ORIGINAL RESEARCH PAPER

FORMS OF KNOWLEDGE TRANSFER IN IT PROJECT MANAGEMENT

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ABSTRACT

This qualitative research study explores the experiences of project managers in IT projects, using an investigative approach to explore the intricacies of knowledge transfer in these contexts. The research framework emphasizes the complexity of social dynamics and the need for a deeper understanding, prompting the use of qualitative methods. Expert interviews were chosen as the primary data collection technique due to their alignment with the research objectives. The study adopts an exploratory perspective, with online interviews conducted using a co-expert approach. The philosophical stance of the study is based on phenomenalist principles and aims to gain insights into the personal experiences of project managers. The experts selected for the study met specific criteria, including certification and experience in IT project management. Thematic analysis revealed key categories: Forms of knowledge transfer, challenges, and opportunities. Personalized spontaneous knowledge transfer emerged as the dominant form, facilitated by informal interactions, and efforts to codify this knowledge in a documented form were observed. Challenges included issues of quantity, distribution, team dynamics, technology platforms, organizational culture, and time constraints. Successful knowledge transfer was associated with increased efficiency, improved quality, faster project completion, and continuous improvement of methods and standards. The study suggests that project-based organizations should develop strategies to improve knowledge transfer, incorporate it into project management standards and focus on facilitating effective communication between team members.

Keywords: knowledge transfer, project management, challenges, opportunities, project-based organizations

Introduction

This research explored the intricacies and perspectives of knowledge sharing in the field of IT project management. Knowledge transfer in this field is a multifaceted and dynamic process that is determined by many factors. As a result of this study, the influence of challenges on knowledge transfer in the IT project landscape was investigated and the potential opportunities of well-functioning knowledge transfer were identified. The exchange of knowledge within projects and between projects and project-based organizations is a complex and ongoing endeavour, influenced by many factors and fluid circumstances. A study by Zhou et al. (2022) examined the process of knowledge transfer from projects to project-based organizations using simplified variables. However, further research is needed to develop sophisticated dynamic models. In addition, their research focuses only on the transfer of knowledge from projects to project-based organizations and overlooks the investigation of the challenges and opportunities associated with this knowledge exchange. Zhou et al. (2022) suggest that future research should emphasize alternative facets of knowledge generation or examine the whole process of knowledge management within project-based organizations.

In the context of this study, knowledge transfer within the project organization will be examined in more detail and the forms of knowledge transfer through knowledge-based project management will be discussed. It also examines how collective knowledge is generated within projects and how it can be transformed into organizational knowledge after a project has been completed. An organization that has comprehensive collective knowledge that goes beyond individual knowledge of individuals is of great importance for its future. This collective knowledge can help the organization adapt to changing circumstances and remain successful in the long term (Probst et al., 2012). In their recent research, Mariam et al. (2022) found a positive relationship between knowledge-based leadership and triumphant project outcomes. This relationship was mediated by enhanced team unity, while the influential effects of esteem for individuals and the intricacy of projects were observed as moderators. The findings of Mariam et al. (2022) are corroborated by the research conducted by Naseem and Abbas (2022). Naseem and Abbas (2022) also confirmed that organizational leadership and management can derive notable benefits from an improved understanding of cross-project knowledge transfer, skilful knowledge integration, and the resulting project outcomes, all of which culminate in the realization of strategic goals.

In order to explore this area of tension and to capture the concrete challenges and opportunities of knowledge transfer in IT project management, this study used qualitative research methods. The focus was on the forms of knowledge transfer used by IT project managers in practice. The aim is to demonstrate to both existing and future project managers that knowledge transfer needs to be managed purposefully and the challenges that need to be addressed. To learn from the experiences of other project managers and project teams and to incorporate recommendations into one's own organisational culture, the empirical results of the interviews will be used.

Theoretical Background

Knowledge transfer is always linked to people and implies empowerment to acquire knowledge (Grothe & Marke, 2012). Understanding knowledge transfer processes also depends on how knowledge is transferred. Different forms of knowledge transfer can manifest in different ways and with different methods (Lehner, 2021). The forms that take place within projects and between projects and the project-based organization correspond to the definition of Thiel (2002), which includes the extension of Tochtermann and Maurer (2000) that knowledge transfer takes place between all knowledge carriers - the material, personnel and collective project knowledge carriers. Project knowledge can be transferred in any form within projects, from projects, and across projects. The individuals involved shape the process and are understood as moving individuals in this processual exchange. Spontaneous transfer processes are individual for each subject, subject to the respective situation, and shaped by the individuals involved (Harnisch-Schreiber, 2023). It is therefore important to systematize this spontaneous transfer of knowledge, but without hindering or even preventing it. To secure this knowledge for the organization in the long term, the knowledgeable person would have to put a short and well-understood description of his or her solution in a place where as many people as possible who need it can find it. There are two ways in which a person can share their newly acquired individual knowledge: they can share it in a one-to-one consultation, or they can present it at a project management meeting to share their experience. Both are forms of knowledge transfer.

