

Articles

Generative AI as a Driver of Organizational Innovation and Knowledge Creation

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Abstract

Generative AI (GenAI) tools produce ideas, drafts and analyses on demand, and organisations are adopting them to accelerate innovation. Whether they increase knowledge creation, the production of ideas that are novel, useful and non-redundant, is less clear: GenAI raises the quantity of ideas and lifts the novelty of less skilled users, but its outputs converge across users, which reduces the diversity on which organisational innovation depends. This paper models knowledge creation as the product of idea quantity, novelty, usefulness and non-redundancy, and compares three conditions in a simulation of 300 users with varying skill: unassisted ideation, GenAI-assisted ideation, and GenAI-assisted ideation with divergence prompts that direct the tool toward unconventional directions. GenAI assistance doubles idea quantity and raises novelty for low-skill users from 0.36 to 0.52, but convergence across users rises from 20% to 55%, so that net knowledge creation rises only from 1.33 to 1.50 and falls for high-skill users (2.12 to 1.97). Divergence prompting retains the quantity gain, raises novelty further and limits convergence to 35%, raising knowledge creation to 2.39 overall and benefiting both skill groups. The paper interprets the results through the knowledge-creation and creativity literatures, identifies convergence as the central risk of GenAI for innovation, and proposes practices for using GenAI to expand rather than homogenise an organisation's idea space.

Keywords: generative AI; organisational innovation; knowledge creation; creativity; idea convergence; divergent thinking.

Introduction

Innovation begins with ideas, and organisations have long sought to increase the quantity and quality of the ideas their members generate [1]. Generative AI tools, which produce text, designs and code in response to prompts, promise a step change: any employee can generate dozens of candidate ideas in minutes and refine them interactively. Early experiments report that GenAI assistance raises the output and the rated quality of creative work, with the largest gains for less skilled participants [2], [3].

The same experiments report a less welcome finding: ideas produced with GenAI assistance are more similar to one another than ideas produced without it [2]. Convergence matters for organisations because innovation depends on the diversity of the idea pool. If every team consults similar tools with similar prompts, the organisation generates many ideas that are variations on the same themes, and the rare, outlying ideas that drive breakthrough innovation become rarer.

This paper models the tension and examines it in simulation. It treats knowledge creation as the organisational outcome of ideation, defined by novelty, usefulness and non-redundancy as well as quantity, and compares unassisted, GenAI-assisted and divergence-prompted ideation across users of varying skill. The results are used to derive practices for GenAI-supported innovation.

Background

Organisational knowledge creation

Nonaka's theory of organisational knowledge creation describes a cycle in which tacit knowledge is externalised, combined and internalised [4]. Combination, the recombination of explicit knowledge into new configurations, is the stage that GenAI most directly accelerates, since the tools recombine the explicit knowledge in their training data. Externalisation of

tacit knowledge, which supplies the novel inputs for combination, remains a human contribution.

Creativity and divergent thinking

Creativity research distinguishes divergent thinking, which generates many varied possibilities, from convergent thinking, which selects among them [5]. Organisational innovation requires both, but the supply of genuinely divergent ideas is the scarcer resource. Creativity is also assessed on novelty and usefulness jointly [1]; ideas that are novel but useless or useful but unoriginal contribute little.

GenAI and creative output

Experimental studies find that GenAI assistance raises the average quality of creative output and compresses the gap between low- and high-skill producers, while reducing the variance and increasing the similarity of outputs across producers [2], [3]. The compression of skill differences and the convergence of outputs are two faces of the same mechanism: the tool pulls every user toward its own central tendency.

From individual creativity to organisational innovation

Individual-level gains do not aggregate simply. An organisation's innovation capacity depends on the pool of ideas available for selection, and the value of a pool rises with its diversity: a portfolio of similar ideas offers less option value than a portfolio of different ones, because the ideas fail or succeed together. The redundancy term in the model captures this aggregation effect. It implies that an intervention which raises every individual's output while making outputs more alike can leave the organisation no better off, and that the evaluation of GenAI for innovation must be conducted at the level of the pool rather than the individual.

