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Employee Creativity in Digital Transformation: Insights from Applied Action Design Research

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Abstract

Employee creativity is mainly influenced by personal and contextual factors. However, in digital transformation, many mindsets as a new kind of factors differing from traditional factors are proven to have an impact on the usefulness of employee creativity. Given the diversity of mindsets shift, researches lack consideration of the ensemble of digital and organizational contexts in actual business. Therefore, this paper adopts Action Design Research (ADR) approach, take employee creativity as an artifact, through Building, Intervention and Evaluation (BIE) to explore the changing requirements of employee creativity in digital transformation and their processing methods, and then improve and summarize them through reflection. Although collaborative, situational and digital intelligence mindsets shift as well as their corresponding solutions are currently identified, our expected contribution is to build a design theory that supports employee design creativity, in particular the form and function principles of the conceptual model of mindsets shift.

Keywords: Employee creativity, Digital transformation, Mindsets shift, ADR method

Introduction

Creativity refers to novel and potentially useful ideas concerning products or procedures (Oldham & Cummings, 1996). When employees exhibit creativity at work, they generate original ideas which are useful for the organization to support creative solutions to business problems (Shalley & Gilson, 2004). Numerous studies have shown that employee creativity can greatly contribute to organizational innovation, effectiveness, and survival (Oldham & Cummings, 1996; Shalley et al., 2004). It is development of employee creativity that enables organizations to improve their ability to respond to risks and opportunities so they can adapt, grow and compete (Shalley et al., 2004). Given the significance of employee creativity, organizational managers and researchers have examined the personal (Zhang et al., 2021; Kang et al., 2021) and contextual factors (Malik et al., 2019; Yang et al., 2021) that shape the employee creativity.

Unfortunately, there is an increasing digital technology that reshapes traditional assumptions about employee creativity (Cai et al., 2020). Organization worries about the useful characteristic of employee creativity when employee shapes creativity in digital transformation. Although scholars raise many questions with regards to how personal and contextual factors of employee creativity change in digital work (Ogbeibu et al., 2021; Solberg et al., 2020). Cai et al. (2020) and even discusses the dynamic interaction of personal and contextual factors of employee creativity in digital transformation (Cai et al., 2020), many mindsets that are different from personal and contextual factors are necessary for subsequent digital
transformation. Thus they are required by employee creativity as a safeguard for usefulness characteristics (Trenerry et al., 2021), such as collaborative mindset which supports the moderating effect of knowledge sharing on employee creativity or event-oriented mindset that uses novelty and critical interaction to fuel employee creativity (Y. Chen et al., 2021; Ma et al., 2021).

Given the diversity of mindsets that may affect employee creativity in digital transformation, it is unclear about the changing requirements of employee creativity mindsets in digital transformation and how to respond to these requirements. One reason is that it lacks consideration of the digital and organizational context in the practical business so employee creativity fails to seek utility in the ensemble they represent. Therefore, we work with a Chinese assembly manufacturing enterprise to explore their employee creativity for ensembles shaped by digital and organizational contexts during the design process. The essay adopts the Action Design Research (ADR) method, take employee creativity as an artifact, through Building, Intervention and Evaluation (BIE) to explore the changing requirements of employee creativity in digital transformation and their processing methods, and then improve and summarize them through reflection.

**ADR Method for Project**

**ADR Method**

ADR is a research method that builds and evaluates ensemble artifacts in an organizational context to generate prescriptive design knowledge (Sein et al., 2011). The two main advantages of the ADR are the integration with practice and ongoing ensemble artifacts shaped by context (Wu et al., 2020), which make the ADR suitable for finding out the changing requirements ensemble of employee creativity in digital and organizational context. According to the ADR literature, ADR method have 4 stages, as shown in Figure 1 (Sein et al., 2011).

The first stage is problem formulation. This stage focuses on practice-inspired that Researchers need to determine the roles and scope of participants with stakeholders, and then formulate the problem in a practice business situation. The problem needs to have theoretical support and universality. The next stage is Building, Intervention and Evaluation (BIE). ADR team build problem-oriented artifact, and the artifact are continually evaluated and intervened. BIE clarifies the locus of innovation. Thereafter, based on the BIE stage, we use Reflection and Learning (RL) to derive artifacts such as principles, models, and methodologies from reflection on the process of building solutions to specific situations. We end the ADR method by summarizing results, formatting learning and applying them universally.

![Figure 1. Four Stages of ADR](image)

Notably, ADR method applications focus on artifacts such as phases, principles, practices, and method models (Gill & Chew, 2019).
**ADR Project Background**

Enterprise A is a large-scale customized equipment manufacturing enterprise. In order to achieve its strategic goal, Enterprise A has formulated a development plan for digital transformation. Therefore, in March 2021, Enterprise A invited our team to participate in the design of employee digital creativity and hoped the result can provide bottom-up support for the digital transformation.

In order to help Enterprises A support employee creativity, we designed an employee creativity competition named "Give me an AI assistant, and I’ll be the master of my work.” based on the multiplicative models in Ability-Motivation-Opportunity (AMO) theory (Cai et al., 2020).