In many organizations, knowledge transfer occurs spontaneously, where knowledge is shared without any planned intention. However, it can be beneficial for the organization to implement systematic, controlled knowledge transfer, where the entire process from knowledge transfer to the application is planned and managed (Mittelmann, 2013). Hansen et al. (1999) distinguish between codification and personalization in knowledge transfer. In codification, the reuse of codified knowledge enables high-quality, reliable, and rapid implementation of information systems. Personalization involves the transfer of knowledge from personal knowledge carriers to tangible knowledge carriers, where the development of an electronic document system codifies, stores, disseminates, and enables the reuse of knowledge. Codified knowledge transfer is about information infrastructure for archiving, accessibility, appropriate search environments, and subject indexing of information (Michaelis et al., 2019).

Literature review

These forms of knowledge transfer show that spontaneous and personal transfer cannot be avoided in projects. Attention needs to be paid to this transfer and a systematic approach is needed to make the knowledge transferred explicit. Thiel (2002) describes that different technologies can be used for knowledge transfer and that these technologies facilitate the exchange. These technologies do not provide a system for the transfer but only serve as a channel. The need to use technologies for the exchange of tacit project knowledge is confirmed by Guribie et al.'s (2022) study on the synthetic assessment of systemic barriers to the personalization of knowledge flows within and between projects. One finding of this study is that the lack of chat rooms for the transfer of tacit knowledge is a major barrier to the personalization of knowledge flow.

To successfully introduce systematic knowledge transfer in project management within an organization, several factors should be taken into account: the organizational culture must be knowledge-friendly, employees must have a strong knowledge orientation, specific role models such as knowledge bearers and knowledge takers should be in place, and appropriate technological support must be available (Mittelmann, 2013). Pawlowsky (2019) describes a knowledge-oriented organizational culture as one of the most important prerequisites for successful knowledge management and identifies a positive attitude towards knowledge as a success factor for knowledge transfer. Lehner (2021) also identifies a knowledge-based culture as a key aspect and employees' positive attitudes towards exploring, sharing, and developing knowledge as essential for successful knowledge management. According to Bullinger et al. (1997), an inappropriate organizational culture is a barrier to continuous knowledge transfer. Cultural distance also has a negative impact on knowledge transfer. Zhou, Deng, Wang, et al. (2022) show that it directly affects effectiveness by mediating willingness to contribute and retain knowledge. Cross-cultural team training reduces cultural distance (Zhou, Chen, et al., 2022). Mahura and Birollo (2021) found that informal practices in PBOs facilitate knowledge transfer by providing space for sharing. Majuri (2022) shows that social capital and motivation are important in inter-firm knowledge transfer. Constraints include changes in project duration, budget, research interests, and resource scarcity. Changes in project duration and budget affect knowledge transfer in all projects. Barbosa et al. (2022) recommend training, diverse teams, and focused meetings for knowledge transfer in project management. But cross-project knowledge transfer also depends on the type of knowledge and transfer methods (Waveren et al., 2017).

Current study

Aim and research question

The main objective of this research was to collect and analyse the practical knowledge of project managers, focusing on their real-life encounters in operational IT projects. In the context of this study, qualitative research has been conducted because the aim is to uncover new opportunities or challenges in knowledge transfer from the perspective of project managers in the context of IT projects. It is intended to provide a basis for new theories or hypotheses and to lay the groundwork for possible subsequent quantitative research that may confirm or refute the findings.

It is not the aim of this work to test existing theories or hypotheses. It is the aim that the results of this work will be of use to both the academic and business communities. One aim of this work is to identify new opportunities and existing challenges. Therefore, the study was guided by the research question of what challenges and opportunities are encountered in knowledge transfer in IT project management. Furthermore, the influence of project

managers' experiences on knowledge transfer in IT projects will be demonstrated. This will show existing and future project managers that knowledge transfer must be planned and controlled and that successful knowledge transfer in IT projects depends on personal knowledge orientation. The empirical results of the interviews will be used to learn from the knowledge transfer challenges already mastered by other project managers and project teams and to introduce recommendations to one's own organizational culture.

Methodology

To address the question at hand, a qualitative research framework was used to develop insights into the encounters of project managers within IT projects. The research was investigative in nature, a method well suited to exploring phenomena that are only partially understood (Eisenhardt & Graebner, 2007). The choice of a qualitative rather than a quantitative approach was a deliberate one, as the former can provide a deeper understanding of complex social dynamics (Eisenhardt & Graebner, 2007), exemplified by the personal encounters of project managers. In addition, it is crucial to delve into the complex and authentic environment in which knowledge exchange takes place. When selecting from the range of techniques available within the qualitative research framework, considerations extend to factors of research efficiency as well as facets of research focus and nuances within the field - in this case, the field of IT project management. Among the available options, interviews have many advantages, both in terms of research efficiency and, most importantly, being well aligned with the objectives of the empirical investigation. The construction of questions within the interview guide allows for the inclusion of gaps identified in the theoretical segment and particularly interesting facets of knowledge transfer. Hence, the guide plays a central role in ensuring that the interview remains focused on the research question. The expert interviews were conducted according to the principles of exploratory expert interviews, as outlined by Bogner et al. (2014). This interview format is suitable for eliciting insights into the research topic and for capturing the contextual background of the experts. With research efficiency in mind, the online interview approach was chosen. Given the researcher's familiarity with the subject area, the interviewer assumed the role of co-expert, creating an interactive dynamic similar to that described in constellation theory. This resulted in a balanced interaction configuration during the interviews, where the interviewer's knowledge of technical jargon and project management was equal to that of the interviewees. This configuration had the advantage of a high level of professionalism and a wealth of factual information, yet the interviews were confined within the boundaries of professional discourse and carried a strong professional influence. This interplay of interactions fits seamlessly with the exploratory underpinnings of this research endeavour, as outlined by Misoch (2019). How the results of data analysis are interpreted varies according to the foundational philosophical perspective held by the researcher. Therefore, understanding the findings of the study requires awareness and transparency of the foundational philosophical stance, a point emphasized by Biedenbach and Müller (2011). As a result, the researcher's inherent philosophical stance is consistent with phenomenalist principles. As a consequence, the analysis of the findings within this research endeavour sought to cultivate insights into the personal realms of project managers' experiences.

