SILESIAN UNIVERSITY OF TECHNOLOGY PUBLISHING HOUSE

SCIENTIFIC PAPERS OF SILESIAN UNIVERSITY OF TECHNOLOGY 2026
ORGANISATION AND MANAGEMENT SERIES NO. 249

THE ROLE OF ASYNCHRONOUS AND SYNCHRONOUS COMMUNICATION IN HYBRID IT PROJECT TEAMS

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Purpose: the aim of this article is to present the results of research about determining whether and how synchronous and asynchronous communication affect the effectiveness of cooperation in hybrid project teams in the IT industry.
Design/methodology/approach: a review of the literature on synchronous and asynchronous communication in project teams and an empirical study in the form of a survey conducted among employees of hybrid IT teams. The research method used was quantitative analysis of the survey results.
Findings: it was established that the choice between synchronous and asynchronous communication is strongly dependent on the type and complexity of the tasks performed, and that the predominance of asynchronous communication can negatively affect team cohesion. The study also showed that IT team members recognise the need to maintain a balance between both forms of communication, as their balanced use promotes effective collaboration and quality of project work. Three of the five research hypotheses were confirmed, including the main one concerning the positive impact of the harmonious use of synchronous and asynchronous communication on the effectiveness of hybrid project teams.
Research limitations/implications: the study has several limitations, primarily related to its small and deliberately selected sample, which makes it impossible to treat the results as fully representative of the entire IT industry.
Practical implications: the results of the study indicate that organisations should consciously balance synchronous and asynchronous communication. The appropriate choice of communication mode improves work coordination, team cohesion and overall project effectiveness. Companies can use these findings to create clear communication rules, implement appropriate digital tools, and train teams in communication skills, which can translate into better project goal achievement and more efficient hybrid work management.
Social implications: The study highlights the importance of conscious and balanced communication in a hybrid work environment, which can contribute to improving employee well-being, reducing the stress associated with constant availability, and better work-life balance. The findings may support the development of more socially responsible organisational practices, which in the longer term may have a positive impact on employees' quality of life and social relationships.

Originality/value: a novelty is the detailed analysis of the relationship between communication mode and task complexity, and the identification of the practical consequences of the dominance of asynchronous communication for team cohesion. The research results are a valuable source of knowledge for project managers, HR specialists, team leaders and researchers involved in communication and management of distributed teams.
Keywords: synchronous communication; asynchronous communication; hybrid project teams; IT industry; team collaboration effectiveness.
Category of the paper: research paper.

1. Introduction

Contemporary organisations, especially those operating in the IT industry, increasingly function in a hybrid work environment that combines elements of remote and stationary work. Dynamic technological changes, globalisation of teams and the growing complexity of projects make effective communication one of the key factors determining the success of project undertakings. In such conditions, communication plays not only an informational role, but also a coordinating, organisational and integrating one, directly influencing interpersonal relationships, the effectiveness of cooperation and the team atmosphere (den Otter, Emmitt, 2007; Muszyńska, 2018, 2020; Geyer et al., 2001; Křečková et al., 2022).

One of the most important challenges in hybrid teams is choosing the right forms of communication. The literature emphasises that synchronous communication, taking place in real time, e.g. during meetings or conversations, promotes quick problem solving, enables immediate clarification of ambiguities and strengthens social bonds between team members. Asynchronous communication, on the other hand, including e-mails and text messengers, allows for time flexibility, promotes thoughtful decisions and leaves a permanent record of agreements, which increases the transparency of project processes. Both modes of communication have their advantages and limitations, and choosing the right one is crucial in the context of tasks of varying complexity and interdependence between team members (Spinach AI, 2025; Daniere, 2024; Major, Spałek, 2017).

Previous research indicates that the effectiveness of communication in distributed teams largely depends on the complexity of the tasks and the level of interdependence between their performers. In the case of high complexity or the need for rapid coordination of activities, synchronous interactions are preferred, as they enable the ongoing exchange of knowledge and joint problem solving (e.g. daily stand-up meetings in agile methodologies). On the other hand, tasks requiring accuracy, reflection or documentation can be more effectively supported by asynchronous communication tools (Velentzas, Broni, 2014; Frączek, 2012).

Despite the growing importance of communication in hybrid teams, the literature still points to a significant **research gap** in the area of specific relationships between the form of communication and the effectiveness of project collaboration in the IT industry. Previous

studies have often focused on general communication models, without taking into account the specifics of contemporary, flexible work environments or the challenges arising from the parallel use of multiple communication tools.

A total of 32 scientific articles corresponding to the thematic assumptions of the article were identified in the literature review (a scoping literature review' was used). For the inclusion criteria, the PCC (Population-Concept-Context) framework was applied. Literature was sought concerning population (who are we studying?): project team members, hybrid, remote or dispersed teams; for the concept (what are we studying?): synchronous communication, asynchronous communication, communication management in teams, the impact of communication on: efficiency, collaboration, team cohesion; in the context (where/ under what conditions?): hybrid working environment, distributed teams, IT/ agile/ project management projects. The following exclusion criteria were established: inappropriate population (no link to teams), inappropriate concept (no reference to synchronous/ asynchronous communication or communication within teams), inappropriate context (lack of context: teamwork, projects, organisational environment), and publication types (blogs, opinions, popular science articles, lack of peer review).

After eliminating duplicates, 21 unique publications remained. Based on their content, four main thematic areas were developed, which concern considerations around the most important aspects related to communication in project teams, both in the context of practices, tools, and factors influencing the effectiveness of this communication. The detailed assignment of individual articles to the relevant sections of the analysis is presented in Table 1.

