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Determinants of success and failure of knowledge transfer in information systems offshoring: a ranking-type Delphi study

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Abstract: The transfer of knowledge from client to service provider poses major challenges in information systems (IS) offshoring projects. Knowledge transfer directly affects IS offshoring success. Therefore, associated challenges must be overcome. Our study examines the determinants of success and failure of knowledge transfer in IS offshoring projects based on a ranking-type Delphi study. We questioned 32 experts from Germany, each with more than ten years of experience in near- or offshore initiatives to seek a consensus among them. We identified 19 success and 20 failure determinants. These determinants are ranked in order of importance using best-worst scaling. Aspects of closer cooperation are critical for effective knowledge transfer. This includes regular collaboration, willingness to help and support, and mutual trust. In contrast, critical determinants of failure are concerned with fears and fluctuation of human resources. Hidden ambiguities or knowledge gaps, an unwillingness and disability to share knowledge, and high fluctuation of human resources negatively impact knowledge transfer.

Keywords: best-worst scaling; BWS; Delphi; determinants of success; determinants of failure; information systems; IS; information systems offshoring; knowledge transfer; ranking-type Delphi.

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1 Introduction

IS offshoring, the transfer of IS services to a service provider outside the service consumer's country, receives growing attention from both academics and practitioners. In academia, the offshoring of IS services has been one of the most discussed phenomena in IS research in recent years (King and Torkzadeh, 2008), while the number of publications increased progressively (Gonzalez et al., 2006; Strasser and Westner, 2015; Wiener et al., 2010). In practice, IS offshoring has become an important issue for organisations (Finlay and King, 1999; King, 2008) and is an important component of business efforts; e.g., to reduce cost and to gain access to talent for delivery of IS services. In addition, it is predicted that the transfer of IS Services will continue to increase for years to come (Capgemini and Deloitte, 2015; Goetzpartners, 2013).

A major challenge of IS offshoring projects lies in the transfer of knowledge from client to service provider (Betz et al., 2014; Huong et al., 2011; Prikladnicki and Audy, 2012). Cultural differences, language barriers, and time zone variance can cause difficulties within the knowledge transfer process, which may undermine the overall IS offshoring project success (Betz et al., 2014; Winkler et al., 2006). Numerous studies confirm that the transfer of knowledge directly affects IS offshoring success (e.g., Beulen et al., 2011; Sudhakar, 2013), while an unsuccessful transfer of knowledge constitutes a major reason for IS offshoring failure (Carmel and Tjia, 2005; Chen et al., 2013).

Although there is a sharp increase of research in relation to knowledge transfer and management aspects in IS research, only a few studies focus on determinants that influence knowledge transfer (Strasser and Westner, 2015; Wiener et al., 2010). These studies conduct mainly interpretive research using case studies indicating that this field of research is still at an early stage. In addition, these studies focus on the identification of influencing factors, while the analysis of these factors is lacking.

Hence, quantitative research that analyses critical determinants influencing knowledge transfer, and thus the success of the offshoring initiative, is required. In order

to quantitatively analyse determinants of success and failure, Remus and Wiener (2010) recommend ranking them. Therefore, we pose the following research questions:

RQ1 What are the determinants that influence, either positively or negatively, knowledge transfer between client and vendor companies in IS offshoring?

RQ2 What is the importance of these determinants?

The answers to these research questions are relevant to research and management practice. For research, our paper addresses the research deficit regarding the aspect of 'how to offshore'. It adds to existing research with the aim to identify and prioritise the influencing determinants. Hence, our study contributes to a deeper understanding concerning success and failure determinants that are crucial for knowledge transfer and the overall IS offshoring initiative. For management practice, our paper offers a comprehensive set of determinants sorted by importance, which are crucial for successful knowledge transfer. The overall results help practitioners take the appropriate measures to facilitate the knowledge transfer process.

To address these questions, we apply a ranking-type Delphi study. This empirical exploratory research approach is widely used in IS research (Paré et al., 2013) and best suited for answering our research questions. Our ranking-type Delphi Study includes one qualitative and two quantitative rounds of questioning experts to seek a consensus among them and to rank the key determinants that influence knowledge transfer in IS offshoring initiatives.

The remainder of this paper is structured as follows: Section 2 gives a brief overview of the conceptual foundation of critical knowledge transfer determinants. In subsequent Section 3, we describe the methodological background of our study, including the process steps to reach consensus and to rank the influencing determinants. Thereafter, we present our findings in Section 4, containing 19 ranked determinants of success and 20 ranked determinants of failure in knowledge transfer. In Section 5 we summarise our key findings and provide avenues for future research.

2 Conceptual Background

We define knowledge as a mix of experience, values, contextual information, and expert insight, allowing the evaluation and incorporation of new experiences and information (Davenport and Prusak, 1998). Knowledge transfer is a "process through which one unit (e.g., group, department, or division) is affected by the experience of another" [Argote and Ingram, (2000), p.151]. This process includes all activities required to transfer knowledge from the source to the recipient. Given our focus on knowledge transfer in an IS offshoring context, we hereinafter consider the transfer of knowledge from onshore to offshore organisations.