Participants

The role of an expert is determined by the researcher within the concrete research process. This methodology facilitates the self-definition of the experts, which results from their positions and the associated knowledge they possess, as outlined by Kaiser (2021). For this research, it is assumed that these experts are responsible for overseeing IT projects and also have insight into the project team and the decision-making mechanisms inherent in the projects. In line with the work of Misoch (2015), these experts are holders of specialized knowledge that has been honed through training efforts, often validated by certificates, or through practical involvement in specific organizational tasks. To verify the expert status of the respondents in this study, specific criteria were implemented, requiring the possession of a valid certification from a reputable project management institute, in addition to a minimum of five years of experience in the field of IT project management. The term 'IT projects' encompasses a range of endeavours, such as software development projects, enterprise software integration and implementation initiatives, information systems endeavours, IT infrastructure endeavours, and strategic IT initiatives, in line with Tiemeyer and Bauer's (2010) study.

The size of the sample was set at eleven people, and the detailed information on their experience and certifications can be found in Table 1.

Table 1.
Information on the interviewed experts

Person, gender	Experience with IT projects	Experience (in years)	Certification(s)
Person 1, male	Digitalisation projects, cloud projects, software development projects, business software implementation projects	19	Project Manager, cPM (pma/IPMA® Level C) Scrum Master
Person 2, male	Implementation projects, digitalisation projects, strategic IT projects	26	Senior Project Manager, cSPM (pma/IPMA® Level B)
Person 3, female	Business software implementation projects	8	Project Manager, cPM (pma/IPMA® Level C) Scrum Master
Person 4, female	Business software implementation projects	8	Project Management Associate, cPMA (pma/IPMA® Level D)
Person 5, male	Software development projects	10	Project Management Associate, cPMA (pma/IPMA® Level D)
Person 6, male	Business software implementation projects	10	PMP® - Project Management Professional
Person 7, female	Business software implementation projects, Software development projects	13	Scrum Master
Person 8, female	Organisational strategy projects, IT projects, process optimisation projects	20	Project Manager, cPM (pma/IPMA® Level C) Scrum Master Product Owner Agile Coach
Person 9, female	Business software implementation projects, data management projects	8	Scrum Master
Person 10, male	Implementation projects, software development projects	19	Project Manager, cPM (pma/IPMA® Level C)
Person 11, male	Implementation projects, infrastructure projects	24	Project Manager, cPM (pma/IPMA® Level C) Scrum Master Product Owner

Note. The experts have signed a consent form and have agreed to the use of the anonymised data.

Building on the above considerations, this study carefully explored the first-hand perspectives of experienced project managers who have played a pivotal role in managing IT projects within organizations. These individuals were selected to be closely aligned with the subject matter of the study,

thereby ensuring a comprehensive and adaptable approach grounded in the specific context of both the projects and the organizations with which they were involved. The primary focus was on these experts themselves and their experiential journeys, an orientation underscored by Misoch's (2015) perspective. Their expertise, in particular their wealth of experiential and active knowledge, formed the core of the applied research, an approach that resonates with Diekmann's views (2021).

In terms of selecting the appropriate subjects, a homogeneous random sampling strategy was deemed appropriate for this research framework within the context of the present study, drawing on the insights of Misoch (2015). This choice was feasible as the intended target group could be effectively engaged through a single channel, ensuring face-to-face interactions during the expert interviews.

Instrument and Data collection

The guided expert interview format allows for subjective impressions and interpretative knowledge to be generated in a specific context, as well as for gaps identified in theory to be filled by exploring professional and expert knowledge (Döring & Bortz, 2016). The design of the study required a detailed and nuanced guideline, while at the same time allowing a sufficiently open interview situation in order to react adequately to the respondents. The interview guide was also a guarantee for the comparability of the content in the subsequent content analysis. The design and details of the guide were based on the research interests and the personal research and interview style of the interviewer, following Bogner et al. (2014). The actual sequence of questions is such that basic biographical information (education, profession, etc.) is requested at the outset to allow the interviewer to gain an impression of the respondent and to be able to respond individually. General questions about the research subject then followed, with the possibility of supplementing these with more detailed questions as the conversation progressed, as shown in Table 2 (Döring & Bortz, 2016).

