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The Influence of User-generative AI assisting relationship on Job Role Clarity and User Self-Efficacy

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1. INTRODUCTION

Self-efficacy is a belief that one possesses the skills and abilities necessary to perform a job or task well (Gist, 1987) and is analogous to agency beliefs, personal mastery, or effort-performance expectancy (Bandura, 1977). In prior human-machine interaction (HMI) research, the focus has largely been on users' subjective perceptions of self-efficacy during interactions with technological artifacts (Ulfert-Blank and Schmidt, 2022). However, there has been limited exploration of how human-machine interaction influences users' overall perceived self-efficacy, which may arise from users' reluctance to view technology (e.g., computers and software) as an enhancement to their personal capabilities, coupled with the challenges of mastering these technologies.

The development of artificial intelligence (AI) technology has directly changed our contemporary modes of work and introduced new opportunities for researching the general self-efficacy of users in the field of HMI. Especially with the emergence of generative AI, it has started to change the work relationship between humans and machines in various fields. On the one hand, distinct from other technologies, humans and generative AI can co-work by leveraging each other's strengths to achieve greater accomplishments (Wu et al., 2021). On the other hand, generative AI exhibits a higher degree of autonomy. Traditional intelligence technologies, typically viewed as automation agents, follow preset instructions and struggle to adapt to unforeseen environmental changes. In contrast, generative AI, considered autonomous agents, can independently adjust, make decisions, and act based on their analysis of their surroundings. Their advanced sophistication allows them to handle complex and dynamic situations more effectively, adapting in real time to achieve specific objectives. Thus, within HMI contexts, generative AI is viewed more as team members than mere tools (O'Neill et al., 2022).
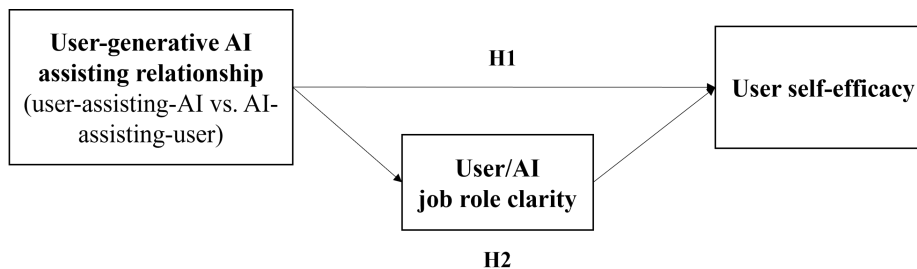
Scholars have proved that generative AI can exert a notably positive influence on self-efficacy across diverse domains, encompassing education, programming, and creative tasks. However, the study by Azuaje et al. (2023) indicated that generative AI's impact on self-efficacy might be context-dependent. Consequently, it is meaningful to deeply explore the changes in user self-efficacy in the process of human-generative AI collaboration, considering various circumstances and antecedents.

There are two types of human-machine work relationships, namely, humans-assisting-machines and machines-assisting-humans (Daugherty and Wilson, 2018; Woo, 2020). In the first system, AI is responsible for managing the entire process from concept to implementation. Users contribute by training AI systems, interpreting AI-generated outcomes, and ensuring AI systems' responsible use while retaining decision-making authority throughout the task. Conversely, in the second system, users lead in task execution and completion, with AI supporting them to enhance their capabilities. In both of these two collaboration systems, humans constitute an essential and indispensable part of the system (Woo, 2020).

Therefore, this study will conduct a more micro-level analysis of the relationship between User-generative AI assisting relationship and user self-efficacy. Our research questions are as follows: (1) How do the relationship between User and generative AI affect user self-efficacy? (2) Can the relationship between User and generative AI indirectly affect user self-efficacy through job role clarity?

2. THEORY AND RESEARCH MODEL

Based on the self-efficacy theory, attribution theory, and human-AI complement model, the hypotheses and research framework are proposed herein (Figure 1).