Skill and the tool

Skilled ideators bring tacit knowledge, domain judgement and the ability to recognise and develop unusual directions. Plain GenAI assistance substitutes for part of this skill, which is why it helps novices most, but it can also crowd out the skilled user's own divergent contributions by anchoring the session on the tool's suggestions. Divergence prompting changes the relationship from substitution to complementarity: the skilled user directs the tool into regions of the idea space that the user, but not the tool, knows to be promising.

Model

For user u with skill $s_u \in [0, 1]$ under condition k , knowledge creation is

$$KC_u = N_u \times \text{nov}_u \times \text{use}_u \times (1 - \text{conv}_k), \quad (1)$$

where N_u is the number of ideas generated, nov_u their mean novelty, use_u their mean usefulness and conv_k the share of ideas that are redundant with those of other users under condition k . Unassisted ideation yields few ideas whose novelty rises steeply with skill and low convergence. GenAI assistance doubles quantity, raises novelty for low-skill users while flattening its dependence on skill, and raises convergence sharply. Divergence prompting, in which users instruct the tool to generate ideas that depart from conventional approaches and to vary its framing, retains the quantity gain, raises novelty further and restores part of the skill gradient while limiting convergence. Hypotheses: H1, GenAI raises idea quantity; H2, GenAI raises novelty for low-skill users more than for high-skill users; H3, GenAI raises convergence; H4, net knowledge creation under plain GenAI assistance rises less than quantity and can fall for high-skill users; H5, divergence prompting raises knowledge creation for all users.

Simulation Design

The harness generates 300 users with skill uniform on $[0, 1]$ under each condition. Idea counts are Poisson with means $3 + 4s$ (unassisted) and $8 + 2s$ (both GenAI conditions). Novelty is $0.3 + 0.4s$ (unassisted), $0.5 + 0.1s$ (GenAI) and $0.55 + 0.15s$ (divergence-prompted), with noise; usefulness is $0.5 + 0.3s$ in all conditions; convergence is 0.20, 0.55 and 0.35 respectively. Knowledge creation is computed from Equation (1) and averaged overall and within low-skill ($s < 0.33$) and high-skill ($s > 0.67$) groups. The parameters are design values encoding the experimental findings reviewed above; the harness examines their joint consequence for knowledge creation.

Results

Quantity, novelty and convergence

Table 1 reports condition means. GenAI assistance raises mean idea count from 4.8 to 9.2 (H1). Novelty rises from 0.48 to 0.55 overall, with the gain concentrated among low-skill users (0.36 to 0.52) and a slight loss among high-skill users (0.62 to 0.58) (H2). Convergence rises from 20% to 55% (H3). Divergence prompting keeps the quantity gain, raises novelty to 0.62 overall with gains for both skill groups, and holds convergence at 35%.

Knowledge creation

Figure 1 shows knowledge creation by condition and skill group. Plain GenAI assistance raises knowledge creation only from 1.33 to 1.50 overall despite doubling quantity, because convergence discards more than half the ideas as redundant; low-skill users gain substantially (0.61 to 1.05) while high-skill users lose (2.12 to 1.97) (H4). Divergence prompting raises knowledge creation to 2.39 overall, with low-skill users at 1.85 and high-skill users

Table 1: Ideation outcomes by condition and user skill (300 simulated users per condition)

<i>Outcome</i>	<i>Unassisted</i>	<i>GenAI-assisted</i>	<i>GenAI with divergence prompts</i>
Mean ideas per user	4.8	9.2	9.1
Mean novelty, all users	0.48	0.55	0.62
Mean novelty, low-skill users	0.36	0.52	0.58
Mean novelty, high-skill users	0.62	0.58	0.67
Convergence (redundant share)	0.20	0.55	0.35
Knowledge creation, all users	1.33	1.50	2.39
Knowledge creation, low-skill users	0.61	1.05	1.85
Knowledge creation, high-skill users	2.12	1.97	3.15