Table 2.
Interview guide

1. information phase
Brief introduction to the study, purpose of the interview

2. demographic data
Education (in project management) Project management experience

3. Warm-up
- How do you deal with spontaneous knowledge transfer in your projects? - To what extent have you systematised knowledge transfer in your projects? - In your opinion, which knowledge should be personalised and which codified?

4. main part
Challenges
- What challenges do you currently face in transferring knowledge in your projects? - What challenges do you currently face in the transfer of knowledge from your projects?
Opportunities
- What opportunities do you see for your projects in a successful knowledge transfer within the project? - What opportunities do you see for your project-based organisation in successful knowledge transfer within project management?

5. fade out
Anything else you want to add or remove?

Note. In the interview situation, the guide was used primarily as an aid to memory and not as a template to be read out.

With a pre-determined sample size of eleven participants, interviews were conducted in March 2023, with each session lasting an average of 43 minutes. The interviews were carefully conducted and documented through individual sessions held on the Microsoft Teams platform. To ensure ethical conduct, verifiable consent was obtained from each interviewee in the form of signed consent forms confirming their agreement to the recording process during the scheduled appointments. The video recordings were then transcribed using the Amberscript web platform, assisted by artificial intelligence (AI) technology.

Data analysis

To effectively evaluate the accumulated data from the guided expert interviews, a comprehensive content analysis was necessary. As outlined by Kuckartz and Rädiker (2022), qualitative content analysis embodies a "methodically controlled scientific analysis of texts, images, films and other forms of communication" (p. 39). The methodology of qualitative content analysis describes three basic approaches: content structuring, evaluative, and typifying qualitative content analysis. Given the research design of this study, which precluded category evaluation and typology development, the content structuring method was adopted. In content structuring qualitative content analysis, information is carefully organized into different categories and subcategories (Kuckartz & Rädiker, 2022). This structured framework serves as a basis for the systematic and organized presentation of the research findings. The category system of the content analysis was initially constructed by deductive means and then supplemented by inductive insights from the transcripts. The overarching categories were derived directly from the interview guide, resulting in thematic categories that seamlessly reflected the underlying structure of the interview guide (Kuckartz & Rädiker, 2022).

Listing of key thematic segments:

- Forms of knowledge transfer
- Challenges
- Opportunities

These overarching themes are closely related to the central research question and aptly reflect the primary focus of this research. In line with the research objective, the challenges and opportunities were identified as primary themes. In addition, these core categories provide a solid foundation for the formulation and structuring of the findings within the final report. The process of formulating types through content analysis can be particularly facilitated with the aid of quality data analysis (QDA) software, a concept advocated by Kuckartz and Rädiker (2022). Therefore, MAXQDA Standard 2022 was judiciously employed to facilitate content analysis in this particular study.

During the initial coding phase, the collected data was reviewed against the main thematic categories and systematically coded accordingly. Sub-categories within these main themes were then identified emergently through inductive analysis based on the available data. This involved examining all coded text segments within a given primary category and merging relevant dimensions to create relevant subcategories. The subsequent coding phase was then guided by these emergent subcategories. The coding principles outlined by Kuckartz and Rädiker (2022) were carefully followed. Upon

completion of the coding process, a series of basic and complex analyses were conducted. These analyses included assessments structured around the pre-defined categories and revealed correlations between the sub-categories within each primary theme. The content analysis of the transcripts of the expert interviews included both quantitative and qualitative elements, such as frequency counts and verbatim quotes (Kuckartz & Rädiker, 2022).

Results

Project knowledge can be divided into narrative project knowledge, which exists before a project starts - this includes knowledge about projects with the individual knowledge and skills of project members and knowledge about general project management - and discursive knowledge, which is created during a project – project knowledge - and is transferred to the project-based organization (PBO) after the project as knowledge from the project. This knowledge is distributed among different project knowledge holders - material, personal, and collective knowledge holders - and the transfer between these project knowledge holders is relevant to the project's success. Project knowledge is generated in six phases and builds on the narrative project knowledge of the project participants. This existing and generated knowledge in the project needs to be managed and coordinated across all project knowledge holders during the entire project duration. During a project, on the one hand, explicit, codifiable, and thus transferable knowledge is generated in the form of project documentation on material knowledge carriers, and, on the other hand, tacit, personalized, and difficult-to-transfer knowledge is generated in the heads of the project participants as personal and collective knowledge carriers.

Figure 1 shows this entire process of knowledge generation and transfer in IT projects and the challenges to be overcome, as well as the resulting opportunities. This figure summarises the results of the interviews.