Few studies focus on determinants that positively influence knowledge transfer in IS offshoring initiatives. These determinants can be divided into key conditions for sharing knowledge as well as techniques used to facilitate the knowledge transfer process. The key determinants clustered by their focus with regard to their research perspective are illustrated in Table 1. In addition, the last column of Table 1 indicates whether the respective study provides qualitative (Qual) or quantitative (Quan) empirical evidence for its findings.

Table 1 Determinants that positively influence knowledge transfer

Focus	*Determinants*	*Perspective*	*Reference*	*Evidence*
Key conditions	Good impressions of each other	Supplier	Huong et al., (2011)	Qual
	Readiness to take over responsibility	Client-supplier interaction	Smite and Wohlin (2011)	Qual
	Support from the knowledge source	Supplier	Deng and Mao (2012)	Quan
	Willingness to participate and cooperate	Supplier	Deng and Mao, (2012), Huong et al. (2011)	Qual and Quan
Techniques used	Codified knowledge through formal training	Supplier	Williams (2011)	Quan
	Gain tacit knowledge by incorporation within the client	Supplier		
	Right balance between formal and informal techniques	Client	Gregory et al. (2009)	Qual
	Stimulating motivation to share knowledge	Client		
	Sufficient planning and careful implementation	Client-supplier interaction	Smite and Wohlin (2011)	Qual
	Using an active learning mechanism	Supplier	Deng and Mao (2012)	Quan

Few key conditions must be fulfilled before knowledge transfer can occur effectively. First, good impressions and a willingness to participate and cooperate facilitate the knowledge transfer process between Japanese and Vietnamese software companies (Huong et al., 2011). Good impressions are derived from national and cultural similarities and a motivation to share knowledge and experience. In addition, knowledge transfer can be difficult in offshoring initiatives because not all participants are willing to share their knowledge with others. Hence, willingness to participate and cooperate is a critical key condition, also confirmed by Deng and Mao (2012). Another key condition identified by Deng and Mao (2012) is support from the knowledge source. This client support can manifest itself in several forms, such as providing technical materials, project management tools, training and visiting opportunities, technical support, and personnel exchange. Finally, transfer readiness must be evaluated. The receiving site's readiness to take over the responsibility is another key condition for effective knowledge transfer (Smite and Wohlin, 2011).

However, the use of techniques has a positive influence on knowledge transfer. According to Williams (2011), the offshore vendor's understanding of the client is positively influenced by exposure to codified knowledge through formal training on the client's business and on the current system or project, and by exposure to tacit knowledge through embedment within the client. Client embedment refers to the extent to which the offshore vendor is tightly incorporated within the client organisation. In addition, using techniques to stimulate intrinsic and extrinsic motivations to share knowledge, as well as finding the right balance between formal and informal techniques, is critical for knowledge transfer (Gregory et al., 2009). Once a positive attitude towards knowledge

sharing and collaboration is presented, formal and informal techniques leads to the greatest outcomes. Furthermore, rushed and ad-hoc execution should be avoided. Knowledge transfers require sufficient planning and careful implementation to facilitate knowledge transfer processes in a positive way (Smite and Wohlin, 2011). Finally, Deng and Mao (2012) show the importance of an active learning mechanism, knowledge articulation, in learning from the client and learning about the client. It is important to stimulate knowledge transfer (Deng and Mao, 2012).

In contrast, there are determinants that negatively influence knowledge transfer. These determinants can be distinguished between aspects related to capabilities, cooperation and strategy, culture and mentality, external influences, and management (cf. Table 2).

Frequent exchanges take place between the on- and the offshore team during the knowledge transfer process. The processes of communication and cooperation depend on the individual competencies of team members. Negative effects on the transfer of knowledge arise from non-qualified personnel with a lack of communication and cooperation competencies as well as little background or business knowledge (Wende et al., 2013).

Furthermore, difficulties in collaborative work impact knowledge transfer in a negative way. These difficulties are due to communication barriers and lack of equivalence in individual competencies (Huong et al., 2011). Communication barriers become apparent when two partners come from different countries without a common language. In addition, Huong et al. (2011) identified a lack of equivalence according to IT skills, working capacity, and project management experience between Japanese clients and Vietnamese vendors that negatively impact knowledge transfer.

Additional difficulties arise, inter alia, from an unwillingness and disability to share knowledge and missing backflow of knowledge (Betz et al., 2014). The unwillingness to share knowledge occurs if team members capture and guard knowledge to gain an advantage over other team members. In some cases, knowledge is not transferred back to the onsite team. Consequently, the knowledge transfer process is prohibited while an undesired dependency on the offshore provider arises.

Beyond this, cultural differences negatively affect the sharing of knowledge (Huong et al., 2011). This includes attitudes and behaviour, i.e., challenges to address knowledge gaps in the midst of a project and to ask questions that would unveil a lack of technical knowledge, as well as following instructions and not showing individual initiative or contributing personal experience to achieve positive results (Wende et al., 2013).

Further determinants are related to external influences and management aspects. Strong data protection laws in Western countries may cause problems and impact, e.g., joint tests of software and systems (Betz et al., 2014). Management-related aspects that negatively influence knowledge transfer are hidden (extra) costs and a lack of transparency regarding what knowledge is available and where (Betz et al., 2014). Betz et al. (2014) found that there is an awareness of the presence of hidden costs arising from, e.g., language problems and intercultural barriers, but a lack of transparency when it comes to identifying them. An additional problem to the missing transparency is that while some knowledge is in fact available, it is not always explicitly recognisable. A further determinant is the lack of common rules between the on- and the offshore team (Huong et al., 2011). There are spoken and unspoken rules that must be synchronised between both parties. Finally, the usage of an usual media mix without any adaption to the project context by the client negatively influences the knowledge transfer (Wende

et al., 2013). Hence, the selection and availability of media is an important consideration in order to not undermine knowledge transfer processes.

