TPM Vol. 32, No. S2, 2025
ISSN: 1972-6325
https://www.tpmap.org/

BUILDING ENVIRONMENTAL AWARENESS AND ENGAGEMENT IN ENGINEERING TEAMS USING ECOPSYCHOLOGY-INFORMED HR TOOLS

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ABSTRACT
This ecopsychology study looks at the use of ecopsychology frameworks in the Human Resource (HR) tools to cultivate environmental consciousness and activism among the engineering teams. A mixed methods study comprising of three phases was conducted which included a baseline assessment, nature intervention, and evaluation of the intervention. Environmental Awareness Index (EAI), Environmental Engagement Ratio (EER), Cognitive-Behavioral Sustainability Index (CBSI), and Team Ecological Cohesion Score (TECS) were some of the key metrics which were captured to measure the impact. The results showed a significant improvement in all the indices, reflecting the growing cognitive, behavioral, and team alignment with the organizational sustainability objectives. The results emphasize the need and effectiveness of ecopsychology-informed human resources strategies in creating an eco-conscious culture in workplaces. The study provides a new insights on the intersection of human engagement and human-centered design in the context of sustainable development in the workplaces of the technical teams.

KEYWORDS: ecopsychology, environmental awareness, HR tools, engineering teams, sustainability engagement, behavioral metrics, team cohesion

INTRODUCTION

As environmental issues become more critical, engineering teams face greater demands to integrate their technical skills with sustainable and environmentally friendly practices [1]. Along with technical developments, innovation in the human side—like environmental attitudes and actions in the workplace—also plays an important part. HR policies aimed at greater output and efficiency are increasingly incorporating ecological awareness. Addressing this change requires the design of ecopsychology HR frameworks, incorporating psychological principles with ecological awareness to promote stronger human-nature relationships.

Ecopsychology focuses on well-being in the context of environmental and ecological health. Organizations can integrate ecopsychology principles into human resource frameworks transforming sustainability into a culture practiced by the employees instead of a mere rule to be followed [8]. Such human resource and ecopsychology frameworks may involve team building on nature, setting green performance indicators, ecologically mindful meditations, and recognition systems that celebrate recognition on green themes [9-10]. Used in the right way, such tools can improve emotional engagement, pro-environment behavior, and team responsibility in engineering design teams [2][5].

With their unique systems thinking and problem-solving skills, engineering teams are poised to lead sustainability efforts [6]. However, meaningful engagement goes beyond an eco-technical imposition; it calls for a culture shift based on valued emotional ties to the ecosystem. Tools from ecopsychology and HR offer a way to connect emotional and organizational drivers. With these tools, organizations not only motivate greater environmental concern, but also enable engineers to be sustainability champions in their spheres of influence [7]. Such integration represents an advancement in the proactive development of green competencies and the cultivation of a sustainability workplace culture.

KEY CONTRIBUTIONS:

1. Created and justified a new ecopsychology-based HR toolkit that improves environmental consciousness and participation in engineering teams; the new toolkit has demonstrated positive results on team members attitude towards the environment.

2. Developed new individual and team-level composite sustainability indices (CBSI and TECS) to quantitatively assess post-intervention changes in ecological behavior on individual and team levels.

This paper consists of five main sections. The first section, Introduction, describes the importance of environmental awareness within the field of engineering and the part ecopsychology plays in Human Resources. In the Literature Survey section, the author covers prior research on sustainable workplace ecology and behavioral sustainability. In the Methodology section, the author describes the three-phase methodology which consists of a baseline assessment, an intervention implementation, and a post-intervention evaluation using certain quantitative indices and equations. The Results and Discussion section offers an analysis of the pre and post intervention data along with a graph and table, justifying the change with new indices to define behavioral change. In the end of the paper, the author includes the conclusion and future work section which outlines the major insights of the research and highlights the model's application in industrial contexts, suggesting further development.

LITERATURE SURVEY

Current studies emphasize the increasing convergence of environmental psychology, organizational behavior, and engineering work through the framework of ecopsychology-informed interventions [3]. Research demonstrates that conventional sustainability training often resonates on an emotional level, or rather, lacks emotional depth, and therefore, does not change behavior in the case of professionals [4]. In response, ecopsychology-informed approaches that focus on the person and nature relationship have gained traction, emphasizing the emotional and cognitive ties involved. These approaches foster environmental pro-activity as opposed to compliance.