Table 1.
List of publications found in the review, taking into account their use

No.	Publication title (in some cases, the title has been translated into English)	Sections of the analysis	Footnote
1	Communication management practices in international project teams based on the example of projects co-financed by European funds	Communication in project teams; Synchronous and asynchronous communication tools used in the IT industry	(Muszyńska, 2020)
2	Monitoring and measuring communication efficiency in distributed project teams	Communication in project teams	(Muszyńska, 2018)
3	Course Transformation From Synchronous To Asynchronous Using Technology	Synchronous and asynchronous communication tools used in the IT industry	(Ali Mehrabian, 2009)
4	Managing Effectiveness of Asynchronous and Synchronous Design Team Communication	The impact of communication on the effectiveness of project teams	(den Otter, 2009)
5	Task virtuality and its effect on student project team effectiveness	The impact of communication on project team effectiveness	(Pineda, 2015)
6	The role of asynchronous discussions in increasing the effectiveness of remote synchronous requirements negotiations	The impact of communication on the effectiveness of project teams	(Damian et al., 2006)
7	Exploring the effectiveness of team communication: Balancing synchronous and asynchronous communication in design teams	Communication in project teams	(den Otter, Emmitt, 2007)

Cont. table 1.

8	Synchronous Collaboration Technology Use in Teamwork	The impact of communication on the effectiveness of design teams; The impact of task type and project complexity on communication	(Sundaravej et al., 2015)
9	Using collaboration technology to facilitate face-to-face and distributed team interactions	Synchronous and asynchronous communication tools used in the IT industry	(Chen, 2004)
10	Design Team Communication and Design Task Complexity: The Preference for Dialogues	The impact of task type and project complexity on communication	(den Otter, Emmitt, 2008)
11	Your teammate just sent you a new message! The effects of using Telegram on individual acquisition of teamwork competence	Synchronous and asynchronous communication tools used in the IT industry	(Conde et al., 2021)
12	Integrating emerging topics through online team design in a hybrid communication networks course: Interaction patterns and impact of prior knowledge	The impact of communication on the effectiveness of project teams	(Reisslein et al., 2005)
13	Project Management Communication Planning: An Improved Optimisation Model With Additional Recipients and Individualised Weights	Communication in project teams	(Křečková et al., 2022)
14	Using Communication to Mitigate the Challenges of Outsourced Projects	The Impact of Communication on the Effectiveness of Project Teams	(Bandezi, 2019)
15	The Effect of Asynchronous Communication on the Relationship Between Intragroup Conflicts and Transition Processes	The impact of communication on the effectiveness of project teams; The impact of task type and project complexity on communication	(Tschas, 2017)
16	Information, Technology and Information Worker Productivity: Task Level Evidence	The impact of task type and project complexity on communication	(Aral et al., 2007)
17	Analysing the social knowledge construction behavioural patterns of an online synchronous collaborative discussion instructional activity using an instant messaging tool: A case study	Synchronous and asynchronous communication tools used in the IT industry	(Huei-Tse Hou, 2011)
18	Communication in Virtual Teams: Ten Years of Experience in Education	Synchronous and asynchronous communication tools used in the IT industry; The impact of communication on the effectiveness of project teams; The impact of task type and project complexity on communication	(Rutkowski et al., 2008)
19	A team collaboration space supporting capture and access of virtual meetings	Communication in project teams	(Geyer et al., 2001)
20	Communication, collaboration, and project management tools for producing and managing group projects at a distance. (Ends and Means)	Synchronous and asynchronous communication tools used in the IT industry	(Milman, 2011/2012)
21	State Treemap: an awareness widget for multi-synchronous groupware	Synchronous and asynchronous communication tools used in the IT industry	(Molli et al., 2001)

This article addresses an identified gap. The **aim of this article** is to present the results of research about determining whether and how synchronous and asynchronous communication affect the effectiveness of cooperation in hybrid project teams in the IT industry. The article is based on a review of the literature and the results of empirical research.

In light of the growing popularity of remote and hybrid work, the results of communication research are becoming particularly relevant for both management practitioners (project managers, HR specialists, team leaders) and researchers involved in the development of modern collaboration models. The article adds value by providing a current analysis of communication practices in the IT industry and indicating directions for further research on improving communication in decentralised project environments.

2. Methods

The methodological approach of this study combines a literature review with an empirical quantitative investigation, allowing for an in-depth exploration of communication practices within hybrid project teams in the IT industry. The research process began with a literature review of academic and industry literature on communication in project teams, with particular emphasis on the distinction between synchronous and asynchronous communication, the impact of communication on project effectiveness, and the role of task complexity in determining communication needs. The literature review followed a structured process involving the identification, selection, and synthesis of sources relevant to communication models, project management methodologies, and hybrid work environments.

Based on literature review, **one main hypothesis and four supporting hypotheses were proposed**. The main hypothesis (also referred to as H5) was *The effectiveness of hybrid project teams in the IT industry is highest when they use synchronous and asynchronous communication to a similar extent*. This assumption is based on an analysis of the literature indicating that the effectiveness of project teams does not depend solely on one dominant form of communication. Teams that are able to flexibly adapt their communication methods to the specifics of a project situation achieve better results than those that consistently limit themselves to one method. Skilful combination of synchronous and asynchronous communication allows for better management of working time, increased responsiveness and higher quality of decisions. The supporting hypotheses were as follows:

H1 - *The complexity of tasks determines the choice of communication mode*. The literature on the subject emphasises that more complex tasks, characterised by greater ambiguity and interdependence, require more frequent and interactive information exchange. In such cases, synchronous forms of communication, which allow for immediate clarification of issues and

joint decision-making, work better. On the other hand, asynchronous messages are sufficient for simple and repetitive tasks, as they help to avoid information overload.