Table 2 Determinants that negatively influence knowledge transfer

Focus	*Determinants*	*Perspective*	*Reference*	*Evidence*
Capabilities	Lack of communication and cooperation competency	Client-supplier interaction	Wende et al. (2013)	Qual
	Little background or business knowledge on the provider side	Client-supplier interaction		
Cooperation and strategy	Communication barriers	Supplier	Huong et al. (2011)	Qual
	Lack of equivalence in individual competence	Supplier		
	Difficulties in knowledge cooperation	Client	Betz et al. (2014)	Qual
	Difficulty maintaining informal networks	Client		
	Latency time using IT and media	Client		
	Missing backflow of knowledge	Client		
	Unwillingness and disability to share knowledge	Client		
Culture and mentality	Challenging to address knowledge gaps in the midst of the project and to ask questions which would unveil a lack of technical knowledge	Client-supplier interaction	Wende et al., 2013	Qual
	Only following instructions and not using their initiative or experience to achieve positive results	Client-supplier interaction		
	Cultural differences	Supplier	Huong et al. (2011)	Qual
External influences	Strong data protection laws in western countries	Client	Betz et al. (2014)	Qual
Management	Hidden (extra) costs	Client	Betz et al. (2014)	Qual
	Lack of transparency regarding what knowledge is available and where	Client		
	Lack of common rules	Supplier	Huong et al. (2011)	Qual
	Using usual media mix without any adaptation to the project context by the client	Client-supplier interaction	Wende et al. (2013)	Qual

3 Methodology

3.1 Delphi method

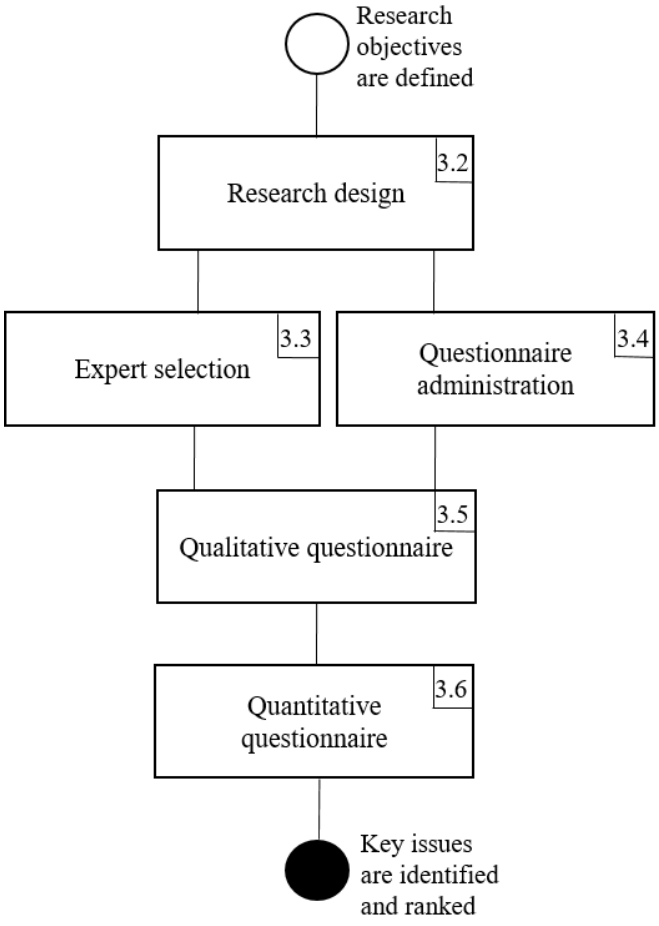
This empirical exploratory study uses the Delphi method to collect data on IT experts' perceptions of the determinants of success and failure of knowledge transfer in IS offshoring initiatives. The objective of the Delphi method is to obtain the most reliable consensus of a group of experts. It attempts to achieve this by a series of questionnaires interspersed with controlled opinion feedback. After each iteration, a controlled feedback with the anonymised consolidated responses is provided to all participants. As a consequence, experts can reflect and revise their opinions and judgements after each iteration (Delbecq et al., 1975; Linstone and Turoff, 1975). Delphi was first described in 1963 by Dalkey and Helmer as a systematic forecasting method to identify future technological and economic trends. Over the years, different Delphi method variants have been applied in a large number of research areas, e.g., business, education, healthcare, and IS. In IS research, Delphi studies have been conducted for almost three decades and have been published in a large variety of outlets, including top-ranked IS journals (Gray and Hovav, 2008; Paré et al., 2013; Rowe and Wright, 1999; Skulmoski et al., 2007; von der Gracht, 2012). The ranking-type Delphi represents the most commonly used by far Delphi variant in the IS field (Okoli and Pawlowski, 2004; Schmidt, 1997) and its application grew significantly in the second half (2006 to 2010) of the decade (Paré et al., 2013).