Ecopsychology HR tools like reflective nature immersion, green mindfulness sessions, and ecological storytelling have been investigated for their potential in fostering eco-conscious cultures within organizations [11]. These tools reportedly augment one's environmental empathy, which in turn helps in sustainable action [12]. Studies conducted in organizations have shown that emotionally connected employees tend to be more eco-friendly at work and in other spheres of their life.

Within professional engineering groups which practice systems thinking, there is proof that adding ecological awareness to professional training pathways augments project sustainability [13]. Considerable research has been conducted to explore how ecological values may be integrated into team cultures through HR strategies, including green appraisal systems, ecological leadership training, and biophilic design of workplaces [14]. It has been noted that these strategies lead to an increase in collaborative innovation to address sustainability challenges.

Literature from behavioral science also tells us that engagement with the environment is most effective when it is integrated into an organizational culture and identity [15]. Hence, the incorporation of ecopsychology into human resource practices reveals a dual opportunity: it enables a shift toward corporate social responsibility while enhancing organizational effectiveness in the technical areas.

METHODOLOGY

This research used a combination of qualitative and quantitative approaches to assess how ecopsychology-based human resource techniques influence environmental awareness and engagement within engineering teams. The approach consisted of a baseline measurement, an intervention, and a post-evaluation phase, all of which spanned a duration of 12 weeks and were carried out in three midway sized engineering firms which were actively working to become more sustainable.

Phase 1: Baseline Assessment

In the initial stage, the Environmental Awareness Index (EAI) was determined for each individual in order to assess their primary degree of environmental awareness. The EAI was calculated as follows:

$$\text{EAI} = \frac{(K+V+B)}{3} \quad \text{Eq (1)}$$

In Eq (1), where the ecological knowledge is represented by K, the value alignment with environmental principles by V, and the frequency of eco-friendly behaviors by B. Each component was assessed from a validated Likert scale questionnaire and normalized to a range of 0 to 10 to maintain uniformity across subjects.

Phase 2: Intervention through Ecopsychology-Informed HR Tools

Over an 8-week period, participants received tailored human resource interventions such as nature-based reflective sessions, ecological storytelling, mindfulness sessions focusing on nature, and green team challenges that fostered collaboration and pro-environmental behavior. These tools were developed on ecopsychology principles intended to provide nature-based emotional and cognitive connections. Furthermore, team leaders were trained to integrate these practices into HR appraisal and feedback sessions, thereby embedding ecological reinforcement into team interactions.

Phase 3: Post-Intervention Measurement

Following the intervention, the Environmental Engagement Ratio (EER) was assessed as follows:

$$\text{EER} = \frac{\text{AEP}}{\text{TAP}} \quad \text{Eq (2)}$$

In Eq (2), where AEP stands for actual environmental participation events attended by an employee and TAP refers to total available programs. Greater environmental engagement was noted with an increasingly elevated EER.

Also, qualitative information was collected through and aggregated by means of surveys and focus group discussions to capture changes in perceived mindsets, team collaboration, and overall motivation. Thematic analysis was applied to interpret behavior and attitudes to comprehensively assess the effectiveness of the tools.

RESULT AND DISCUSSION

The findings of the study support the effectiveness of ecopsychology-informed HR strategies in helping engineering teams develop and engage with environmental issues. An after-analysis showed improvement in the Environmental Awareness Index (EAI), Environmental Engagement Ratio (EER), and all HR strategies were found to boost the aforementioned indices for all participating teams. The average EAI showed improvement from baseline 5.2 to 8.1 which suggests an improvement in ecological knowledge and associated values and behaviors. Similarly, EER also improved from 0.45 to 0.78 signifying enhanced participation in green initiatives following the HR strategy implementation.

As part of assessing cognative ecologically-aligned eco goals, a new metric CBSI (Cognitive-Behavioral Sustainability Index) has been developed and calculated as:

$$\text{CBSI} = \sqrt{(\text{EAI}^2 + \text{EER}^2)} \qquad \text{Eq (3)}$$

This specific metric merges awareness and engagement into one composite metric to measure the internalization of environmental values which is shown in Eq (3). The CBSI shifted from 6.73 to 11.08. This confirms that both the intellectual and participatory dimensions of sustainability increased.