Figure 1.
Illustration of knowledge generation and transfer in IT projects with challenges and opportunities[1]
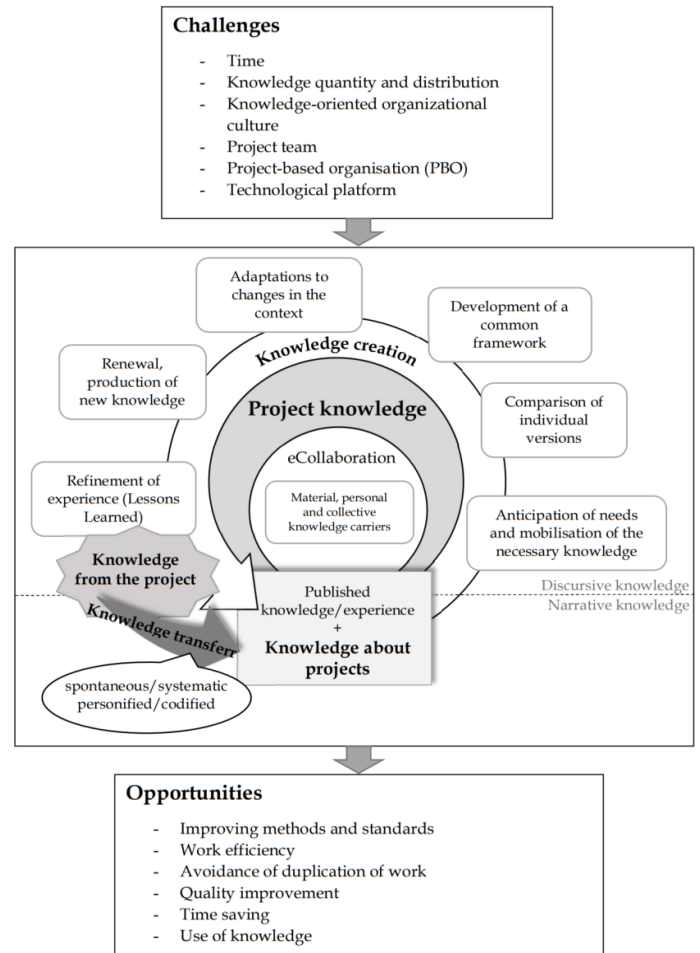
Challenges in project knowledge transfer

Concerning the six challenges - shown in Figure 1 - associated with knowledge transfer in IT project management, it was found that experts in project-based organizations have difficulties mainly with the quantity and distribution of knowledge and do not receive sufficient support from the organization. According to the experts, the main challenge in knowledge transfer is finding the right amount of knowledge and then distributing it to the right recipients. In terms of the amount of knowledge, "the big difficulty from our point of view is [...] where do I start and where do I stop" (Transcript_P7, Item 47). In contrast, the time factor and the knowledge-based organizational culture play a less significant role in the challenges. Time is a factor in all project management issues, including

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1 Own illustration based on Christian (1994) and Schindler (2001).

knowledge transfer. Person 4 stated during the interviews that knowledge transfer - especially codified transfer - is often neglected due to lack of time. This is illustrated by the following statement "So I think the biggest challenge is time. [...] when it gets tight, you are usually very happy to sacrifice something like that" (Transcript_P4, Item 47). Therefore, "some things [...] are just in people's heads because there is just no time to document them. And there are also exactly these gaps in knowledge that we have" (Transcript_P7, Item 39). IT project management professionals struggle to codify and distribute the right amount of knowledge to ensure that the people receiving it can use it effectively. There is a risk of providing too much knowledge, which can overwhelm recipients and prevent them from using it. On the other hand, technical knowledge may be too complicated for people to understand and use effectively. There is also no standard methodology for determining the most effective method of transfer or for identifying the appropriate recipients of knowledge. Another barrier can be the lack of qualified people in the project team to receive the knowledge. There are also language barriers, especially if the person transferring knowledge and the person receiving it come from different sectors or disciplines and use different terminologies. Respondents noted that "this tax environment [...] they use their own language anyway. And if you haven't studied tax law, you have a hard time with the terminology' (Transcript_P7, Item 55) and 'that the main problem [...] is that you have [...] hardcore technicians, in their technical language, who are very technical, and that you have to bring together the translation from the technology to the end user who has to work with the output of the project' (Transcript_P10, Item 57). It is therefore important to categorize project knowledge to target knowledge distribution and ensure that the right knowledge is transferred to the right people. Project managers, therefore, need to think carefully about what knowledge can be transferred to whom.

According to experts, the project-based organization (PBO) has weaknesses which means that knowledge transfer is not sufficiently taken into account in project management. According to person 1, knowledge transfer "leads a shadowy existence [...] if there is not really someone behind it, and that should be an authority, i.e. a central authority, like knowledge management or the project management office, which still actively demands the thing" (Item 40). This suggests that project managers expect more support from the PBO. Currently, the experts have the feeling that "nobody in the organ-isation is interested in it and nobody cares about it" (Transcript_P10, Item 69). To ensure successful project management, PBOs are recommended to establish central institutions that manage knowledge transfer within and between projects. The PBO should also train professionals who have broad knowledge in different areas and can be deployed flexibly in projects. Another weakness of the PBO is that there are no clear processes, sanctions, or rewards for knowledge transfer. This means that there are no indicators or controls to monitor whether project management is delivering knowledge transfer. Person 11 explains the failure of the PBO in this area by saying that "sometimes the organisation is simply not prepared to take this project knowledge out because the committees are not in place" (Item 78) and "exactly this knowledge that every project brings with it dies [...] in the silo thinking of the company from project to project because they simply have no overview of what they already have going on" (Item 78). When implementing projects, experts often face internal barriers within the project team. In particular, interpersonal problems are a major challenge as they hinder effective knowledge transfer. It was clear from the interviews that it is often difficult to maintain open communication within the team, which makes it difficult to share knowledge and information. In addition, the size of the project team leads not only to greater heterogeneity and competition among team members but also to greater differences in the experience and skills that each team member brings to the table. The interviews showed that "the biggest challenge is interpersonal issues, that people don't want to talk to each other anymore or don't want to share certain things when it comes to knowledge transfer. That is already a problem" (Transcript_P9, Item 63) and "the more different people are, the more difficult it becomes" (Transcript_P10, Item 63). As a result, a considerable amount of time is required to integrate the different knowledge bases and perspectives and to create a common framework for knowledge transfer. The need to use multiple technology platforms creates additional challenges for experts as project knowledge is distributed across these platforms. To overcome these hurdles, policies, and guidelines for the use of platforms need to be established. This is confirmed by the statement of Person 8, who remarked: "We urgently need rules on how to deal with this, otherwise we will end up in chaos" (Transcript_P8, p.38). These should not only determine which platforms are used, but also how they are used. Furthermore, when it comes to setting precise work instructions for these technologi-