The main steps of the Delphi method are depicted in Figure 1. The first step comprises the design of the Delphi study to clearly define the field of research. After that, the expert selection and questionnaire administration processes can be conducted simultaneously. Both processes consist of three process steps to create a list of experts to develop the questionnaire. After the completion of both processes, the first qualitative, and subsequently the second and third quantitative questionnaires, of Delphi can be started. The intention of the first questionnaire is to elicit as many determinants of success and failure as possible from all the experts and to verify the state of research. The second and third questionnaires pursue the objective to explore agreement with the determinants elicited in the first questionnaire and to rank these determinants. The following Subsections 3.2 to 3.6 describe the respective numbered process steps in detail.

3.2 Research design

First, the design of the Delphi study needs to be specified. Different foci and objectives clearly differentiate Delphi method variants from each other (Strasser, 2016). We use a ranking-type Delphi method (Delbecq et al., 1975; Schmidt, 1997) for our study design. The focus and objective of the ranking-type Delphi is to seek a consensus of the relative importance of a set of issues. The characteristics of ranking-type Delphi and other different Delphi method variants are shown in Table 3. The grey marked squares illustrate our selected research approach.

Figure 1 Process steps of Delphi method to reach consensus and to rank key issues



Source: Adapted from Delbecq et al. (1975), Ekionea and Fillion (2011) and Schmidt (1997)

Regarding the panel participants involved, a differentiation between an expert in a narrow sense and in a broad sense can be observed. An expert in a narrow sense is an individual at the top of their field of knowledge derived from training or experience. In contrast, an expert in a broad sense does not necessarily have a wide range of knowledge in their own fields; their expert status results from their actual position in the decision-making hierarchy or their affiliation with an interest group. Our panel consisted of a group of experts with proven expertise in IS projects transferring knowledge to near- or offshore locations (cf. Appendix). Hence, our panelists were experts in a narrow sense.

The participating group can be partially anonymous, i.e., the participants know each other's names or directly exchange feedback, while their responses remain anonymous, or totally anonymous, i.e., panelists, as well as their responses, remain anonymous. In the series of questionnaires for the study at hand, responses were only sent to researchers who anonymised all replies. This total anonymity allowed group participants to express their judgements individually, without any influence from other panel participants.

Table 3 Characteristics of the selected Delphi method variant

Dimensions	*Characteristics*						
Focus and objective	Arguments: develop relevant arguments and expose reasons (argument Delphi)	Decisions: prepare and support decisions (decision Delphi)	Facts: elicit opinion and gain consensus (classical Delphi)	Ideas: define and differentiate views (policy Delphi)	Opinions: opinion capture in multi-disciplinary tasks (EFTE Delphi)	Rankings: consensus about the relative importance of a set of issues (ranking-type Delphi)	Scenarios: construct holistic scenarios (disaggregative policy Delphi)
Panel participant	Expert in narrow sense				Expert in broad sense		
Participating group	Restricted anonymity				Total anonymity		
Round 1 design	Qualitative				Quantitative		
Specific characteristics of panel	Size of panel should be high in absolute terms	Consider different groups of experts		Cover a high percentage of a specific group of experts	Should include a group of experts with no strong personality conflicts		Size of panel should not be too large
Issues developed from	Experience of participants			Literature review		Pilot study	
Processing of the results	IT-supported				IT-supported in real-time		

Source: Strasser (2016, p.8)

The first round was qualitative, which included open questions. This design offers freedom for experts to verify the determinants of success and failure from existing research and to provide their own determinants that positively or negatively influence knowledge transfer.

The panel size was high in absolute terms for representation of a high number of expert views. Although there is no consensus in literature on the optimal number of subjects for a Delphi study in general or a ranking-type Delphi in detail (Paré et al., 2013; Skinner et al., 2015), we followed the recommendation of Delbecq et al. (1975) and aimed to reach a panel size of approximately 30 participants.

The questions were developed through an exhaustive literature review (Strasser and Westner, 2015), complemented by the experience of the participants from the first round. For questionnaire and result processing we used the survey tool 'LimeSurvey'.

3.3 Expert selection process

Our expert selection process consisted of three steps: 1) elaboration of the expert selection criteria; 2) searching for experts that fulfil these criteria and aggregate the findings into a list of potential experts; and 3) contacting the selected experts to invite them to participate in our study.

1 Experts suitable for the study are managers or practitioners with IS off- or nearshoring experience. They should be directly involved in IS off- or nearshoring initiatives incorporating the transfer of knowledge from Germany to near- or offshore countries.

2 To identify these experts, we relied on the largest German business social network, XING. We contacted all people registered at XING who had an affiliation with near- or offshoring in Germany. For this purpose, we used the search string 'offshor* OR nearshor* OR off-shor* OR near-shor*' in 'XING's', 'I offer' to identify experts with the appropriate affiliation. In addition, we limited the search to 'Germany' in the 'region' search field.

3 As a result, 700 experts with potentially relevant expertise were aggregated in a list and contacted via XING. The first contact contained an explanation of our study, asking whether there was an interest to participate. Overall, 369 experts expressed their interest and were suitable to participate. These experts were invited by e-mail and received a link to a web page hosting the questionnaire.

3.4 Questionnaire administration process

In parallel to the expert selection process, questionnaire administration was conducted. This process consisted of three steps: 1) selecting the survey instrument; 2) administering the questions for each iteration; and 3) pre-testing and validating the design.

