Remote collaboration in knowledge work

STUDY ON TEAM INNOVATION

Although there has been a series of scientific studies of the effects of remote work on the productivity of employees and companies, there has been no comprehensive overview so far. That's because in most cases the assessment is based on readily measurable, standardized activities of individuals (see the StudyNet article "Less productive when working from home?"). Team performance is less easy to assess, so it has not been studied to the same extent. That's also the case for the possible effects of remote work on the innovative power of organizations.

A possible answer to these questions is now being offered in a publication by two researchers from the University of Pittsburgh in the USA and a colleague of theirs from the University of Oxford in the United Kingdom. The team, which was led by Yu-Ru Lin, analysed more than 20 million scientific publications and over four million US patent applications in order to examine the differing dynamics of on-site and remote teams. The study was published in the scientific journal *Nature* in November 2023.

Motivation and experimental setup

It was previously assumed that the technical possibilities for remote teamwork make it easier to share knowledge about scientific and specialized topics and thus boost opportunities to implement real innovations. However, recent research has shown that "ideas are increasingly difficult to find". Yu-Ru Lin and her colleagues therefore suspected that even though the new technical possibilities of remote working increase the opportunities to combine scientific knowledge in innovative ways, this potential is not being used effectively.

To test this hypothesis, they analysed 20,134,803 scientific studies conducted between 1960 and 2020. The results of these studies had been published by 22,566,650 researchers working together either in on-site teams or partially or wholly separated across long distances. A second data set consisted of 4,060,564 US patents granted to 2,732,326 inventors who had applied for the patents

between 1976 and 2020.

For all of these publications, the researchers initially noted the locations of the individual project participants and their resulting distance from the other participants. They also recorded the locations (cities) of the scientists' research institutes. In addition, they noted whether the individual project participants were located in different time zones. In parallel, they assessed the degree of innovation of the respective publications and patents. In the case of scientific publications, later citations by third parties were recorded. If these citations mentioned not only the publication in question but also previous studies, it could be assumed that these studies were further developments within a line of investigation, in the sense of incremental developments. If only the new study was referred to, this indicated a high degree of innovation or disruptive discoveries. Possible additional influencing factors included, for example, the size of the teams and hierarchical structures within the teams. Finally, the researchers used supplementary publications to evaluate additional informational and data material about the tasks of individuals within the research teams. Such publications were available for 57,887 studies.

Special attention was given to the period around 2010, during which several suppliers launched tools for remote work on the market (Trello, Slack, Microsoft 365, Google Drive, Zoom, Teams, etc.).