cal platforms, "the difficulty may simply be that you don't know what these tools can do and how they can actually make your life easier" (Transcript_P3, Item 51). For knowledge to be shared in projects, it is also necessary for the organizational culture to create space for this and to have a positive attitude toward dealing with mistakes. However, experts currently have the impression that the organizational culture is not geared towards knowledge sharing and that knowledge sharing is not encouraged. The experts explained that "there has to be a framework and opportunities for you to really transfer knowledge. And that is often not easy because everybody is under pressure and under power" (Transcript_P2, Item 59) and "the biggest challenge is the resistance that comes from fear" (Transcript_P8, Item 52). These findings underline the importance of a knowledge-oriented organizational culture for successful knowledge transfer. Time is a factor in all project management issues, including knowledge transfer. The experts interviewed stated that knowledge transfer - especially codified transfer - is often neglected due to lack of time.

Forms of knowledge transfer

In the main category of forms of knowledge transfer, the forms of transfer were always mentioned by the experts in combination with each other, so that individual subcategories were formed for the four forms and the text passages were also coded several times if several forms occurred. This resulted in the following Table 3, which shows how often each combination of transfer forms was mentioned.

Table 3.
Frequency distribution of the mentioned transfer forms in combination with each other

Transfer form	Spontaneous	Systematic
Personified	12	5
Codified	5	4

Note. The results were extracted from MAXQDA.

This table shows that the most frequently mentioned form of knowledge transfer in the expert interviews was a spontaneous personalized transfer. Systematic personalized transfer and spontaneous codified transfer were mentioned equally often. Systematic codified knowledge transfer was mentioned the least.

The results of the study show that project managers identify the spontaneous exchange of personalized knowledge as the most common form of knowledge transfer. Persons 2 and 4 describe this form of transfer as "basically it feels like the biggest knowledge transfer that you have in a project" (Transcript_P4, Item 31) and "it's an essential component. [...] where you really get the important things" (Transcript_P2, Item 33). The experts use this type of knowledge transfer specifically to facilitate the flow of information. Project managers appreciate the benefits of an informal setting and a relaxed atmosphere to obtain project-related information. Based on the present results, it can also be concluded that this personalized knowledge transfer is already systematically implemented in practice and is consciously managed by project managers. This is reflected in the statements of persons 2 and 6, who have institutionalised the informal coffee and lunch break discussions, as follows "Yes, that was [...] partly, so to speak, through such coffees or [...] also such offline rounds. So that you [...] go out together [...] for a beer or [...] the team goes out for a meal" (Transcript_P2, Item 35) and "Of course there are the corresponding, I always call them brunch meetings in between, where you then regularly sit down with the corresponding department and also get a status update there" (Transcript_P6, Item 24). It can also be concluded that there is no universally applicable procedure, but that project managers vary the systematization depending on the complexity of the project and their previous experience. When a spontaneous, informal transfer takes place within a project, project managers subsequently try to transform the spontaneous, personalized exchange into a codified exchange. This finding could be inferred from the statement of person 9, who noted that 'no matter what I hear, it's written somewhere afterwards, whether it's on a piece of paper or not' (Item 35). However, the interview results do not reveal a consistent system for this transformation. It could therefore be interpreted that the experts found their solutions, and adapted to the particular situation. The experts also recognized the need for systematic codification of knowledge transfer. However, there is no consistent approach here either. The results show that decisions to codify knowledge are made based on subjective perceptions of project managers rather than objective criteria. This is confirmed by the statements of persons 2, 5, 6 and 10: "I don't have a method for it now. I say that quite honestly, that I have to decide situationally" (Transcript_P2, Item 39). and "It has a lot to do with intuition. Of course it always depends on

[...] the assessment of how it stands in the project context" (Transcript_P5, Item 33) and "There are no clear rules" (Transcript_P10, Item 33) and "I think it is also a matter of interpretation" (Transcript_P6, Item 30). As a result, the quality and quantity of codified knowledge vary between organizations and projects. It follows that the possibility of systematized knowledge transfer between organizations and projects is not currently recognized as such by project managers. The summary conclusion is that it would be beneficial for project managers if project-based organizations had a clear set of rules for selecting transfer options. In this way, they could ensure that they meet both internal and external requirements while avoiding the creation of redundant and worthless documentation.