1 We decided to use a web-based questionnaire tool for data gathering. We compared different tools according to their features and selected LimeSurvey[1] because it was most appropriate for our research design.

2 Data gathering was undertaken in three rounds. Each iteration was intended to undertake a different step in the process of consensus building, followed by Delbecq

et al. (1975), Schmidt (1997) and Strasser (2018): brainstorming, narrowing down, and ranking (cf. Subsection 3.6).

3 The final step of the questionnaire administration process included the design of a pre-test. Five participants pre-tested each subsequent questionnaire and gave feedback. Since the Delphi method is not used to derive statistically significant results, the detection of a nonresponse-bias is not as necessary as it is for large-scale quantitative surveys (Daniel and White, 2005). Nevertheless, we compared the role and location of non-respondents to those who chose not to participate in the study. We could not determine a specific pattern of differences between the two groups. In addition, we used the cognitive method 'think aloud' to validate the questionnaire (van Someren et al., 1994) and employed statistical treatment of data with the Coefficient of Variation (CV) to measure the degree of stability and consensus (Dajani et al., 1979; von der Gracht, 2012).

3.5 Qualitative questionnaire

The first round of the study started on September 23, 2016. Three weeks later a reminder was sent, before the survey was closed after week four. The intention of the first iteration was to elicit as many items as possible from all the experts according to the determinants of success and failure of knowledge transfer. Hence, we presented the literature findings according to determinants positively or negatively influencing the knowledge transfer cf. Table 1 and Table 2) and used open-ended questions to offer freedom for experts to express their judgements according to these findings and to contribute new determinants. We provided clear instructions and asked the participants to describe the meaning of each new item. Content analysis (Collis and Hussey, 2013) was used to group the determinants and judgements suggested by participants in the first iteration into common themes. In addition, the biographical information collected in this round included the industries in which the participants gathered their IS off- or nearshoring experience, the position(s) the participants held in IS off- or nearshoring initiatives, the years of experience the participants had with IS off- or nearshoring initiatives, and whether the participant's experience was mainly based on IS off- or nearshoring initiatives. This information is shown in the Appendix.

A randomly ordered list of the results from round 1 was sent to each participant via e-mail to consolidate the list of items. After the participants commented and validated the round 1 results, the final number of items were reported to all participants. Overall, 161 participants took part in the first round of the study, which represents a response rate of 23% in relation to the initially invited 700 experts; respectively 44% in relation to the 369 experts who expressed their interest. After the first round, we decided to focus on highly experienced experts with more than ten years of IS offshoring experience. This sample (n = 53) was considered for the second round.

3.6 Quantitative questionnaire

The second iteration started on November 30, 2016. A reminder for participation within 14 days was sent to non-respondents on January 02, 2017. While our set of determinants from round one consisted of around 20 items, we went on to the ranking phase (Schmidt, 1997). Hence, the second round pursued the objective to rank all determinants. As a

ranking approach, we used best-worst scaling (BWS), as suggested by Kobus and Westner (2016), as a ranking mechanism within Delphi studies and described in detail by Strasser (2018). BWS is based upon random utility theory and is defined as "method of data collection, and/or a theory of how participants provide top and bottom ranked items on a list" (Louviere et al., 2015). The first step in implementing a BWS survey is to choose a statistical design to construct the comparison sets (Louviere et al. 2013). For this purpose, BWS studies typically use balanced incomplete block design (BIBD). A BIBD is a set of v elements, which are allocated to b k-element subsets called blocks. As a result, each element occurs r times throughout all blocks and is paired λ times with every other element. For our study, a suitable BIBD could have consisted of 21 determinants of success and 21 determinants of failure (Louviere et al., 2013; Strasser, 2018). In addition, we chose five determinants per block (k). Hence, with 21 blocks in each case, each determinant will be displayed five times, assuming the design is perfectly balanced. While answering 42 question blocks in total can be tedious and time-consuming – associated with the risk that experts might not fully complete the questionnaire – we decided to follow the recommendation of Sawtooth (2013) using the following decision rule and formula: 3K/k. K is the total number of items in the study, and k is the number of items displayed per set. Based on this rule, our questionnaire finally included in each case (success and failure) 20 determinants (K) with 5 determinants in each block (k) allocated to 12 blocks. The questionnaire was created based on this data. In the next step, we asked the 53 participants to choose the best and worst determinant from the aforementioned choice sets. After the second round, the answers given by the participants were evaluated. An individual rating of the items was calculated in the first step. This was done by calculating the item-wise difference between best and worst scores for each participant. To obtain positive-only ratings that are more familiar for rating scales, a linear transformation on the means (X) is conducted. According to Allen and Yen (2001), a linear transformation can be defined as $Y = aX + b$. In this context 'a' would be constant, 'X' would be the mean, and "b" is the number of repetitions of an item in the BIBD plus one. The resulting formula is $X^{-} = X + r + 1$.