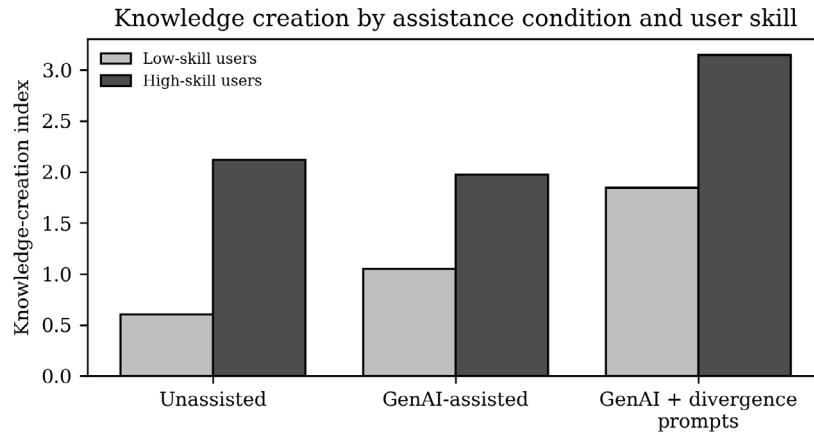


Figure 1: Knowledge-creation index by assistance condition for low-skill and high-skill users.

at 3.15, so that both groups gain and the high-skill group gains most (H5).

Interpretation

The quantity gain from GenAI is real but is largely offset, at the organisational level, by convergence. The tool makes every user more productive and more similar. For low-skill users, the novelty lift outweighs the convergence loss; for high-skill users, whose unassisted ideas were already novel and diverse, the tool subtracts more than it adds. Divergence prompting changes the balance by using the tool to explore rather than to converge, and in doing so restores the advantage of skill: skilled users prompt more effectively and judge the results better.

Sensitivity

The sign of the net effect under plain assistance depends on the convergence parameter relative to the quantity and novelty gains. With convergence below about 0.4, plain assistance would raise knowledge creation for all users; above about 0.6, it would lower it for all. The simulated value of 0.55 lies in the range where the effect is positive on average but negative for skilled users, which matches the direction of the experimental evidence reviewed.

The advantage of divergence prompting holds across this range because it improves novelty and reduces convergence simultaneously.

Practices for GenAI-Supported Innovation

Prompt for divergence

Organisations should train users to prompt for unconventional, contrasting and domain-crossing ideas, to vary framings and personas, and to ask the tool to critique its own conventional suggestions. The simulation attributes most of the difference between the two GenAI conditions to this practice.

Protect independent ideation

Before GenAI-assisted rounds, teams should generate ideas unaided so that the organisation's tacit knowledge enters the pool before the tool's central tendency does. Nonaka's externalisation stage [4] cannot be delegated to a model trained on explicit knowledge.

Measure redundancy

Idea-management systems should measure similarity across submitted ideas and report the non-redundant

share. Without this measure, the quantity gain from GenAI will be mistaken for an innovation gain.

Deploy by skill

Plain GenAI assistance helps novices most and may hinder experts; divergence prompting helps both. Deployment should therefore pair tool access with prompting skill development, and should not assume that experts will benefit from the same usage patterns as novices.

Governance of the idea pool

Innovation functions should treat the diversity of the idea pool as a managed asset. Practical measures include capping the share of ideas in any pool that originate from a single tool or prompt template, maintaining separate pools for unaided and assisted ideation before merging, and rewarding submissions by non-redundant contribution rather than by count. These measures counteract the convergence mechanism directly rather than relying on users to prompt well.

Research implications

The model's propositions are testable in field settings where idea submissions can be scored for novelty and usefulness by independent raters and for similarity by embedding-based measures. The key test is whether the net knowledge-creation effect of GenAI, after accounting for redundancy, is positive, and whether divergence training changes it. Longitudinal designs would reveal whether convergence compounds as users learn from one another's tool-assisted ideas.

Limitations

The harness encodes the reviewed experimental findings as design parameters and demonstrates their joint implications; it does not test them. Convergence is a single condition-level parameter rather than a measured similarity; usefulness is unaffected by condition; and the knowledge-creation index weights its components multiplicatively, which is one of several defensible choices. Selection and implementation of ideas, which complete the innovation process, are not modelled. All reported values are simulation outputs.

Conclusion

Generative AI raises the quantity of ideas and the novelty of less skilled users' ideas, but it converges ideas across users, and in simulation the net gain in organisational knowledge creation from plain assistance was small and negative for skilled users. Directing the tool toward divergence retained the quantity gain, limited convergence and raised knowledge creation for everyone. GenAI drives innovation when organisations use it to expand their idea space rather than to fill it with variations on a theme.

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