Opportunities with successful knowledge transfer

If all the challenges can be overcome in the project, the experts see six opportunities for project-based organizations. The experts surveyed believe that successful knowledge transfer in IT projects can lead to increased work efficiency, time savings, and improved project quality. Person 3 states: "It becomes more efficient and thus has an effect on the project duration and ultimately also on the project costs, i.e. the increase in efficiency in the project" (Item 55). The experts also emphasized that well-functioning knowledge transfer can lead to faster project completion, allowing the organization to respond more flexibly to market changes. The experts noted that mistakes currently occur in IT projects because project participants do not have access to knowledge and have to make assumptions about the organization's needs without really knowing what the project outcome is. The most important observation on quality improvement is that "if knowledge transfer were perfect, many mistakes would not happen. Mistakes in the sense of - yes, I believed that you need this and that. So the belief will go, but the knowledge will be there" (Transcript_P2, Item 61). Accordingly, measures to optimize knowledge transfer in the project-based organization (PBO) can successfully improve quality. The use and reuse of knowledge is also an important aspect, as knowledge is often lost after project completion and has to be found again in similar projects. This is reflected in the following statements made by the experts: "would the whole thing be sustainable in the sense that the knowledge is distributed and that the knowledge [...] is not lost after the project because the project is distributed again" (Transcript_P2, point 61). "If it is

really available immediately, yes, you can just concentrate much better on the tasks at hand instead of generating initial knowledge and searching for it" (Transcript_P3, item 55). The experts explained that knowledge is currently not sustainable and therefore the same knowledge has to be built up again and again, even in similar projects. Despite the lack of experience in this area, the experts recognize the potential for continuous improvement of methods and standards in project management. A central office for the management of methods and standards is seen by project managers as a positive factor in the management of projects. The avoidance of duplication of effort is also seen as an opportunity that has potential for individual projects and the entire PBO and argues for the introduction of a central office to manage knowledge transfer. The experts stated that 'if everything was clear and everything was communicated in such a way that everyone who has the knowledge that should and must be communicated gets to where it is needed, you would certainly save a lot of double coordination' (Transcript_P10, Item 65) and 'you would save yourself from doing certain things twice and three times and therefore also save resources and money' (Transcript_P11, Item 90). This shows that even when duplication is avoided, there is potential for individual projects and for the whole project-based organisation (PBO), and the examples cited again support the introduction of a central office to manage knowledge transfer.

Discussion

These results confirm Mittelmann's (2013) finding that spontaneous knowledge transfer usually occurs without planned intention and that it would be beneficial to systematize and manage it.

These findings also show that the coffee breaks mentioned by Barmeyer and Würfl (2012) are highly relevant for knowledge transfer in the context of IT projects and that they can facilitate the personal exchange of views, assessments, experiences, and knowledge in a targeted manner.

The experts' statements showed that the project managers try to codify the spontaneous personalized transfer afterward, thus transforming it into a spontaneous codified transfer. This shows that people are already trying to follow the solution proposed by Mittelmann (2013) of long-term storage of the transferred knowledge. However, the interview results do not reveal a consistent system of this transformation and storage, so the interpreta-

tion suggests that the experts have found very individual and situational solutions for this procedure. It can be deduced from these expert statements that, on the one hand, the need to systematize codified transfer is recognized, but that, on the other hand, project managers do not use a uniform procedure. Furthermore, the results show that project managers do not define measures for codifying knowledge according to objective criteria, but that decisions to consciously codify transfer arise from the subjective perception of its necessity. This indicates that the quality and quantity of codification knowledge differs between companies and programs. This suggests that the possibility of systematically transferring codified knowledge across organizations and projects is not currently perceived as such by project managers.

These findings support the findings of Mahura and Birollo (2021) that creating, maintaining, and improving knowledge transfer is the responsibility of PBOs. Similarly, this finding supports the results of the study published by Ren et al. (2019), which states that PBOs should create a specific and explicit incentive system to encourage transfer behavior. Similarly, these study results reflect the findings of Srisuksa et al. (2022), who found that project team members need to be motivated to share knowledge and also have the intention to share knowledge. One reason for deliberately withholding knowledge may be competition and scarcity of resources within the project team. If individual members are striving to achieve their personal goals, they will hide even more knowledge as requests for knowledge transfer are not seen as potentially useful to the team's efforts to achieve its goals (Moh'd et al., 2021). The statements from the experts indicate that for knowledge transfer to be successful, a knowledge-oriented organizational culture must be in place. This reinforces Ren et al.'s (2019) argument that project culture should be built under the guidance of organizational culture and that these cultures should not be considered separately. According to the results of the study, project managers also need extensive knowledge about the functionalities of technological platforms to be able to use them effectively. This shows that the success factor for knowledge transfer in projects mentioned by Kock et al. (2020), the correct use of technology platforms, does not work positively in practice due to a lack of knowledge on the part of the project managers, but rather as a hindrance. According to Hanisch et al. (2009), the continuous improvement of methods and standards in project management is also an important goal of project knowledge management. According to the experts, this goal is not currently being pursued in practice. The experts recognize this potential, but no real experience has been gained.