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┌──────────────────────┐
│  User-generative AI  │         H1          ┌──────────────────┐
│ assisting relationship│ ─────────────────→  │ User self-efficacy│
│ (user-assisting-AI vs. AI-│                  └──────────────────┘
│   assisting-user)    │      ┌──────────────┐
└──────────────────────┘ ───→ │    User/AI   │ ───→
                              │ job role clarity│
                              └──────────────┘
                                    H2
```

Users feel competence improved when they perceive that external coping resources are available to achieve their work goals and cope with adversity (Chen et al., 2022). In a user-generative AI collaboration system, users regard generative AI as an external coping resource. According to attribution theory, When generative AI assists the user, AI executes procedural tasks, while humans are responsible for more flexible, non-routine tasks. According to attribution theory, users will attribute successful experiences, which serve as a source of self-efficacy, to AI's strength to handle repetitive and predictable workflows and their own creativity. Conversely, while users assisted generative AI, the AI threatened the self-efficacy of human experts by challenging their decisions. As a result, users tend to underestimate AI's role in enhancing their abilities. (Isabella et al., 2019). Hence, we propose:

H1: Users will have higher self-efficacy when they employ a user-assisting-generative AI strategy than a generative AI-assisting-user one.

Additionally, compared to generative AI systems that assist themselves, user-assisting generative AI systems better adhere to the Human-AI Complementarity Model (Wu et al., 2021). In this scenario, individuals tend to focus on tasks that require creativity, resulting in a deeper understanding of their roles in the task process. This enhanced understanding of roles and responsibilities contributes to clearer expectations in a generative AI-user collaborative work environment. It will reduce generative AI users' ambiguities, negative expectations, and uncertainties, which in turn will enhance their commitment and performance (Brougham & Haar, 2018). Furthermore, Chen (2002) discovered that role clarity can predict users' sense of self-efficacy, with higher role clarity enhancing individual self-efficacy among organizational members. Thus, we propose the following hypothesis:

H2: Job role clarity mediates the relationship between the user-generative AI assisting relationship and user self-efficacy, such that user-assisting-generative AI will positively affect the user's job role clarity, which in turn will lead to more positive user self-efficacy.

3. MATERIALS, RESULTS AND MAJOR FINDINGS

This study conducted a lab experiment to test hypotheses. The experiment involved two groups (user-assisting-generative AI vs. generative AI-assisting-user), examining participants' perceived job role clarity and self-efficacy in completing tasks working with AI. After the manipulation check, 102 control group samples and 46 experimental group samples were included for final analysis.

This study observed some valuable and interesting findings: (1) T-test results (t(147) = 2.37, p = 0.019) indicate that users of the user-assisting generative AI system perceive higher self-efficacy than those in the other system. (2) Job role clarity mediates the relationship described above (Table 1, 5,000 bootstrap samples).

Table 1. Results of the Mediation Analyses

	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
indirectly effect	0.046	0.021	2.2	0.028	0.005	0.086

directly effect	0.076	0.046	1.66	0.097	-0.014	0.167

4. MAIN CONTRIBUTIONS

We develop a new model to explain the effects of user-generative AI-assisted relationships on the user's job clarity and self-efficacy. Using the experimental study method, we find that users exhibit higher self-efficacy when employing a user-assisting-generative AI strategy than a generative AI-assisting-user one, with job role clarity mediating this relationship. The findings in our paper have important managerial implications for organizations and individuals adopting generative AI tools for task completion. In the future study, we will further validate the research results through repeated experiments. We will also explore and delve deeper into boundary conditions, exploring factors such as task familiarity, generative AI familiarity, and individual differences that may moderate the influence of the user-generative AI assisting relationship on the user's self-efficacy and task satisfaction. Additionally, the possibility of conducting longitudinal studies or field experiments presents a valuable opportunity to further investigate contextual factors and underlying psychological mechanisms that influence the observed phenomena.

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