H2 - *There is a relationship between multitasking and preferred form of communication*. The analysis indicates a potential relationship between the number of tasks performed in parallel and the choice of preferred communication method. People who perform multiple tasks simultaneously are more likely to use asynchronous tools, which allow for greater time flexibility and more effective information management. Employees focused on a single activity prefer synchronous communication, which supports the ongoing exchange of information and reduces response times.

H3 - *An excessive reliance on asynchronous communication can weaken team cohesion*. The results of the literature review suggest that the dominance of asynchronous communication can lead to a decline in team integration, increased relational distance, and difficulties in resolving conflicts. The lack of direct interaction weakens engagement, limits the opportunity to strengthen social bonds, and can result in a growing sense of isolation among team members.

H4 - *Too many communication tools reduce the effectiveness of project teams in the IT industry*. The analysed literature indicates that an excess of communication platforms and channels can cause information overload, disintegration of information, and difficulties in managing data flow. Teams using multiple uncoordinated tools encounter problems with communication transparency, leading to errors, delays, and a decline in overall productivity.

The empirical component consisted of a **survey** targeted at individuals working in hybrid project teams in the IT sector. Data collection was conducted through an online questionnaire (with 36 questions, see Appendix 1), enabling respondents to share their perceptions and experiences regarding communication practices, preferred communication modes, and challenges associated with hybrid collaboration. The survey included closed-ended questions designed to measure the relationship between communication practices and team effectiveness, as well as demographic and contextual questions that allowed for segmentation of responses by role, experience level, and work model. This method was particularly suited to the exploratory nature of the study, providing a quantitative basis for analysing patterns and correlations within the target population.

The sample was selected using a purposive, non-random sampling strategy, focusing on IT professionals employed in organisations operating in a hybrid model. A total of 86 people working in the IT industry completed the survey. For further analysis, **50 responses** from respondents declaring a hybrid working mode (combining remote and office work) were included, in accordance with the research project assumptions. The final sample consisted mainly of specialists in the early and mid-stages of their careers, working predominantly in small project teams typical of agile IT environments. This demographic profile provided valuable insights but also introduced limitations regarding representativeness.

Data analysis included **descriptive statistics (mean, standard deviation, variance) and relational analysis (Spearman's rank correlation coefficient, the Kruskal-Wallis test)**, enabling the exploration of dependencies between communication modes, task characteristics, and perceived team effectiveness. Selected calculations are included later in the article. The quantitative findings were then integrated with insights derived from the literature review, supporting a multi-layered interpretation of communication behaviours in hybrid project settings.

3. Results and discussion

The analysis of the survey data revealed several significant patterns regarding communication practices in hybrid IT project teams. Table 2 summarises the list of hypotheses along with the results of their verification in the study.

Table 2.
Summary of hypothesis verification

Hypothesis	Description	Verification
H1 - supporting hypothesis	The complexity of tasks determines the choice of communication mode	accepted
H2 - supporting hypothesis	There is a relationship between multitasking and the preferred form of communication	accepted
H3 - supporting hypothesis	An excessive predominance of asynchronous communication weakens team cohesion	not accepted
H4 - supporting hypothesis	Too many communication tools reduce work efficiency	not accepted
H5 - main hypothesis	Team efficiency is highest when there is a balance between synchronous and asynchronous communication	accepted

Hypotheses H1 and H2 were accepted both in the literature and in the research data. Both theory and practice prove that the choice of communication form should depend on the complexity of the task. Synchronous communication works better for ambiguous tasks or those requiring immediate coordination, while asynchronous communication is more conducive to simple tasks or those requiring concentration. Multitasking also shows a relationship with the choice of communication form, people managing multiple threads are more likely to choose forms that allow them to work at their own pace. On the other hand, hypotheses H3 and H4, although inspired by the literature, were not accepted. Although the literature warns against excessive asynchronous communication as a factor that weakens team integration and morale, the survey respondents did not perceive any clear negative effects of this phenomenon. It is possible that organisations effectively compensate for these shortcomings through other practices (regular synchronous meetings, integration activities, rotational office work). Similarly, the number of tools used was not considered by respondents to be a factor reducing

efficiency, which may indicate adaptation to a multi-platform environment or effective communication management.

To better illustrate why hypotheses H3 and H4 were not accepted, the following part of this chapter presents an analysis of the results for the questions relating to them, along with statistical calculations.

The hypothesis H3 concerned the potential effects of the dominance of asynchronous communication on team cohesion and integration. The literature on the subject has indicated that a lack of face-to-face interaction may lead to reduced engagement, difficulties in building relationships, and a sense of isolation within the team. The study sought to verify the extent to which these concerns are reflected in the opinions and experiences of the respondents. The analysis covered questions regarding perceptions of the frequency of team-building meetings, the perceived atmosphere and unity within teams where written communication predominates, and the team-building practices employed within teams.