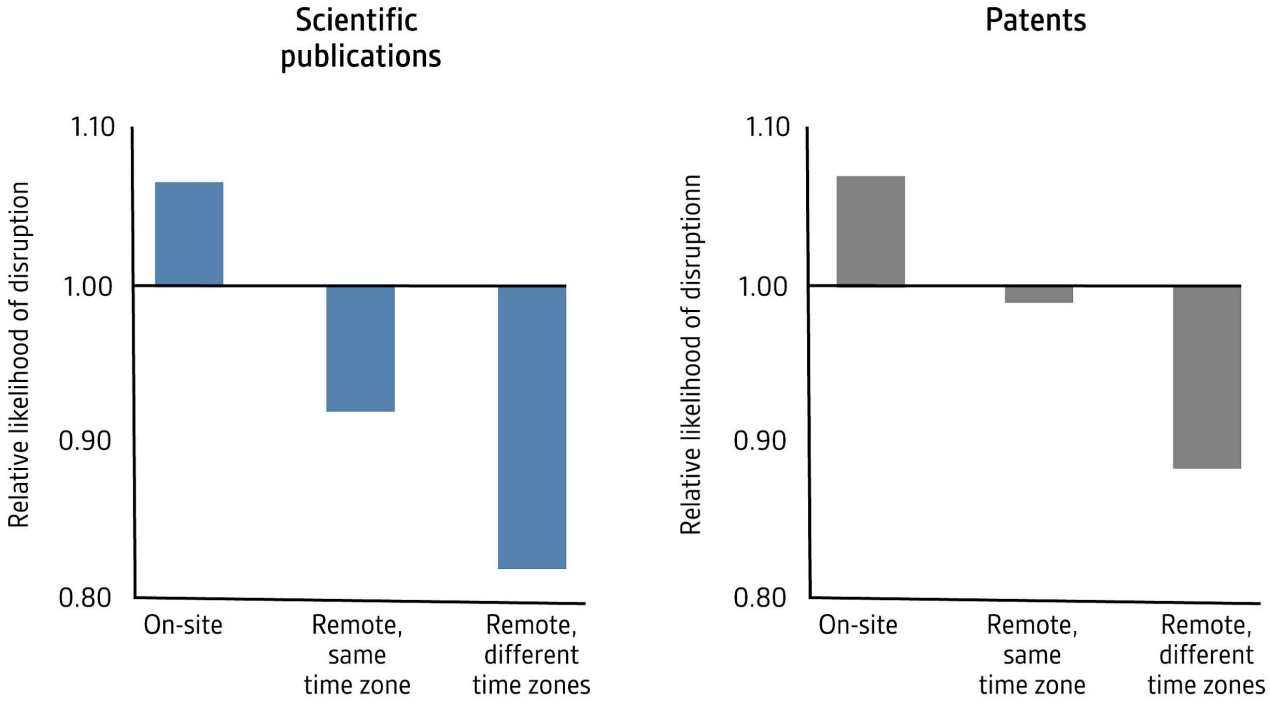
An overview of the findings

REMOTE WORK LEADS TO FEWER GENUINE INNOVATIONS

During the time period under observation, the average distance between the members of a research team increased from 100 km to 800 km. In the field of patents, this effect was somewhat smaller but nonetheless significant. Instead of the initial average distance of 250 km between the participants, the final average distance was 750 km. At the same time, the proportion of scientific studies and patents that could be called disruptive decreased by 20%.

The decrease of high-level innovative studies was especially visible when the team members were distributed across different cities and thus the likelihood of occasional in-person meetings was reduced. By contrast, the size of the teams did not have any effects.

The decrease was greater when teams were distributed across different time zones.



IBA StudyNet: Impact of remote work on innovation

ON-SITE TEAMS CREATE CONCEPTS, REMOTE TEAMS IMPLEMENT THEM

The assignment of roles within teams also seems to be related to the locations of the individual team members. The likelihood of remotely working team members participating in the early phases of a project, when the targets are defined, was 13% lower than for team members working on site. This effect is most visible in the actual concept phase. Here, the likelihood of remotely working team members participating in early project phases was 20% lower, once again independently of the size of the team.

In general, and across all project phases, the team members who were working at a greater distance from the others tended to be carrying out technical tasks such as data collection and data analysis. Project conception and the interpretation of the results obtained are tasks that were often reserved for the team members working on site.

Summary and interpretation

The study shows that there is a close relationship between cooperative development on site and the innovative power of the teams. Highly innovative research or patents are generally worked on by individuals who are a maximum distance of 10 km from their coworkers, while teams that are distributed over a large distance are more likely to work on refinements of existing technologies. The roles of individuals in hybrid teams are distributed correspondingly. An individual who is located

on site or at least is able to regularly participate in in-person meetings determines the direction of the research, and in many cases all the other team members merely do the supporting work. On the basis of this data, Lin and her colleagues conclude that individuals doing remote work can expand the pool of know-how, but often they only contribute parts of their knowledge. The researchers also point out that when team members are present together on site there is a greater chance of happy accidents (serendipity) taking place and a greater likelihood of unusual ideas being taken seriously and followed up.

It's worth noting that the effects described above continued even after 2010. It can therefore be concluded that the use of new communication technologies has made no changes to the established processes.

Significance of the results for remote work in companies

The study confirms a phenomenon that some managers and employees in private companies have also been observing for quite some time: Remote work is helpful if the aim is to design efficient processes; however, genuine innovations are often based on the cooperation of project participants on site. One possible explanation lies in the fact that coincidences, as well as the readiness to pay serious attention even to ideas that initially don't seem to make as much sense, play a crucial role in the development of genuine innovations. Experience has shown that both of these factors occur less often in companies' web conferences, which are often run on a tight schedule.

Yu-Ru Lin and her colleagues also suspect that another reason for the close connection between on-site meetings and genuine innovation is that project members who are working remotely are less involved in the strategically important concept phases. As a result, only a part of their knowledge can be put to use. It remains unclear whether the researchers who are working remotely are consciously not contributing all of their knowledge to the project work or, alternatively, whether they are only being included in the research work to support individual implementation steps such as data-gathering or data analysis from the very start. However, in both cases the effect remains the same: knowledge that could be valuable remains unused. As a result, this research can also be interpreted as a warning for companies and their employees: it is possible to fully realize the project participants' potential only if sufficient periods of in-person cooperation are planned in. The message of the study for employees is that in-person meetings are necessary in order to make their own skills visible.

INFORMATION ON THE STUDY

Lin, Y., Frey, C. B. und Wu, L. (2023), Remote collaboration fuses fewer breakthrough ideas. Nature 623, 987–991. https://doi.org/10.1038/s41586-023-06767-1

Auch verfügbar unter:

https://www.researchgate.net/publication/361135288_Remote_Collaboration_Fuses_Fewer_Breakt

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