



Exploring the Productivity Impacts of Generative AI in Organizations

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Abstract. This research paper explores the impact of Generative AI (GenAI) on human productivity within organizations, focusing on the perspective of employees. Using an exploratory case-study method, we conducted semi-structured interviews with 17 participants from various roles to understand how GenAI impacts work process and productivity. Our findings suggest that these tools can automate routine tasks and enable new workers to acquire skills rapidly, but that GenAI adoption may also entail time-consuming upskilling for individuals and undermined team workflow. Furthermore, by employing a Human Resources Management (HRM) perspective, this paper contributes to the Information Systems (IS) literature by offering a nuanced understanding of the organizational impacts of GenAI, suggesting that a balanced approach seems essential to maximize the potential benefits while limiting the drawbacks of these new tools.

Keywords: Generative AI · Organizations · Productivity

1 Introduction

The rapid introduction of Generative AI (GenAI) tools in numerous organizations has galvanized the interest of Information Systems (IS) researchers in the last few years. The foremost example of this phenomena is illustrated by the rapid rise of OpenAI's ChatGPT since November 2022, a conversational agent that delivers human-like answers for a broad number of subjects [1]. According to Lim, et al. [2], GenAI refers to: “a technology that (i) leverages deep learning models to (ii) generate human-like content (e.g., images, words) in response to (iii) complex and varied prompts (e.g., languages, instructions, questions).”

The adoption of this technology by firms raises several issues surrounding the organizational and socio-technical impacts of GenAI. Its introduction can bring substantial change by potentially enhancing efficacy and value through automation, while simultaneously reshaping work processes [3]. For example, GenAI programming assistants are increasingly being used to improve productivity [4]. However, others suggests that these tools can result in productivity loss, raising a practical issue for organizations, which can wonder what are the real strengths of these tools for their workers [5]. Notably, a recent report of the consulting firm BCG details how GenAI can augment the idea generation

process and creativity but hinders in problem solving tasks, compared to consultants without access to ChatGPT-4 [6]. Furthermore, to-date, the body of literature mostly consists of opinion-pieces on the potential benefits or drawbacks of GenAI, with scarce analysis of the processes in which organizations adopt this technology or its link to organizational performance, thus offering minimal assistance to organizations [3]. Indeed, GenAI research in IS is still at an early stage, lacking substantial empirical data to assess its impact in organizations [7]. Consequently, the devil lies in the details, and current research seems to lack a thorough understanding of the practical impacts of GenAI for organizations.

In this context, the goal of this paper will be to gather empirical data on the current uses of GenAI and assess how this technology affects work productivity. Our research focuses on worker perceptions, given the scarce investigations from this viewpoint. Prior research suggests that executives and managers have a greater positive orientation towards GenAI than employees, suggesting a more top-down approach towards this technology, thus more work is needed to understand the different perspectives within firms [8]. To that end, in this paper, we will answer the following research question: “What are the effects of Generative AI on human productivity within organizations?” In order to answer this research question, we conducted interviews with software developers and managers in companies that have implemented GenAI. Our findings contribute to deepen the knowledge in IS by addressing gaps surrounding the organizational uses of GenAI. Further, through a greater understanding of the organizational impacts of GenAI, practitioners could maximize the potential of this technology, by guiding its adoption for better suited tasks and roles, thus reducing the productivity losses and other potential risks for organizations.

The remainder of this paper is organized as follows; the next section details the current literature on the organizational effects of GenAI. Then, the third section outlines our research methodology. The results are presented and discussed in the Sect. 4 and 5. Finally, our last section offers a conclusion.

2 Background

Given the swift adoption of GenAI tools following the introduction of Open AI’s ChatGPT, the literature surrounding its productivity uses is still growing rapidly. Unlike other IS tools, which usually require sizable capital investments and implementation periods, GenAI’s user-friendliness and ease-of-use through natural language prompts seems to warrant specific scholarly examination compared to other productivity tools [9, 10]. Indeed, a recent McKinsey & Company report highlight the great productivity potential for organizations, through increased content synthesis, software development, customer engagement and content generation [11]. On the other hand, others underscore that while individuals see the value of working with GenAI, workers seem to mistrust these tools and the implementation processes which may reduce employment through automation when organizations adopt this technology, raising implications about the ethical dimension of current uses of GenAI [12].