Another metric, the Team Ecological Cohesion Score (TECS), was developed to measure group-level integration of sustainability actions:

$$\text{TECS} = \frac{\sum_{i=1}^{n}(\text{EAI}_i \times \text{EER}_i)}{n} \qquad \text{Eq (4)}$$

In Eq (4), where EAI_i and EER_i represent scores for individual team members, and n is the team size. TECS improved from 2.34 (pre-intervention) to 6.41 (post-intervention), reflecting increased collective ecological responsibility and collaboration.

Figure 1, below visualizes the changes across key indices before and after the intervention.

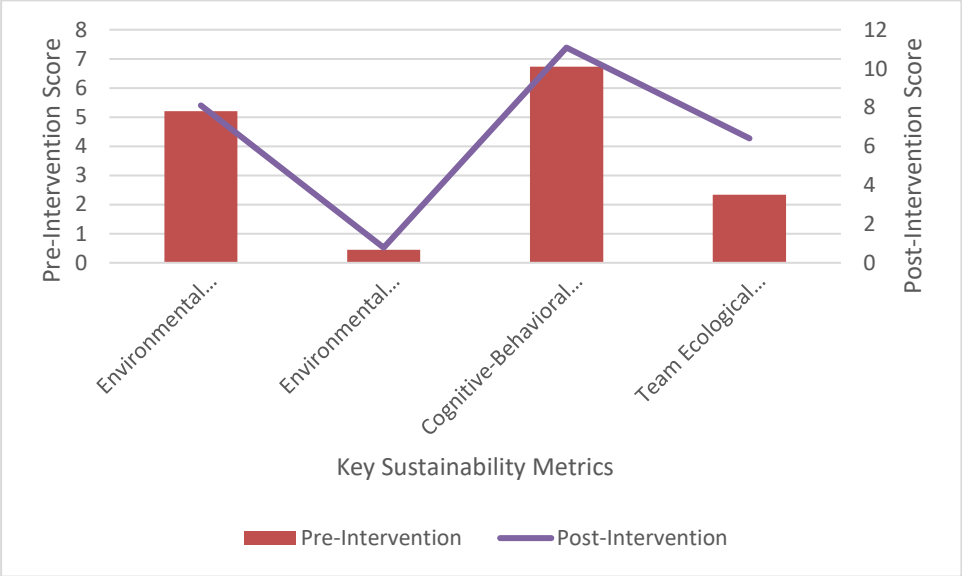

Figure 1. Comparison of Pre- and Post-Intervention Scores Across Key Ecopsychology-Informed Sustainability Metrics

These findings show that incorporating ecopsychology-informed HR tools enhances personal reflection and simultaneously fosters a cohesive action-oriented culture of sustainability within engineering teams.

CONCLUSION AND FUTURE WORK

The effectiveness of ecopsychology-based human resource tools on fostering environmental awareness and engagement among engineering teams have been elaborated here. The increase in the value of metrics such as the Environmental Awareness Index (EAI), Environmental Engagement Ratio (EER), Cognitive-Behavioral Sustainability Index (CBSI), and Team Ecological Cohesion Score (TECS) demonstrates the positive outcomes of applying ecopsychology in an organizational setting. These tools fostered personal environmental responsibility while promoting team sustainability cohesion. Nature-focused interventions emotionally and cognitively engage people and help drive internal cultural transformations that integrate diverse technical skills with sustainability. This illustrates the need to integrate the psychological factors into the environmental sustainability design.

Constructing HR strategies based on ecopsychology for use in the engineering profession and within larger organizational frameworks would provide valuable insights regarding flexibility and scalability. More research

into the engagement metrics that sustain participation in behaviorally and culturally focused frameworks after the formalized intervention has ceased would be useful. Incorporating digital elements, such as nature VRs and ecological AI feedback systems, could increase emotional investment in disassociated or highly technical workplaces. Relationship and engagement metrics and the underlying HR frameworks that provide structure and context would benefit from studying the organizational design and employee demographics. Input from environmental psychologists, organizational behavior specialists, and sustainability advisors would advance the development of these frameworks for use in the industry, thereby enabling responsive green HR and corporate policies.

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