The first key question in this context was question (question 26) concerning the lack of online or offline meetings, which leads to a weakening of team cohesion. Most participants recognise the role of synchronous meetings in strengthening team bonds. 68% of respondents agreed that the lack of regular live interactions weakens integration. 16% of respondents disagreed, whilst the remaining 16% chose the neutral option. This result indicates that over two-thirds of employees consider face-to-face meetings, whether online or offline, to be an important factor in team cohesion, and that their absence may lead to a loosening of bonds and a sense of community.

Opinions proved to be somewhat more varied in next question (question 27), which had a slightly opposite tone. 64% of respondents agreed with the statement that a team can remain cohesive and understand each other well, even if asynchronous communication predominates. Of these, 28% selected ‘strongly agree’ and 36% ‘somewhat agree’. At the same time, 14% of respondents expressed the opposite view. There was also a relatively large neutral group, accounting for 22% of responses. These results suggest a certain division of opinion. The majority believe that even with mainly written communication, it is possible to maintain good cooperation and understanding within a team; however, a significant minority have doubts about this or deny such a possibility. It can be assumed that the respondents’ personal experiences influence these assessments - those who have worked in teams that mainly use asynchronous channels but maintain a good atmosphere will be inclined to agree. Others, who have felt the negative effects of a lack of meetings, will more often be among the sceptics.

In question 28, we again see many affirmative responses. 74% of respondents consider regular meetings important for maintaining a sense of belonging (36% strongly agree, 38% somewhat agree). Only 8% dispute this claim (6% ‘somewhat disagree’, 2% ‘strongly disagree’), whilst 18% remain neutral. This result, combined with the outcome of question 26, highlights the key role of meetings, which relates not only to the aspect of integration (social

bonds) but also to the subjective feeling of being part of a team. For many employees, regular real-time contact, even if remote, is an essential element of team building.

When comparing the answers to questions 26-28, a certain apparent inconsistency can be observed, as on the one hand the majority say 'yes, meetings are important and the lack of meetings harms integration', whilst on the other hand the majority state 'despite the predominance of asynchronous communication, the team can still be cohesive'. It seems that respondents recognise a certain balance and boundary conditions here. The most likely interpretation is that occasional or limited meetings are important for team cohesion, but at the same time, the mere predominance of written communication tools does not necessarily preclude team cohesion, provided that other factors such as good relationships, shared values, and occasional team-building activities are in place. In other words, people believe it is possible to maintain a cohesive team even when communication is largely asynchronous, but at the same time they appreciate the role of meetings and team-building activities in fostering team spirit.

TableBłąd! W dokumencie nie ma tekstu o podanym stylu.**3.**
Mean, standard deviation and variance of responses to questions 26-28

Question number	Mean	Standard deviation	Variance
Question 26	3.86	1.18	1.39
Question 27	3.73	1.05	1.09
Question 28	3.98	0.98	0.96
H3	3.86	1.07	1.15

For clarity, Table 3 summarises the mean scores, standard deviations and variances for questions 26-28. These means are, respectively: 3.86 (question 26), 3.73 (question 27) and 3.98 (question 28). We can therefore see that the highest mean is for question 28, which means that respondents were most likely to agree with the general statement regarding the importance of regular meetings. A slightly lower average (though still above the neutral value of 3) for question 27 confirms that opinions were more varied here. The variance of responses to question 27 (1.09) is also higher than for question 28 (0.96), reflecting the divergence of opinion. The overall H3 index, which is the average of these three questions, is 3.86, suggesting moderate support for the hypothesis that team cohesion is at risk when asynchronous communication predominates. Respondents tend to highlight the importance of meetings, but do not rule out the possibility of maintaining integration in remote working conditions.

In question 11, where respondents indicated how often their team organises scheduled meetings (online or offline) attended by many members. 42% of respondents state that their team meets daily for short status updates. A further 28% indicate that meetings take place several times a week (2-4 times). 20% of teams meet once a week. There are few instances of lower frequencies - 6% answered 'once a month', and only 2% (1 team) meet less than once a month. These figures show that most hybrid IT teams practise frequent, regular synchronisation meetings. Combined with the earlier results, it can be concluded that respondents generally work in teams where the lack of face-to-face contact is not total.

This is an important observation, suggesting that despite the dominance of digital tools, the rhythm of team work still includes a significant synchronous component. Hence, perceptions regarding integration (questions 26-28) were formulated through the lens of teams that do, however, hold a certain number of meetings, which may explain why many people believe the team is cohesive even when asynchronous communication predominates (since some meetings do take place, complete isolation is difficult to achieve).

Respondents were then asked how they most frequently communicate with their team members daily (question 12). Respondents could select only one primary channel for daily communication. The data shows a dominant preference for text-based messaging (chats), which was selected by 64% of respondents. Online meetings came second as the main form (14%), and face-to-face conversations came third (12%). Few respondents cited telephone calls or text messages as their main channel (4% each). This suggests that, in the teams surveyed, asynchronous communication theoretically dominates day-to-day work - which is, in fact, typical of dispersed, hybrid environments using tools such as Teams or Slack. It is worth bearing in mind, however, that synchronous communication involves more time per 'use' (a meeting lasts longer than a brief chat conversation), so it cannot be unequivocally stated that asynchronous communication significantly predominates.