These themes also appear in the emerging academic literature. For example, Brynjolfsson, et al. [13] suggests that access to these tools can increase productivity, especially for

lower-skilled workers. Also, recent evidence indicates that GenAI tools such as GitHub Copilot can act as a pair for programming and increases productivity, although it may negatively impact code quality [14]. Dakhel, et al. [15] expands upon this and proposes that GenAI tools as pair programmers can benefit experienced software developers, as they can more aptly correct the generated output, but that it can undermine productivity for less experienced workers. Furthermore, these authors suggest the natural language processing of GenAI is currently non-optimal and requires a lot of prompt engineering, meaning finding the best way to convey your requests to the GenAI tool [5, 15, 16]. This finding seems to undermine of the key aspects of GenAI productivity. However, Liang, et al. [4] suggest that GitHub Copilot users write close to a third of their code using this tool, usually simple tasks, enabling these software developers to focus on the complex tasks.

These contrasting results illustrate the need to develop a model expressing how Generative AI affects productivity in organizations. Indeed, as stated above, the current literature seems to focus on its positive effects such as productivity and while others on potential hinderances, few scholars seem to analyze them together and examine what these affordances entails for individuals and firms. In fact, Sabherwal and Grover [17] suggests that current research lacks nuance which undermines a thorough investigation. Therefore, to address this gap, developing a model can enable a better understanding of the phenomena as it currently manifests itself [18]. In other words, we will evaluate what are the benefits and challenges of GenAI in relation to productivity in organizations.

3 Case Study and Method

The research strategy chosen for this project is the exploratory case study method. Indeed, our research question aims to explain *how* GenAI affects the productivity of software developers [19]. We used semi-structured interviews to gather these details. Indeed, this allowed interviewees more freedom in their answers and enabled us to answer our research question more exhaustively, as we used an interview outline and went further into details as the participants answered. Furthermore, to increase the internal validity of our research, we conducted a pilot interview to have a greater knowledge of our subject before starting the process and executed more interviews than originally planned to increase the coverage [20]. Interviews were recorded and transcribed using Microsoft Teams software. These 30-min interviews contained questions on GenAI productivity and use and the affordances that these tools entail. We developed 9 open-ended interview questions probing this topic. Some sample questions that were included in this interview guide were: *How would do you currently use GenAI ?* and *Do you think GenAI has affected you work performance?* The data gathered was anonymized and no personal data was collected.

For the analysis, emerging patterns and themes from the interviews were gleaned following an inductive approach to qualitative data analysis [19]. Specifically, we performed a descriptive analysis of our handwritten notes and transcripts, followed by an initial coding phase to assess the potential themes inherent to our data. Subsequently, we revised and delimited these categories and patterns.

This case study explores the GenAI uses of software developers and managers in large companies in Norway. We recruited 4 participants separated from a range of experience

from a convenience sample. We believe having perspective from different firms and level of experience would enable us to gather better insights to answer our research question and offer a greater possibility of generalization. Furthermore, as the interviews progressed, some participants referred us to other individuals interested by this project, giving us a snowballing sample of 17 participants, from a broad range of roles, as shown in Table 1.

Table 1. Participants

ID	Role	Years of experience
P1	AI Researcher	14 years
P2	AI Researcher	8 years
P3	IT consultant	3 years
P4	Data scientist	6 years
P5	AI consultant	10 years
P6	Developer	5 years
P7	Attorney	20 years
P8	Executive director	15 years
P9	IT consultant	9 years
P10	IT consultant	13 years
P11	Chief medical officer	6 years
P12	Data scientist	7 years
P13	Developer	20 years
P14	Data science manager	8 years
P15	Senior data scientist	17 years
P16	Developer	4 years
P17	Data ethics advisor	20 ears

4 Results

The preliminary thematic findings from the participants in Table 1. Are discussed in the following section. The main themes are divided as follows: automation, onboarding, competences and team coordination.

4.1 Automation

The majority of participants interviewed indicated that GenAI increased productivity in their work, through automation of routine tasks. For example, P11 stated: *“I would say that GitHub Copilot is the one that has changed my day the most. It’s just an amazing*

tool to have as a developer that makes you faster and the thing that it makes you faster on is more or less just removing boring tasks so you can focus on the fun part of being a developer.” P5 agreed, with a caveat for quality, saying that “I think for my personal workflow, much of my tasks has been automated. I am also a developer and programmer myself, so I also use the tools for software development. Even though the quality we can have a discussion it still helps from an automation standpoint ... And just in terms of volume and the outreach and capacity that you can have. I think also has been greatly enhanced.”