The multiplicative models in AMO show that motivation and opportunity-enhancing variables work together to develop the creative potential of ability-enhancing variables to achieve the highest levels of creativity (Cai et al., 2020). Therefore, through the form of the competition, it not only provides motivation-enhancing variables such as leadership encouragement, prize-money and promotion opportunities, but also offers commitments such as addressing business problems and achieving some employee digital creativity as opportunity-enhancing variables to further boost their creative endeavor.

Additionally, in order to determine the boundaries of the competition, Enterprise A makes three requirements for the designed employee digital creativity, including considering the novelty in digital context, ensuring the usefulness of the digital ideas, and matching the business problems.

The whole ADR project lasted 7 months, as is shown in the Table 1. It is worth mentioning that we hope to eventually build a model that supports the design process of employee digital creativity, but the Formalization of learning stage has not yet been completed, so we still research in process.

<table>
<thead>
<tr>
<th>Stages</th>
<th>Dates</th>
<th>Activities</th>
<th>Artifacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1: Problem Formulation</td>
<td>2021.05.01 - 2021.06.21</td>
<td>● Project initiated by the Enterprise A (practice driven)</td>
<td>● Problem of the employee creativity recognized as lacking the mindset shift in digital transformation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Ideation through initial engagement and investigation</td>
<td>● Updated Collaborative and Situation mindsets</td>
</tr>
<tr>
<td>Stage 2: BIE-Alpha version</td>
<td>2021.06.22 - 2021.08.20</td>
<td>● Design Collaborative-Situation Model to assist employees in analyzing business</td>
<td>● Collaborative-Situation Model</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage 2: BIE-Beta version</td>
<td>2021.09.10 - 2021.12.03</td>
<td>● Communicate, adjust and supplement through feedback presentations</td>
<td>● Updated digital intelligence mindsets</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Design Human-AI Hybrid Work model to assist employees in design ideas</td>
<td>● Human-AI Hybrid Work model</td>
</tr>
<tr>
<td>Stage 3: RL</td>
<td>-</td>
<td>● Communication, adjustment and redesign</td>
<td>● New emerged mindsets and solution method</td>
</tr>
<tr>
<td>Stage 4: Formalization of Learning</td>
<td>-</td>
<td>Still research in process</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Application of ADR in Practice

Stage 1: Problem Formulation

In the problem formulation stage, we diagnosed that lack of an employee’s mindset shift in digital transformation is a problem for employee digital creativity. We identified three stakeholders to form the ADR team with researchers, including business employees, technical departments, and senior management. And existing problems of employee creativity were examined based on focus group discussions, workshop sessions, semi-structured interviews, and questionnaires. Specifically, on the one hand, we conducted research on products derived from employee creativity and explored the business difficulties caused by existing products; on the other hand, the preliminary design of employee creativity was evaluated to analyze the content that may affect the usefulness of employee creativity from an organizational and digital perspective.

Through practice-driven discovery, traditional mindsets affect the usefulness of employee creativity in digital transformation, including traditional organizational mindset and traditional process mindset, details are shown in Table 2.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Description</th>
<th>Source</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional organizational mindset in digital transformation</td>
<td>Employee creativity being bound by traditional organizational: Employees build ideas with a focus on the benefits of the individual or department, while ignoring the impact of the idea on other individuals or departments involved</td>
<td>Employee Creativity preliminary design</td>
<td>Quality employees had many input requirements involving production employees in the design, which made support activities increase the burden on primary activities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Employee Creativity derived products</td>
<td>Many departments complained that they had to operate too many systems, even faced with the same content</td>
</tr>
<tr>
<td>Traditional process mindset in digital transformation</td>
<td>Employee creativity is affected by traditional process: employees like to standardize problems and solutions when designing, and then design a process-based system. But this is debatable in the dynamic and uncertain digital transformation</td>
<td>Employee Creativity derived products</td>
<td>There were many offline behaviors of employees that were out of the system, and many employees even got more work in order to promote the system process</td>
</tr>
</tbody>
</table>

Table 2. Problem of Employee Creativity in Initial Stage

In addition, we also obtained theoretical support for the problems from the literature. Traditional organizational mindset: ‘Guanxi’ culture in many Chinese enterprise (A binary relationship of mutual
obligations between partners) made employees reluctant to break through the organizational boundaries (Davison et al., 2012), and it was difficult for employee creativity driven by their own or team interests to have a positive impact on the enterprise. However, in digital transformation, the organizational paradigm of enterprises was no longer an organization with clear boundaries based on the linear functional system, but showed the characteristics of new paradigms such as platformization, ecologization, modularization, and virtualization (Chen et al., 2019; Vial, 2019). In order to gain a competitive advantage, enterprises were rapidly turning to the shaping of ecosystems based on platform collaboration, which also enabled enterprise innovation to quickly enter a new era of collaborative innovation of co-creation, sharing and win-win (Huang et al., 2021).