In addition to project meetings, respondents were also asked about informal activities. 70% of respondents answered "Yes", which means that some form of additional team building takes place in their teams (whether regular or occasional). 30%, however, indicated a lack of such practices. This split suggests that most teams are aware of the need to build additional social bonds and strive to do so, yet in a significant proportion (one in three teams) they do not go beyond basic professional contacts. Teams without team-building activities may be more vulnerable to a decline in cohesion when working remotely or in a hybrid model, as the lack of informal bonds and opportunities to build trust can exacerbate the isolation inherent in asynchronous communication. Considering this, in teams where 30% of respondents are concerned, the risk of weakened cohesion (highlighted in the hypothesis) could be higher if, in addition, communication is highly asynchronous. Unfortunately, a detailed examination of this aspect clearly exceeds the scope of the data collected, but it is worth noting this relationship as context.

TableBłąd! W dokumencie nie ma tekstu o podanym stylu.**4.**
Spearman's correlation between the frequency of team meetings (question 11) and the perceived role of meetings in team integration (question 26)

Variable A	Variable B	Spearman's correlation (ρ)	p
Question 11	Question 26	0.083	0.566

TableBłąd! W *dokumencie nie ma tekstu o podanym stylu.* shows the Spearman's correlation between the actual frequency of team meetings and the perceived role of meetings in team cohesion. The result obtained, p = 0.566, indicates no correlation. In other words,

respondents from teams that meet very frequently do not differ significantly in their views from those in teams that meet less often. Both groups are capable of both agreeing and disagreeing with the statement that a lack of meetings weakens integration. This is an interesting observation, as one might expect that those who meet infrequently would feel the lack of meetings more keenly and agree more strongly with question 26; however, the results do not support this. Perhaps this stems from the fact that even teams with a low frequency of meetings try to compensate for this with other forms of contact, or from the fact that the frequency of formal meetings does not always translate into a sense of integration.

Table 5.
Kruskal–Wallis test to assess the impact of the form of daily communication (question 12) on perceived team cohesion (question 27)

Variable A	Variable B	Kruskal–Wallis	p
Question 12	Question 27	0.58	0.748

Table 5 presents the Kruskal-Wallis test, which examines whether people who communicate mainly synchronously daily assess the statement regarding team cohesion differently when asynchronous communication predominates, compared to those who mainly use asynchronous channels. The test results did not reveal any significant differences.

To carry out a further analysis examining how respondents' daily communication patterns influence their average level of agreement with the statement regarding the importance of synchronous communication in maintaining a sense of team cohesion, it was necessary to categorise the various forms of communication into synchronous and asynchronous. The responses "Face-to-face conversation", "Online meeting" and "Telephone conversation" were classified as synchronous, whilst "Slack, Discord text chat" and "Text message (SMS)" were classified as asynchronous. This made it possible to conduct a statistical test despite the multi-categorical nature of question 12.

The respondent groups do not differ significantly in their responses to question 27. This means that even those who communicate predominantly asynchronously daily are neither more nor less convinced of the possibility of maintaining team cohesion than those who use synchronous communication more frequently. This result may indicate that the perception of team cohesion is shaped by many factors, and the preference for communication channels alone (which is partly a personal choice and partly a function of the team's specific work) does not determine opinions on integration. People who mainly write daily may perceive both the pros and cons of such a situation, just as those who talk a lot do. There is no simple division here where 'chat advocates downplay the issue of cohesion and 'meeting advocates exaggerate it.

The results of the analysis are inconclusive as to whether the hypothesis should be accepted or rejected. Most respondents agree that the lack of face-to-face meetings has a negative impact on team cohesion and that regular meetings are important for a sense of team spirit. This supports the argument that a complete reliance on asynchronous communication would be

detrimental. At the same time, however, some respondents believe that a team can remain cohesive even with a predominance of written communication, suggesting that asynchronous dominance is not automatically a death knell for cohesion, provided the team finds other ways to maintain bonds. The actual practices of many teams (frequent status meetings, team-building activities in 70% of teams) mean that few experience a complete predominance of asynchronous communication. Hence, Hypothesis 3 can be considered largely accepted in terms of the direction of the effect, but its practical significance appears limited, as few teams allow for such an extreme predominance of asynchronous communication that their cohesion would be seriously compromised. Statistical analyses such as the Kruskal-Wallis test and Spearman's rank correlation did not reveal statistical significance between the variables under study, which weakens the strength of the empirical acceptance of this hypothesis. Consequently, although the direction of the observed relationships is partly consistent with the hypothesis, the lack of statistical significance does not allow for its definitive acceptance. Hypothesis H3 can therefore be considered partially supported at the interpretative level; however, from the point of view of statistical rigour, it must be rejected.

The hypothesis H4 put forward in this article focused on the statement that 'an excessive number of communication tools in use reduces the efficiency of project teams in the IT sector'. An excess of disparate platforms (email, various instant messengers, task management systems with built-in chat) can lead to information chaos, cause problems in finding information and generate additional "communication work", which ultimately results in a decline in team productivity. To test this hypothesis, the survey included questions regarding perceptions of the number of tools within the team, the perceived consequences of using multiple channels, and opinions on the potential unification of communication tools.

Question 29 addressed the issue of the subjective perception of a decline in one's own efficiency when switching between multiple tools. In this case, opinions are divided, although responses indicating a problem still predominate. 56% of respondents admit (including 26% strongly, 30% somewhat) that switching channels and using multiple communication applications has a negative impact on their productivity. 20% disagree with this (14% somewhat disagree, 6% strongly disagree), and 24% have no firm opinion (neutral response). These responses suggest that over half of employees experience some inconvenience associated with using different tools simultaneously; even if they do not consider the number of tools to be 'too high', the very necessity of switching between, for example, email, a messaging app and a task management app can be perceived as a factor slowing down their work. People accept the number of tools as necessary, but at the same time they recognise the downsides of this situation in their day-to-day work.

