PEOU = Perceived Ease of Use,
PU = Perceived Usefulness,
A = Attitude,
SR = Social Recognition,
SI = Social Influence,
TTF = Task-Technology Fit

Construct	Item	Loading	Cronbach's α	rho_A	rho_C	VIF		AVE
TTF	TTF1	**0.86**	0.809	0.821	0.875		2029	0.637
	TTF2	**0.772**					1695	
	TTF3	**0.709**					13150	
	TTF4	**0.844**					1949	
SI	SI1	**0.816**	0.883	0.916	0.927		31778	0.81
	SI2	**0.948**					4072	
	SI3	**0.931**					3596	
SR	SR1	**0.887**	0.878	0.893	0.925		2407	0.804
	SR2	**0.887**					2756	
	SR3	**0.877**					2231	
PU	PU1	**0.903**	0.868	0.87	0.919		2461	0.791
	PU2	**0.872**					2104	
	PU3	**0.894**					2327	
PEOU	PEOU1	**0.869**	0.851	0.878	0.908		2233	0.767
	PEOU2	**0.886**					1845	
	PEOU3	**0.873**					2356	
A	A1	**0.874**	0.858	0.858	0.913		2057	0.778
	A2	**0.865**					2063	
	A3	**0.907**					2584	
CI	CI1	**0.929**	0.848	0.848	0.929		2178	0.868
	CI2	**0.934**					2178	

Analysis of indicator reliability, internal consistency, convergent validity, and discriminant validity based on Hair et al. (2022)

RESULTS

Evaluation of the Measurement Model (2/5)

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Internal consistency was validated by

- Cronbach's Alpha (0.60-0.90),
- Composite reliability [rho_c] (0.70-0.95),
- Reliability coefficient [rho_a] (0.70-0.95)

all near the acceptable range (in brackets)(Hair et al., 2022).

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Analysis of indicator reliability, internal consistency, convergent validity, and discriminant validity based on Hair et al. (2022)

RESULTS

Evaluation of the Measurement Model (3/5)

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Convergent validity was assessed using the average variance extracted (AVE), with all constructs exceeding the minimum requirement of 0.50 (Hair et al., 2022).

Construct	Item	Loading	Cronbach's α	rho_A	rho_C	VIF		AVE
TTF	TTF1	0.86	0.809	0.821	0.875		2029	**0.637**
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	TTF4	0.844					1949	
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Analysis of indicator reliability, internal consistency, convergent validity, and discriminant validity based on Hair et al. (2022)

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RESULTS

Evaluation of the Measurement Model (4/5)

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Regarding the discriminant validity between latent constructs, Heterotrait-Monotrait (HTMT) ratio exceeded the critical value of **0.90** in two cases (illustrated in bold) (Hair et al., 2022).

	A	**CI**	**PEOU**	**PU**	**SI**	**SR**	**TTF**
A	1						
CI	***0.949***	1					
PEOU	0.561	0.519	1				
PU	0.885	0.840	0.769	1			
SI	0.569	0.697	0.327	0.408	1		
SR	0.734	0.681	0.369	0.572	0.651	1	
TTF	0.894	0.771	0.838	***1.037***	0.340	0.588	1

HTMT Evaluation Results

RESULTS

Evaluation of the Measurement Model (5/5)

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Yet, the Fornell-Larcker criterion and cross-loading analysis indicated sufficient discriminant validity. Consequently and no changes to the measurement model were required (Hair et al., 2022).

	A	CI	PEOU	PU	SI	SR	TTF
A	**0.882**						
CI	0.809	**0.931**					
PEOU	0.497	0.451	**0.876**				
PU	0.765	0.720	0.679	**0.890**			
SI	0.505	0.608	0.286	0.369	**0.900**		
SR	0.638	0.592	0.346	0.503	0.572	**0.897**	
TTF	0.750	0.648	0.714	0.876	0.301	0.493	**0.798**

Fornell-Larcker Criterion

RESULTS

Evaluation of the Structural Model (1/2)

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- Structural model was analyzed to examine the relationships between the latent variables.
- Path coefficients, t-values, and p-values were calculated using bootstrapping with 5,000 iterations and a significance level of 5%.