Traditional process mindset: employees liked to standardize problems and solutions when designing, and then design a process-based system. However, in digital transformation, volatility and uncertainty conflicted with process-based systems, resulting in offline behaviors that were disconnected from the system. This situation formed a new field of research called shadow IT systems (Rentrop & Zimmermann, 2012). In order to achieve a good digital transformation, enterprises needed a professional risk warning mechanism to support the agility of internal and external environmental challenges (G. Q. Chen et al., 2018; Hanelt et al., 2021). For this reason, scenario-based requirements modeling methods and theories had been mentioned more in digital Era (Wiecher et al., 2021). To sum up, a lot of traditional mindsets put a burden on digital transformation, making employee creativity less useful.

**Stage 2: BIE**

Based on the results of the problem formulation stage, the BIE stage explored the transformation of traditional mindsets. We obtained the knowledge (mindsets shift and its coping methods) generated in the process of employee creative design through organizational intervention, so this essay followed the organization-dominant BIE in ADR method. ADR team planned business employees as designers, technicians and senior management as users.

The whole BIE consisted of two consecutive cycles, Alpha version and Beta version.

In all versions, the BIE provided modeling methods to design employee creativity, which assisted employees to analyze their demands and design employee creativity. The concrete content was described separately in the Alpha version and the Beta version.

**Alpha version**

Facing the problems of traditional organizational mindset and process mindset, we built a model to support employees in designing employee creativity based on collaboration and situation mindsets, as was shown in Figure 2.

The model design was based on Collaborative Networked Organization (CNO) and Collaborative Situation Meta-Model.

CNO is an organization that maintains networked collaboration between heterogeneous entities (Camarinha-Matos et al., 2009). Virtual Organization (VO) and VO Breeding Environment (VBE) are important organizational forms and management models in CNO. Compared with the definition of VO in organizational management, the CNO theory emphasizes more on the dynamic operation of VO, that is, the process of agilely building a goal-oriented VO when organization is facing opportunities (Camarinha-Matos et al., 2009). VBE supports VO dynamics as a collaborative environment that provides common management principles and infrastructure (Afsarmanesh & Camarinha-Matos, 2005).

Therefore, using CNO to support model design can help employees to analyze and reconstruct business problems with collaborative mindset. And more importantly, the CNO can clearly show the collaborative operation process, so that employee creativity can better meet the requirements of agile collaboration capabilities in digital transformation.

Situation-based modeling methods are usually supported by meta-models. Common situation meta-models include user-centered, business-centered and object-oriented situation meta-models. Employee creativity is a multi-mindset integration artificial product of collaboration and situation mindsets, and the business
situations of practical enterprises include complex entities collaboration. Hence the Collaborative Situation Meta-model that integrates collaboration is applied to our model design.

Collaborative Situation Meta-model is a meta-model that supports employees to model and analyze collaborative situations (Benaben et al., 2019). Context, Objectives, Partners and Behavior are the core concepts of Collaborative Situation Meta-model. Context refers to the environment of a system situation, including its related components and characteristics. Objectives includes not only the common goal of the collaboration, but also the current status of the collaborative activity. Partners refer to entities and their resources that participate in collaborative situations. Behaviors refer to various operations initiated by collaborators in collaborative scenarios, including collaborative processes or activities.

**Figure 2. A Process Model of Collaborative Situation Analytics**

**Beta version**

After Alpha version intervention, we assessed employee digital creativity through debriefing. A new problem then emerged: many employees could clearly show the collaborative situations of the business in the design of employee creativity, but the final artifact was still limited to the design of mechanical information systems that could not adapt to volatility and uncertainty. Furthermore, the traditional business data-based mindset in practical enterprises made it impossible for employees to imagine the work mode that was separated from the information system. This brought ambiguity to the goals of employee creativity in digital transformation.

With the purpose of supporting employees to form digital intelligent mindset, this paper selects Human-AI Hybrids as the focus theory. Rai et al. (2019) showed that Human-AI Hybrids underpin the next-generation digital platform, which is a description of the future working model. Human-AI Hybrids theory proposes three modes of human-AI collaboration: substitution, augmentation and assemblage (Rai et al., 2019). But Human–AI Hybrids lacks the ability to integrate with other mindset shifts and actionable operational logic. For this reason, we introduce the Decision Model and Notation (DMN) model to link the employee digital creativity design process from analyzing business problem to designing AI to work with employees (Biard et al., 2015). Details are shown in Figure 3.
Next Step and Expected Contributions

After the intervention in Alpha version, we found that there were still traditional mindsets that needed to be transformed through focus group discussions, workshop sessions, semi-structured interviews, and questionnaires, and thus carried out Beta version. We supplemented the model with the addition of a process model for designing the working mode of Human-AI Hybrid, and it was used when employees designed creativity. The end of the BIE was because in the final evaluation, senior management recognized the artifacts designed by employees and promised to support to realize some employee creativity.

However, stage 3 and 4 of our research is still in the research process. We aim for a design theory that underpins employee design creativity. Based on Avdiji et al. (2020) Framework, we will generate form and function principles for conceptual model (Avdiji et al., 2020). Especially, in order to structure the organizational problem of employee creativity in digital transformation, frame it with a conceptual model that describes the mindsets shift and its coping methods. In addition to the exploration of design principles, the universality of design theory also needs to be further explored.

References