Question 30 was about the use of too many different applications for communication within the respondents' project teams. The results here are clear-cut, as many as 76% of respondents disagree with the statement that their team uses too many tools (including 50% who strongly disagree and 26% who somewhat disagree). 12% responded neutrally, and only 12% perceive

this as a problem (4% strongly agree and 8% somewhat agree). This means that in the vast majority of the teams surveyed, the number of communication channels used is perceived as reasonable and not excessive.

The survey also covered potential solutions, asking for views on the need to unify tools. 50% of respondents agree that having different tools is justified by the lack of a single universal solution. 28%, on the other hand, disagree, believing that perhaps a single tool might suffice after all. 22% responded neutrally. This distribution indicates a division of opinion, as half of the respondents believe that the status quo (several tools) is necessary and that it makes no sense to hope for a single ideal tool, whilst over a quarter are more critical, likely leaning towards the view that multiple tools are, after all, unnecessary complications.

The next question, number 32, concerned a very specific negative consequence of a potential surplus of tools. 52% of respondents do not frequently have difficulty finding the information they need. 34% tend to disagree, and 18% strongly disagree that they often have such a problem. 20% of respondents are neutral, which can be interpreted as 'sometimes, but not very often' or as having no opinion. In contrast, 28% agree that they often find themselves unable to locate something due to fragmented communication (16% somewhat agree, 12% strongly agree). This indicates that over a quarter of employee's experience information chaos resulting from multiple channels. However, the majority (over half) do not consider this a frequent problem, which may mean that their teams have reasonably well-organised communication practices. Overall, this result is consistent with question 30, because if the majority do not think there are too many tools, then the majority also tend to cope well with finding information.

Question was about readiness to consolidate communication into a single tool. Here again, a diversity of views is evident, with a slight majority in favour. 50% of survey participants agree (18% strongly agree, 32% somewhat agree) with the statement that standardising communication tools would improve their team's work. 20% disagree (14% somewhat disagree, 6% strongly disagree), whilst 30% remain neutral. When combined with the results of question 31, we get an interesting picture, as half of the respondents say "yes, a single tool would improve work", but at the same time half say, "many tools are needed, because one is not enough". This may suggest that these are not the same groups of respondents. Of course, some people may have agreed with both statements at the same time, which may seem contradictory, but is possible if we interpret "no single tool meets all needs" as a description of the current situation, and at the same time "a single tool would streamline work" as an expression of the desire for such a tool to exist. Perhaps some respondents believe: "Yes, we currently have to use many tools because there is no single ideal one (agreeing with question 31), but if such a single, coherent tool existed, it would make our lives easier (agreeing with question 33)". Others may hold the opposite view: "We do not need a single tool (I disagree with question 33), because various specialised tools are better (I agree with question 31)".

To understand this better, the consistency of responses between questions 30 and 33 was examined, which will be discussed in more detail below.

Table 6.
Consistency of responses regarding the perception of an excess of communication tools (question 30) and the need for a single, universal tool (question 33)

	Low agreement with question 33	Moderate agreement with question 33	High agreement with question 33
Low agreement with question 30	8	12	18
Moderate agreement with question 30	0	3	3
Strong agreement with question 30	2	0	4

The table 6 shows the concordance matrix for these two questions. Responses have been grouped into categories of low (1 and 2), medium (3) and high (4 and 5) agreement. Among those who do not see themselves as having an excess of tools at all (low agreement with question 30), as many as 18 strongly agree that a single tool would improve their work (high agreement with question 38). A further 12 in this group hold a neutral view on the matter, whilst only 8 show low agreement with question 33, meaning they do not believe in the effectiveness of a single universal tool. This suggests that even many people who do not perceive the current number of tools as a problem recognise the potential in the idea of unification. Conversely, among those who moderately agree that there are too many tools (moderate agreement with question 30), opinions on unification were divided. A few people are neutral or in favour, a few against (this category is small, so it is difficult to draw conclusions). In contrast, in the group that clearly believes there are too many tools (high agreement with the question, 30), the majority (numbering just 4 people) also strongly support the idea of a single tool, which is logical, as for them integration would be the solution to the perceived problem. Interestingly, there are also two people who, although they believe there are too many tools, do not agree that a single tool would help. Perhaps they are sceptical about the feasibility of such a tool or have had bad experiences with 'all-in-one' solutions. Overall, however, the table shows that the idea of a single tool has considerable support even among those satisfied with the current situation. This can be interpreted as a general desire to simplify the working environment.

Table 7.
Mean, standard deviation and variance of responses to questions 29-33

Question number	Mean	Standard deviation	Variance
Question 29	3.53	1.20	1.39
Question 30	1.94	1.24	1.53
Question 31	3.31	1.22	1.48
Question 32	2.27	1.26	1.58
Question 33	3.43	1.10	1.27
H4	2.90	1.20	1.45

Table 7 summarises the mean responses, standard deviations and variances for questions 29-33. The very low mean for question 30 (1.94) is striking (the lowest of all the questions discussed), which confirms the earlier analysis: the majority of respondents do not believe that there is an excess of communication tools in their teams. The mean for question 32 is also quite low (2.27), indicating that the problem of information fragmentation is more often denied than acknowledged. In contrast, question 29 has an average of 3.53, which indicates moderate agreement with the proposition that efficiency declines when there are many tools - that is, respondents here were more inclined to agree, even though they do not consider the number of tools to be excessive (a possible interpretation is: "we don't have too many tools, but switching between them still tires me out sometimes"). The averages for question 31 (3.31) and question 33 (3.43) confirm that opinions regarding the need for multiple tools versus a single tool are balanced, with a slight indication of a desire for simplification. The standard deviations for these questions (1.27-1.58) are slightly higher than for many previous topics, which indicates considerable diversity of views within the study group - the issue of tools is not clear-cut and elicits differing opinions.