Hypothesis	Relationship	Path Coeff.	t-Value	p-Value	Significant
H1	TTF → PU	**0.758**	10.025	0.000	***
H2	TTF → PEOU	**0.716**	8.654	0.000	***
H3	SI → PU	0.086	1.594	0.111	n.s.
H4	SI → PEOU	0.111	1.207	0.227	n.s.
H5	SR → PU	0.047	0.631	0.528	n.s.
H6	SR → PEOU	–0.071	0.572	0.567	n.s.
H7	PEOU → PU	0.097	1.900	0.058	n.s.
H8	PU → A	**0.794**	10.341	0.000	***
H9	PEOU → A	–0.042	0.453	0.651	n.s.
H10	A → CI	**0.809**	15.990	0.000	***

RESULTS

Evaluation of the Structural Model (2/2)

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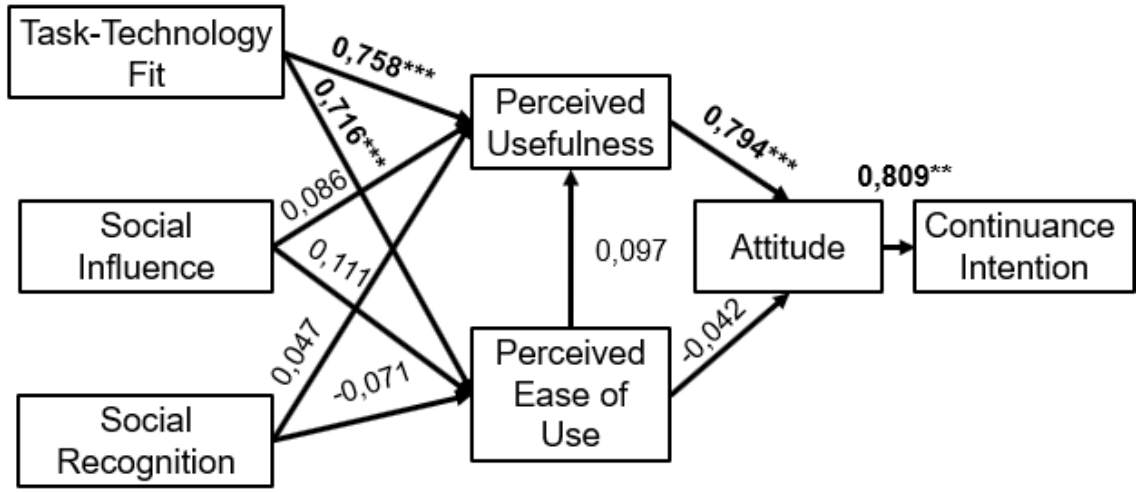
- Higher alignment between **tool's features and requirements of ideation task** is associated with positive evaluations regarding **usefulness** and **usability.**
- Perceived Usefulness positively influences Attitude Toward Use.
- Attitude Toward Use positively influences Continued Intention to Use.



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CONCLUSION

Impact of Human-AI Collaboration on Creativity

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- DALL·E 3 is generally well-accepted for early-stage logo ideation, particularly when the tool's capabilities align with design task requirements.
- Alignment between the tool's functionalities and task requirements plays a central role in shaping perceived usefulness and ease of use.
- Social factors like Social Influence (SI) and Social Recognition (SR) showed limited impact on adoption in creative settings.
- Technology, like AI increases efficiency by accelerating ideation and reducing resource use, even if quality gains are less evident. However, human input remains important.

Practical Implication:

Designers are likelier to adopt and use GenAI tools like DALL-E 3 when tailored to specific design tasks and seamlessly integrate into creative workflows.

CONCLUSION

Limitations and Future Directions of AI and Creativity in Media

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Limitations

- Small, convenience sample.
- Hypothetical scenario and no real tool interaction.
- Limited generalizability to other tools/domains.
- No moderating or mediating effects analyzed.

Outlook

- Broader, more diverse samples.
- Include qualitative methods (interviews, observations).
- Explore autonomous AI agents and deeper HAIC dynamics.

THANK YOU FOR YOUR ATTENTION

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