The rating scores of each individual were then used to calculate the mean scores and the standard deviation (SD). Overall, 40 participants answered the second round of the study, which represents a response rate of 75%. As preparation for the third round, we sorted the determinants in each question block according to the group response displayed in descending order of the X^{-} value. In addition, we pre-filled each question block with the answer of each participant to enable comparison. Based upon the systematic comparison of the group answer in each question block versus their own response from the second round, these 40 participants were asked again. The participants had to consider if they wanted to revise their response based on the views of the other experts in round three and to give reasons for this revision. The intention of the third round was to gain stability and consensus (Dajani et al., 1979; von der Gracht, 2012) and to rank all items. 32 participants answered the third round of the study, which represents a response rate of 75%. While stable answers between the second and the third round were reached, we stopped the Delphi survey at this point and developed a final ranking list.

4 Results

The ranked determinants that positively influence knowledge transfer are presented in Table 4. It is obvious that the CV values of 15 determinants decrease or remain the same, while the remaining increase slightly. The individual CV difference (CV Diff) is constantly smaller than 0.1, while the absolute CV difference is ca. 0.01. Hence, stability is clearly reached and there is no need for an additional round. The consistent decrease of the CV between the second and the third round further indicates an increase in consensus (greater movement toward the mean). According to English and Kernan (1976), a CV of ≤ 0.5 indicates a good degree of consensus. Thus, the individual CV of round three clearly indicates that consensus is reached for 19 of the 20 determinants; solely, the determinant ranked on place 20 reached a CV between > 0.5 and ≤ 0.8, which indicates a less than satisfactory degree of consensus (English and Kernan, 1976). Thus, the last determinant was not considered.

The participants confirmed seven out of ten determinants from literature in the first round. 'Confirmed' means that these determinants (with an asterisk (*) in Table 4) were named by more than 50% of the 53 experts in round one and thus considered for round two and round three. Based on comments from the expert group, the designation of some tasks has been modified. Table 6 in the Appendix shows round one's results regarding the determinants that positively influence knowledge transfer from literature.

The ranking results from the achieved X^- value. The first three determinants reach an X^- value of > 5 focusing on aspects of closer cooperation. In accordance to the first determinant one participant added: "Regular collaboration is the key. This includes honest communication, i.e., that one can ask questions and is able to communicate when something is not understood or went wrong". Closer cooperation further requires trust and a willingness to help and support the offshore team and to share their knowledge. The importance of the latter determinant confirms previous research findings of Deng and Mao (2012) and Huong et al. (2011). In addition, one of the participants highlighted: "Mitigate information hiding, especially from onsite delivery. The willingness from all team members to participate and cooperate is crucial for the success of knowledge transfer."

The determinants on ranking positions four to 16 reach an X^- value of ≤ 5 up to > 3. One implies working together on real problems and challenges (ranking position four). "Only theory or training does not work. Real problems have to be solved collectively" (one participant of the study). In addition to this, online and onsite trainings and shadowing workshops with the offshore team occupy rank seven and rank ten. Hence, working together on problems from daily operations is critical, but needs to be supplemented by carrying out trainings or workshops. The latter are ranked in the top ten and used with positive effects: "We do a lot of training with the nearshore guys, both in Kiev and here in Berlin. This helps with the process and with the knowledge transfer, and gets the guys to know each other face to face." Finally, it can be noted that this ranking position encompasses five determinants that originated from previous research findings. This confirms their relevance and simultaneously illustrates their importance in contrast to other determinants.

Table 4 Ranking of the determinants that positively influence knowledge transfer

Rank	*Determinants*	*Perspective*	$\bar{X}$	*X*	*SD*	*CV R2*	*CV R3*	*CV Diff*
1	Collaborating regularly to clarify questions, solving problems together, and exchanging information on current topics.	Client	5.34	1.34	1.05	0.19	0.20	–0.01
2	Willingness to help and support the offshore team and share own knowledge and experiences.*	Client	5.16	1.16	0.91	0,19	0.18	0.01
3	Mutual trust, e.g., that mutual commitments are adhered to.	Client	5.13	1.13	1.49	0.31	0.29	0.02
4	Working together on real problems and challenges and solving them in a joint approach, creating common experience.	Client	4.88	0.88	0.99	0.24	0.20	0.04
5	Treating people fairly and respecting other cultures, behaviours, and feelings.	Client	4.81	0.81	1.24	0.28	0.26	0.02
6	Transparency regarding vision, mission, goals, actual status, and priorities.	Client	4.75	0.75	1.71	0.37	0.36	0.01
7	Carrying out online and onsite trainings and workshops with the offshore team.	Client	4.34	0.34	0.69	0.22	0.16	0.06
8	Sufficient planning and careful performing of the knowledge transfer process.*	Client	4.22	0.22	1.05	0.26	0.25	0.01
9	Clear roles and responsibilities.	Client	4.16	0.16	1.20	0.29	0.29	0.00
10	Performing shadowing workshops onsite (former people work, supplier is watching) for knowledge articulation.	Client	4.09	0.09	1.01	0.24	0.25	–0.01
11	Stimulating intrinsic and extrinsic motivations to share knowledge and collaborate.*	Client	4.03	0.03	1.53	0.43	0.38	0.06
12	Inviting people of the offshore team to the onshore location, improving tacit knowledge exchange.*	Client	3.94	–0.06	1.34	0.35	0.34	0.01
13	Good common intercultural understanding among all team members.*	Client-supplier interaction	3.88	–0.13	1.24	0.39	0.32	0.07
14	Being open-minded and involving the offshore team in discussions of onsite topics.	Client	3.84	–0.16	1.28	0.37	0.33	0.03
15	Providing all relevant information and technical material of business processes and features accessible to all team members to support knowledge transfer, e.g., via Confluence or SharePoint.*	Client	3.59	–0.41	1.27	0.41	0.35	0.06
16	Using deeply integrated collaboration tools and common ticket systems.	Client	3.03	–0.97	1.05	0.36	0.34	0.02
17	Establishing a detailed project control, progressing the knowledge transfer process, and reporting to the next higher management level.	Client	3.00	–1.00	1.39	0.50	0.46	0.03
18	Receiving site's readiness to take over the responsibility.*	Client-supplier interaction	2.97	–1.03	1.07	0.35	0.36	–0.02
19	Using an accepted and understood development methodology.	Supplier	2.44	–1.56	1.20	0.43	0.49	–0.06
20	Comparable process maturity.	Client	2.41	–1.59	1.62	0.58	0.67	–0.09