Table 8.
Spearman's correlation between switching between communication tools (question 29) and the assessment of their excess in the team (question 30)

Variable A	Variable B	Spearman's correlation (ρ)	p
Question 29	Question 30	0.332	0.018

An analysis of the correlation between questions 29 and 30 was also carried out to check whether people who feel a decline in efficiency when using many tools also tend to believe that their team has too many of these tools. Table 8 shows the Spearman's correlation coefficient for these two variables. A value of $\rho = 0.332$ was obtained at $p = 0.018$, indicating a significant, moderate positive correlation. As one might expect, respondents who claim that switching between multiple channels reduces their efficiency are also more likely to feel that their team uses too many applications. A negative perception of the number of tools goes hand in hand with the belief that this number is excessive. This is a consistent picture, because if someone considers the number of tools to be reasonable, they are unlikely to feel inefficient because of them, whereas those who feel frustrated by switching between programmes are more likely to say that there are simply too many of them. This correlation provides empirical support for Hypothesis 4 at the individual level, as it shows that for some people, the excess of tools is a real problem which they perceive as a drop in productivity. Nevertheless, it is worth remembering that since many respondents do not perceive this 'excess' in their own case, the problem does not appear to be widespread across the entire sample (hence the average for question 30 was low, and the correlation, though significant, applies only to those who selected higher values on both questions).

Question 14 was a multiple-choice question in which respondents were asked to indicate all the tools they use regularly for teamwork. The available options included popular messaging apps and platforms such as Slack, Discord, Microsoft Teams, Google Meet, Zoom, email, and the option to add others. Email and Microsoft Teams are the most frequently used - 60% and 58% of respondents, respectively, use them regularly. Messaging apps such as Slack (26% use it daily) and Discord (24%) are also very popular, although it should be noted that teams usually use just one of these tools. Among meeting tools, Google Meet dominates (34% of responses), whilst Zoom is used by only 6% of respondents, which may be because some companies standardise on Google or Microsoft solutions. Among the 'Other' tools listed were, among others, Outlook, Webex, Notion, WhatsApp and SMS. However, these were isolated cases. Generally, the respondents usually use several complementary tools, and many of the chosen platforms serve different functions (chat, meetings, documentation), so a certain number of tools seems unavoidable, which explains the answers to question 31 (half believe that one tool cannot replace them all). On the other hand, the appearance of so many names (even if only mentioned once) in the responses indicates that, on a cross-team basis, there is a wide variety of technologies in use.

In addition, the actual number of tools used by individual respondents and their perceptions regarding the fragmentation of information were examined. To conduct this study, the number of tools each respondent uses for their daily work was counted. It is worth noting that the numerical distribution is not proportional, as the majority of survey participants indicated 2 or 3 tools used regularly, whilst only a few mentioned 4 or more. It was found a certain correlation - those using only 1 or 2 tools have a lower average level of agreement (closer to 2.0, i.e. 'somewhat disagree'), whilst in the group using 3 tools the average response is slightly higher (closer to 3.0, neutral), and for the group using 4 or more tools it is even higher (above 3.0). Given the disparity between the groups, the trend is as expected - the more different communication tools someone uses, the more likely they are to feel overwhelmed by information.

Answers for question 33 - "A single, universal communication tool would improve my team's work" show differences in attitudes towards a single universal tool depending on the team role. Neutral attitudes were predominant among managers, accounting for as much as 44%. The remaining responses are split between moderate and strong support, with 31% 'somewhat agreeing' and 25% 'strongly agreeing'. No one in this group expressed opposition to the idea of tool unification. This suggests openness to the concept, but also a certain caution in giving it unequivocal support. In the case of the operational group, the distribution of responses to the statement " " is more varied. 47% of respondents agreed that a single tool would improve the team's work, with 32% agreeing moderately and 15% strongly. On the other hand, as many as 30% of respondents in this group disagreed, indicating the presence of significant doubts. It can be assumed that for some operational staff, the ability to adapt tools

to their own preferences and the specific nature of their tasks is important, which may raise concerns about excessive standardisation.

The survey yielded mixed results regarding the assumption that an excess of communication tools reduces team efficiency. On the one hand, over half of the respondents feel that their own productivity suffers when they must use multiple channels, and they identify specific problems (such as difficulty in finding information). These individuals are also more likely to feel that their team has too many tools, which supports the hypothesis that an excess of tools has a negative impact on work. On the other hand, the majority of respondents do not perceive the number of tools in their team as excessive. For these individuals, the issue of fragmented communication is not a serious problem, perhaps because in practice they use only 1-2 main tools, which is a manageable situation. As a result, Hypothesis 4 could only be accepted for a subset of the surveyed group where multiple platforms are actually used, and people feel overwhelmed by this. Across the entire sample, the impact of the number of tools on efficiency is not so clear-cut (as evidenced by the relatively low average scores for responses denying an excess). It is worth noting that a significant proportion of respondents see a potential benefit in unifying tools, suggesting that, as a preventive measure or looking ahead, they would be keen to simplify communication to ensure the risk of reduced efficiency does not increase. Overall, as there are no clear-cut results, hypothesis 4 is not accepted.