Conclusions

The results of the study show that project managers identify the spontaneous exchange of personalized knowledge as the most common form of knowledge transfer. They use this type of knowledge transfer specifically to facilitate the flow of information. Project managers appreciate the benefits of an informal setting and a relaxed atmosphere to obtain project-related information. Based on the available results, it can also be concluded that this personalized knowledge transfer is already systematically implemented in practice and is consciously controlled by the project managers. It can also be concluded that there is no universally applicable procedure, but that project managers vary the systematization depending on the complexity of the project and their previous experience. When a spontaneous, informal transfer takes place within a project, the project managers subsequently try to transform the spontaneous, personalized exchange into a codified exchange. However, the results of the interviews do not reveal a consistent system for this transformation. It could therefore be interpreted that the experts found their solutions, and adapted to the respective situation. The experts also recognized the need for a systematic codification of knowledge transfer. However, there is no consistent approach here either. The results show that decisions to codify knowledge are made based on subjective perceptions of project managers rather than objective criteria. As a result, the quality and quantity of codified knowledge vary between organizations and projects. It follows that the possibility of systematized knowledge transfer between organizations and projects is not currently recognized as such by project managers. The summary conclusion is that it would be beneficial for project managers if project-based organizations had a clear set of rules for selecting transfer options. In this way, they could ensure that they meet both internal and external requirements while avoiding the creation of redundant and worthless documentation.

The starting point of this research is the problem that, on the one hand, knowledge transfer is considered to be important for achieving project success and, on the other hand, there are difficulties in carrying out this knowledge transfer. The assertion made by Naseem and Abbas (2022)

in their study that there is no solution to how project-based organizations can ensure effective knowledge management while maximizing project performance to create, capture and internalize knowledge in their organization can be confirmed based on the present research findings. In addition, the empirical research proved that the expected difficulties in implementing knowledge transfer occur in the operational IT project management environment. In summary, the following difficulties that project managers currently face when transferring knowledge in IT projects can be identified from the research findings:

- No methods for dealing with the volume and distribution of knowledge
- No specifications, role descriptions and support from the Project Based Organisation (PBO)
- Deliberate concealment of the knowledge of individuals within project teams due to differences in previous experience.
- Spread of codified knowledge across multiple technology platforms and insufficient knowledge of their functionalities
- No knowledge-based organizational culture within the PBO where knowledge sharing is desired
- Too little time to optimally manage and implement the knowledge transfer that is already taking place.

These challenges show that several difficulties in knowledge transfer in IT projects are related to the PBO. It follows that the PBO is partly responsible for the difficulties in knowledge transfer and must therefore be part of a practical solution. The model of Zhou, Deng, Hwang, et al. (2022) for knowledge transfer to the PBO and the framework of Zhou, Deng, Wang, et al. (2022) for knowledge transfer in the project environment provide theoretical solutions to counteract these problems. For such solutions to be applied in practice, it is necessary to integrate generic models and frameworks into project management standards. In addition, the standards need to identify possible measures for creating internal organizational guidelines and schemes for knowledge transfer within PBOs and make clear the need for organizations to do so. This would ensure that future organizations consider the associated knowledge transfer from the outset when implementing project management standards and processes and that projects are not prioritized solely on content, cost, and time. In addition, in parallel with project management processes, the requirements

for the procurement of technology platforms need to be extended to include knowledge transfer management capabilities. In the future, PBOs will need to prioritize their role as facilitators and moderators of knowledge transfer between projects and create or strategically realign central offices, such as project management offices, to take advantage of opportunities to increase work efficiency, save time, improve quality, leverage and reuse knowledge, avoid duplication of effort and, in the long term, improve internal methods and standards.

Limitations and future directions

The study has some limitations that need to be addressed to ensure a more comprehensive and unbiased approach. One limitation arises from the fact that the expert interviews were conducted with the interviewer as a co-expert, resulting in a strong technical bias. To build more trust and gather confidential process knowledge, an alternative interaction constellation could have been chosen. For example, having a neutral party conduct the interviews might help to gain a more comprehensive understanding of the subject matter. Another limitation is the researcher's involvement in the field, which influenced the research design and practical implementation. This involvement may have led to certain assumptions being taken for granted and not adequately considered in the research. To address this, future research could involve someone with no prior knowledge of the field to conduct the interviews, allowing for a more objective and open exploration of the phenomena. From an economic perspective, time constraints prevented the implementation of theoretical sampling, leading to incomplete theoretical saturation and limited insights from the interviews. To overcome this limitation, conducting additional interviews could help to ensure a representative sample and increase the depth of the findings. Methodologically, the chosen qualitative content analysis approach has paradigmatic aspects that may limit the insights gained, particularly from the perspective of proponents of the quantitative paradigm. It would be beneficial to consider incorporating complementary research methods to gain a more comprehensive understanding of the subject matter. In addition, the study focuses mainly on the IT project management perspective, which may limit the generalisability of the findings. To broaden the scope and applicability of the findings, future research could include project management perspectives from other domains or consider input from various project roles.

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