P9 also concurred stating that: *“Yeah, I’d say it definitely makes you more efficient ... one prompt can replace quit a few Google searches”*. P14 offered a nuanced view distinguishing the productivity impacts between two tools *“I was thinking mostly about Co-pilot when I said “not really” but ChatGPT, I think we’re seeing increasing adoption and increasing change of how people are working.”*

4.2 Onboarding

Another finding was that the increase of productivity seems beneficial in the different ways, based on experience. In fact, a few interviewees argued that the impact was greater for new employees. For example, P3 stated that: *“Yeah, I’d say it definitely makes you more efficient. And the younger ones can focus on the business logic and not the code.”* P5 highlighted the positive effects of generative AI for new employees as well *“We have some use cases where you have reduction of time in 90%, and then you have other tasks, so these are more on the automation side and we talked about kind of the boring, the boring tasks that our new employees had to do.”* These highlight an emerging theme for new employees, as the increase in productivity seems to develop through a streamlined onboarding process.

4.3 Competences

While the previous participants described what new employees were enabled to do through GenAI productivity, some interviewees detailed the difficulty to assess these gains because of the upskilling of competences needed to use GenAI tools. For example, P8 affirmed *“I think it’s still a bit difficult to highlight kind of concrete efficiency gains from it. And I think that we shouldn’t underestimate the competence and the work to really make the sufficiency gains. I have also been a pilot user now for some weeks on Co-pilot. We see a huge potential, but to really change your daily work to make use of it, it will take time and effort and dedication to actually see these benefits, and you shouldn’t underestimate it.”* Furthermore, P4 concurred stating that *“I mean. Like 90% of all AI and machine learning use cases in business fails like 80%-90% and the reason for that is that it’s never the tech. In my opinion, it’s almost always people.”* Also, P7 mentioned, *“We want to develop prompt repositories.”*

Furthermore, several participants stressed the impact of their organizations’ training practices for GenAI. Such as P7 stating: *“We have several sessions, both on prompting exercises and what not so they can use it and learn how to use it.”* P9 expressed a similar experience claiming that: *“Yeah, they uh, when they launched the tool, there were several training sessions... they were scheduled for different time zones so everyone had the*

opportunity and there was also quite a lot of information given out together with the announcement.” Likewise, P8 stressed they faced “Mandatory courses for all employees to learn how to use it.” These findings underscore broad effects that GenAI may have in organizations, which may need to become more technologically ready in order to harness the full potential of these new tools.

4.4 Team Coordination

Another pattern that emerged was the friction at the team level following the introduction of GenAI. Various participants mentioned issues while during the implementation. For example, P6 argued: “Like it is not everyone using it at the same level ... so we still have a way to go in terms of just both changing habits and setting up our workflows.” This highlights the hinderances inherent to successful technology adoption in organisations and a potential drawback to desired productivity gains. Similarly, P14 stated: “If you’re interested you can explore this technology. But to make it work a team should explore it together.” While some participants were eager to adopt GenAI and were confident of its effect on their individual productivity, some stressed that translating these gains at the team level revealed to be more arduous than expected.

To synthesize the results identified in this investigation on the impacts of GenAI on productivity in organizations, we provide a model in Fig. 1. Indeed, we show that GenAI affects organizations in various ways and that can be conceptualized using a Human Resources Management (HRM) lens, in order to assess the changes in work processes. For example, through automation, GenAI seems to have positive effect on the organization aspect by way of a change in work design. Moreover, its streamlined effect on onboarding may positively affect the HR practices of people resourcing as well as learning and development. Nevertheless, the training and other upskilling requirements to develop competences needed when GenAI is introduced may affect this learning and development. Similarly, while GenAI may seem to help engage employees at an individual level, this technology may undermine employee relations by way of team