Hypothesis H5, adopted in the study, was of key importance. It refers directly to the main aim of the study, i.e. assessing the impact of communication on the effectiveness of IT project teams. Both the literature and the survey results consistently indicate that the quality of communication is one of the main factors determining the effective work of a project team. Project management theorists have long emphasised that communication failures can jeopardise even perfectly planned projects. Empirical results have confirmed this view. Teams assessed (by their members) as communicating better achieved higher performance. This observation has broad practical implications, as it highlights the need to invest in communication skills and in tools and procedures that support the efficient flow of information within organisations. In other words, the confrontation of theory with practice confirmed the universal importance of effective team communication described in the literature, while also highlighting areas where modern teams have developed effective solutions to mitigate potential problems. From a broader perspective, the results of the synthesis indicate that communication in hybrid project teams is evolving as organisations adapt to new working realities. Theoretical models of communication must take into account the growing role of technology and changes in the ways of building remote relationships. Practice shows that with the right approach combining the right tools, transparent procedures and a supportive organisational culture, hybrid teams can achieve high efficiency, rivalling traditional teams working exclusively in the office.

This study therefore makes an important contribution to the knowledge of communication in distributed teams, confirming some of the existing theoretical findings and extending them to the current context of IT teams operating in a hybrid model.

The conclusions drawn can be put to practical use in improving communication strategies in organisations, while also pointing the way for future research on improving communication in a changing project work environment.

4. Summary

This study examined the role of synchronous and asynchronous communication in hybrid IT project teams, emphasising how communication practices influence team effectiveness, cohesion, and overall project performance. The findings demonstrated that the choice of communication mode is strongly shaped by task characteristics: synchronous communication is better suited for complex, interdependent, or ambiguous tasks requiring immediate clarification of, while asynchronous communication supports activities demanding precision, documentation, and flexible time management. Importantly, the results confirmed that maintaining a balance between these two modes is essential, thoughtful integration of both forms enhances collaboration and supports efficient project execution.

The analysis also showed that effective communication depends not on the number of tools used but on clear communication norms and purposeful tool selection, reinforcing the importance of strategic communication planning within organisations. Both the literature review and empirical data underscored that hybrid teams must continuously refine communication practices as they adapt to evolving work models and increasing digitalisation of collaboration processes. Overall, the study contributes valuable insights for researchers and practitioners by offering evidence-based recommendations for optimising communication in hybrid project environments.

Future research on communication in hybrid IT project teams should incorporate mixed-methods approaches, combining quantitative surveys with qualitative interviews for deeper insight into interpersonal and organizational dynamics. It would also be valuable to examine culturally diverse and globally distributed teams, where communication norms differ.

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Appendix

Research survey on the role of communication in hybrid project teams in the IT industry (questions)

1. What is your role in the project team?
2. How long have you been working in the IT industry?
3. What is your current work mode?
4. How many members does your project team usually consist of, including yourself?
5. How do you prefer to communicate with team members?
6. When you have a complex or unclear task to discuss, which form of communication do you prefer to use to clarify any doubts?
7. In what situations do you decide to meet offline or online instead of writing a message?
8. How often during online meetings (e.g. video conferences) do you perform other tasks at the same time?
9. What do you usually do during a typical online meeting where you are not have to speak?
10. If you are very busy (you have several tasks "running" at once), how would you prefer your colleague to communicate a new task or urgent question to you?
11. How often does your team organise scheduled online meetings or offline meetings in which most team members participate?
12. How do you most often communicate with your team members? on a daily basis?
13. Does your team engage in additional team-building activities?
14. Which communication tools do you use regularly in teamwork?
15. How would you rate the current ratio of synchronous to asynchronous communication? asynchronous communication in your team?
16. How would you rate the effectiveness of communication in your team?
17. What do you associate most with the advantage of asynchronous communication in a team?
18. Complex issues are best discussed in face-to-face conversations: online or offline.
19. I prefer to deal with simple matters in writing (e.g. by e-mail or chat) rather than in meetings.
20. When a task is unclear or complicated, it is more important to be quick live contact is more important than a polished written message.
21. I avoid organising meetings if the topic can be easily explained asynchronously (via message).
22. Frequent status meetings interrupt my work and make it difficult concentrate.
23. I prefer to receive a message (e.g. in a chat) rather than a phone call when I am busy performing tasks.

24. I sometimes perform several tasks at once at the expense of communication quality communication (e.g. I don't catch everything at a meeting because I'm doing something else at the same time).
25. The possibility of asynchronous communication helps me manage better multiple tasks simultaneously.
26. Lack of online or offline meetings weakens team integration.
27. Even with predominantly asynchronous communication, the team can be harmonious and understand each other well.
28. Regular online or offline meetings are important for maintaining a sense of being part of the team.
29. Switching between multiple communication tools reduces my work efficiency.
30. I think that our team uses too many different applications for communication.
31. Various tools are needed because no single one will suffice all of our team's communication needs.
32. I often have trouble finding information because it is scattered throughout various communication channels.
33. A single, universal communication tool would improve my work team.
34. Too much communication takes place synchronously, which reduces our productivity (too many meetings, not enough time to work in concentration).
35. Too much communication takes place asynchronously, which decisions are made more slowly, and information easily escapes us.
36. The right balance between meetings and offline communication has a positive affects the effectiveness of our work.