Note: Determinants with an asterisk (*) originate from literature.

Table 5 Ranking of the determinants negatively influencing knowledge transfer

Rank	*Determinants*	*Perspective*	X^{-}	*X*	*SD*	*CV R2*	*CV R3*	*CV Diff*
1	Offshore team does not ask questions in case of ambiguity or makes knowledge gaps transparent because it would unveil a lack of technical knowledge.*	Client	6.19	2.19	0.92	0.15	0.15	0.00
2	Unwillingness and disability of the onsite team to share knowledge due to, e.g., anxiousness about losing work or fear of change.*	Client	5.69	1.69	1.33	0.25	0.23	0.01
3	High fluctuation of human resources at offshore site.	Client	5.44	1.44	1.27	0.26	0.23	0.03
4	Insufficient language skills onsite and offshore.*	Client-supplier interaction	4.75	0.75	1.20	0.27	0.25	0.02
5	Conflicting operation models and lack of willingness to change existing processes.	Client	4.69	0.69	1.40	0.30	0.30	0.00
6	Limited initiative or use of experience to achieve positive results and only following instructions.*	Client	4.66	0.66	1.08	0.24	0.23	0.00
7	Inadequate documentation with inconsistent terminological definitions that are not centrally accessible.	Client	4.19	0.19	1.33	0.30	0.32	–0.01
8	Lack of cultural understanding leads to cultural differences in knowledge transfer process.*	Client-supplier interaction	4.03	0.03	1.29	0.34	0.32	0.03
9	Laws and regulations that do not allow the transfer of processes or data into other countries.*	Client	4.00	0.00	1.35	0.42	0.34	0.08
10	High ratio of remote knowledge transfer, sparsely joint onsite work at the same location.	Client	3.88	–0.13	0.96	0.26	0.25	0.01
11	Limited background knowledge relevant to the project on the provider side.*	Client	3.84	–0.16	0.94	0.29	0.24	0.05
12	Low technical capabilities in the offshore team.	Client	3.72	–0.28	1.23	0.33	0.33	0.00
13	Absence of a common knowledge base.	Client	3.69	–0.31	0.92	0.29	0.25	0.04
14	Lack of soft skill competencies in the offshore team.*	Client	3.66	–0.34	1.02	0.33	0.28	0.05
15	Lack of transparency regarding what knowledge is available and where.*	Client	3.63	–0.38	0.82	0.25	0.23	0.02
16	Lack of common rules.*	Client	3.44	–0.56	0.93	0.27	0.27	0.00
17	Lack of informal network relationships to share knowledge.*	Client-supplier interaction	3.13	–0.88	0.82	0.36	0.26	0.10
18	Missing technical equipment or lack of tools for knowledge transfer.	Client	2.59	–1.41	1.14	0.41	0.44	–0.03
19	Contractual limitations on time.	Client	2.47	–1.53	1.03	0.40	0.42	–0.02
20	Latency time using IT and media, e.g., in video conferences.*	Client-supplier interaction	2.34	–1.66	1.19	0.50	0.50	0.00

Note: Determinants with an asterisk (*) originate from literature.

The last three determinants, 17 to 19, reach an X^- value of ≤ 3. These determinants focus on project control, responsibility, and the usage of an accepted and understood development methodology. Establishing a detailed project control to progress the knowledge transfer process and to report to the next higher management level reaches the 17th ranking position. Two participants added: "Transparent and tight control supports performance reflection for all participants", while "The true performance is measured by key performance indicators, [i.e.] responsiveness and right understanding of prioritisation of tasks". Smite and Wohlin (2011) found that the receiving site's readiness to take over the responsibility is a key condition for effective knowledge transfer. While this determinant was considered important in round 1, it is – compared to the other determinants – of minor importance after round 3, achieving an 18th position on the ranking list. The usage of an accepted and understood development methodology reached the last (19th) ranking position. We did not consider the determinant on the last (20th) position, process maturity, because it did not reach a good degree of consensus.

The ranked determinants that negatively influence knowledge transfer are presented in Table 5. It is obvious that the CV values of 17 determinants decrease or remain the same, while the rest increase slightly up to 0.03. The individual CV difference is constantly smaller or equal to 0.1, while the absolute CV difference is ca. 0.02. Hence, stability is clearly reached and there is no need for an additional round. The consistent decrease of the CV between the second and the third round indicates an increase in consensus. The CV values of round three show a good degree of consensus in accordance with English and Kernan (1976). Hence, consensus is reached for all 20 determinants.