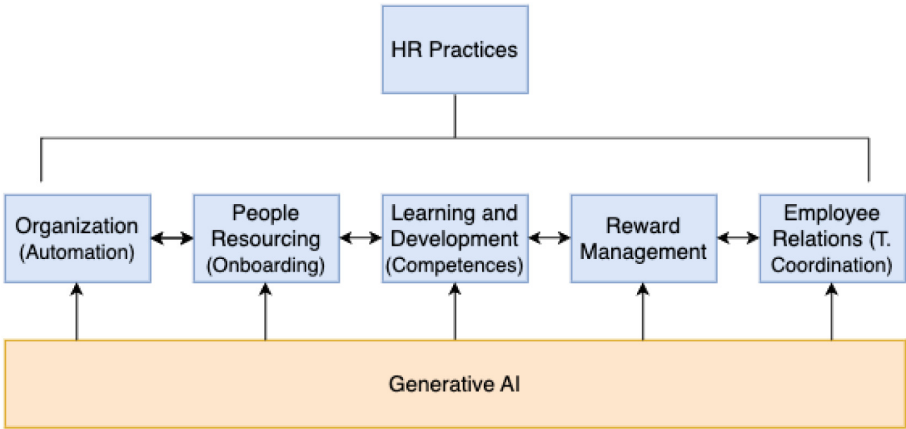


Fig. 1. Effects of Generative AI in the HR system (adapted from [21])

communication issues. These findings outline a mixed picture of the productivity effects of GenAI in organizations.

5 Discussion

As previously mentioned by Liang, et al. [4], our results show that software developers do seem to automate mundane or repetitive tasks through GenAI tools. Undeniably, while imperfect, these tools seem to enable individuals to focus on more complex tasks through automation. The participants also suggested that less experienced employees may reap additional productivity benefits from GenAI tools, as they would focus on other tasks than understanding the code itself. This contrasts with Dakhel, et al. [15], as they suggests more experienced employees would gain more substantial benefits. We posit that this contrasting finding with the literature could be explained by the development of the GenAI tools. Indeed, in the 18 months between these two research projects, the natural language processing performance of the tools has evolved greatly, suggesting its ease-of-use may have increased [22].

Also, numerous participants stressed that while GenAI tools can increase productivity at an individual level, upskilling employees and creating an organizational environment that promotes GenAI adoption and use is a laborious task for firms. Thus, suggesting that a more holistic vision of these tools should be taken into consideration to gage real efficiency. This relates to [5, 15], which stress the potential productivity loss when adopting these tools. Furthermore, it seems that the implementation process to foster team productivity is still seemingly a bit unexplored, as participants underscored their difficulty to coordinate team workflows following the introduction of GenAI.

These results offer an answer to our research question, which examined how does GenAI impact human productivity in organizations. We found that through automation, firms can ameliorate the onboarding process which creates a greater impact for new workers. Moreover, that GenAI training and upskilling was a possible hinderance for productivity and lack of adequate staff coordination undermined the benefits of these tools.

These findings provide a more holistic analysis of GenAI-enabled productivity and contributes to IS literature, particularly scholars' call for a more balanced view of GenAI effects, and our model suggest that employing an HRM perspective may facilitate this process [17].

6 Conclusion

To conclude, this paper provides valuable insights into the way individuals and organizations utilize GenAI tools in an industrial setting. The findings underscore the productivity benefits, challenges and mixed effects of the tools in organizations. The case study showed that GenAI tools seem to increase productivity which enables workers to focus on more strategic tasks, while also finding that firms and individuals have difficulty assessing productivity because of the new competences needed to use GenAI tools and its impact on the workflow of teams. These mixed findings underscore the fact that existing studies do not seem to have exhaustively examined the mechanisms

behind GenAI productivity, highlighting a need to fill this gap and critically examine its organizational uses, which a HRM lens could simplify. Furthermore, these results highlight the necessary balancing act organizations will face while adopting these tools, as socio-technical factors seem fundamental for a successful integration of GenAI tools.

The main limitation of our study stems from our interview process which was at a single point in time. To increase the interval validity our research results, it would have been preferable to interview additional participants over a greater number of instances. Moreover, future studies could focus on the effects of GenAI for specific job roles, instead of a diverse set of participants. Furthermore, the results of our study could offer an interesting research path for future researchers, particularly in the implementation process of GenAI tools. As indicated by certain participants, challenges seem arise in this technological phase.

References

1. Fui-Hoon Nah, F., Zheng, R., Cai, J., Siau, K., Chen, L.: Generative AI and ChatGPT: Applications, challenges, and AI-human collaboration. vol. 25, ed: Taylor & Francis, pp. 277–304. (2023)
2. Lim, W.M., Gunasekara, A., Pallant, J.L., Pallant, J.I., Pechenkina, E.: Generative AI and the future of education: Ragnarök or reformation? A paradoxical perspective from management educators. *Int. J. Manage. Educ.* **21**(2), 100790 (2023)
3. Prasad Agrawal, K.: Towards adoption of Generative AI in organizational settings. *J. Comput. Inf. Syst.* **64**, 1–16 (2023)
4. Liang, J.T., Yang, C., Myers, B.A.: A large-scale survey on the usability of ai programming assistants: Successes and challenges. In: *Proceedings of the 46th IEEE/ACM International Conference on Software Engineering*, pp. 1–13. (2024)
5. Simkute, A., Tankelevitch, L., Kewenig, V., Scott, A.E., Sellen, A., Rintel, S.: Ironies of Generative AI: Understanding and mitigating productivity loss in human-AI interactions. *arXiv preprint arXiv:2402.11364* (2024)
6. Candelon, F., Kraymer, L., Rajendran, S., Martinez, D.Z.: How People Can Create—and Destroy—Value with Generative AI. *BCG Global*, vol. 21, (2023)
7. Dhoni, P.: *Unleashing the Potential: Overcoming Hurdles and Embracing Generative AI in IT Workplaces: Advantages, Guidelines, and Policies*. Authorea Preprints (2023)
8. Cardon, P.W., Getchell, K., Carradini, S., Fleischmann, C., Stapp, J.: *Generative AI in the Workplace: Employee Perspectives of ChatGPT Benefits and Organizational Policies*. (2023)
9. Rane, N.: Role and challenges of ChatGPT, Gemini, and similar generative artificial intelligence in human resource management. *Stud. Econ. Bus. Relat.* **5**(1), 11–23 (2024)
10. Aral, S., Brynjolfsson, E., Wu, D.: Which came first, it or productivity? Virtuous cycle of investment and use in enterprise systems. *Virtuous cycle of investment and use in enterprise systems* (2020)
11. Bruce, D.F., et al.: *Unlocking the potential of generative AI: Three key questions for government agencies*. McKinsey's Public Sector Practice, 2023. [Online]. Available: <https://www.mckinsey.com/industries/public-sector/our-insights/unlocking-the-potential-of-generative-ai-three-key-questions-for-government-agencies>
12. Shook, E.D., Paul.: *Work, Workforce, Workers Age of Generative AI Report*. Accenture (2024)
13. Brynjolfsson, E., Li, D., Raymond, L.R.: *Generative AI at work*. In: *Working Paper Series*, National Bureau of Economic Research, No. 31161, issue Working Paper Series (2023)

14. Imai, S.: Is github copilot a substitute for human pair-programming? an empirical study. In: Proceedings of the ACM/IEEE 44th International Conference on Software Engineering: Companion Proceedings. pp. 319–321. (2022)
15. Dakhel, A.M., Majdinasab, V., Nikanjam, A., Khomh, F., Desmarais, M.C., Jiang, Z.M.J.: Github copilot ai pair programmer: Asset or liability? *J. Syst. Softw.* **203**, 111734 (2023)
16. Ebert, C., Louridas, P.: Generative AI for software practitioners. *IEEE Softw.* **40**(4), 30–38 (2023)
17. Sabherwal, R., Grover, V.: The Societal Impacts of Generative Artificial Intelligence: A Balanced Perspective. *J. Assoc. Inf. Syst.* **25**(1), 13–22 (2024)
18. March, S.T., Smith, G.F.: Design and natural science research on information technology. *Decis. Support Syst.* **15**(4), 251–266 (1995)
19. Oates, B.J., Griffiths, M., McLean, R.: *Researching information systems and computing*. Sage (2022)
20. Diefenbach, T.: Are case studies more than sophisticated storytelling?: Methodological problems of qualitative empirical research mainly based on semi-structured interviews. *Qual. Quant.* **43**, 875–894 (2009)
21. Armstrong, M., Taylor, S.: *Armstrong’s handbook of human resource management practice*. Kogan Page Publishers (2020)
22. Takagi, S., Watari, T., Erabi, A., Sakaguchi, K.: Performance of GPT-3.5 and GPT-4 on the Japanese Medical Licensing Examination: comparison study. *JMIR Med. Educ.* **9**(1), e48002 (2023)