The participants confirmed twelve out of 17 determinants from literature in the first round. "Confirmed" means that these determinants (with an asterisk (*) in Table 5) were named by more than 50% of the 53 experts in round one and thus considered for round two and round three. Based on comments from the expert group, the designation of some tasks has been modified. Table 7 in the Appendix shows round one's results regarding the determinants that negatively influence knowledge transfer from literature.

As previously mentioned, the ranking results from the X^- value, the first three determinants reach an X^- value of > 5 concerning fears and fluctuation of human resources. One participant explained: "The offshore team is not able to address knowledge gaps and ask questions. We can only guess whether they really understand the information. A lack of technical knowledge would never be openly admitted." This finding confirms previous research (Wende et al., 2013) and thereby underlines the importance of these determinants according to their negative influence on knowledge transfer. In addition, "Knowledge transfer needs to be repeated endlessly due to fluctuation [of human resources] at the offshore site." Conversely, there are also fears for the onsite team, such as anxiousness over losing work or other changes. Consequently, an unwillingness and disability to share knowledge with the offshore team arises and negatively affects the knowledge transfer. One participant of the study stated: "Nobody will help to eliminate their own job. Change is always outside the comfort zone." This finding confirms Betz et al. (2014) and underlines the importance of this determinant.

The determinants on ranking positions four to 17 reach X^- values of ≤ 5 up to > 3. It is apparent that knowledge transfer is negatively influenced due to a lack of different skills and competencies, primarily at the offshore site. This includes insufficient language skills (ranking position four), limited background knowledge relevant to the project (ranking position six), lack of soft skills (ranking position 14), and low technical

capabilities (ranking position 12). The first three confirm previous studies by Betz et al. (2014), Huong et al. (2011), and Wende et al. (2013), while the last determinant supplements them. One participant makes a comparison: "I find that the skill level compared to our own test managers is very theoretical with limited experience. Most solutions come from the internet and not [result] from experiences." Another indicates the level of difficulty: "Simple jobs are fine, but complicated [tasks] need massive support from the onsite team and this isn't possible every time." Furthermore, two determinants relate to the usage of explicit knowledge. Inadequate documentation with inconsistent terminological definitions (ranking position seven), as well as the absence of a common knowledge base (ranking position 13), negatively influence the knowledge transfer. A participant of the study explained: "Legacy systems or systems that were used for a long time often do not have proper documentation. Knowledge is kept within heads." Finally, it can be noted that this ranking position encompassed nine determinants that originated from previous research findings. This confirms their relevance and simultaneously illustrates their importance in contrast to other determinants.

The last three determinants reach X^{-} values of ≤ 3. These determinants focus on IT (equipment) and contractual limitations. Missing technical equipment or lack of tools for knowledge transfer is placed in the last three rankings (ranking positions 18 and 20). Finally, according to one participant, contractual limitations (ranking position 19) influence knowledge transfer: "The service provider does not allocate enough time to process information after knowledge transfer sessions due to contractual limitations." Betz et al. (2014) found that the latency time using IT and media negatively impact knowledge transfer, for example, in video conferences. While this determinant was considered as important in round one, it is – compared to the other determinants – of minor importance, achieving the last place on the ranking list.

5 Conclusions

Knowledge transfer from client to service provider is associated with numerous challenges and is of major importance to the success of IS offshoring initiatives. We, therefore, conducted a ranking-type Delphi study and questioned 32 experts from Germany with more than ten years of experience in IS near- or offshoring initiatives. Our study included one qualitative and two quantitative rounds. In the first qualitative round, we presented the literature findings of previous research and used open-ended questions to encourage experts to express their judgements according to these findings and to contribute new determinants of success and failure. In the second and third rounds, the participants ranked the set of determinants in order of importance using a BWS approach. We found a consensus among the group of experts according to 19 determinants of success and 20 determinants of failure.

The three most important determinants of success focus on aspects of closer cooperation. This includes

1 collaborating regularly to clarify questions, solving problems together, and exchanging information on current topics
2 a willingness to help and support the offshore team and share personal knowledge and experiences
3 mutual trust.

We further found that working together on problems from daily operations is critical, but needs to be supplemented by carrying out training or workshops. The last three determinants of success focus on aspects related to project control, responsibility, and use methods. This includes:

1 Establishing a detailed project control to progress the knowledge transfer process and to report to the next higher management level.

2 Receiving a site's readiness to take over the responsibility.

3 The usage of an accepted and understood development methodology.

The three most important determinants of failure concern fears and fluctuation of human resources. This includes:

1 The fact that the offshore team does not ask questions in case of ambiguity or makes knowledge gaps transparent because it would unveil a lack of technical knowledge.

2 The unwillingness and disability of the onsite team to share knowledge due to, e.g., anxiousness over losing work or fear of change.

3 High fluctuation of human resources at an offshore site.

Another finding was that the knowledge transfer is negatively influenced due to a lack of different skills and competencies, primarily at the offshore site. This includes insufficient language skills, limited background knowledge relevant to the project, lack of soft skill competencies, and low technical capabilities. In addition, the transfer of explicit knowledge is impeded while adequate documentation with consistent terminological definitions as well as a common knowledge base is lacking. The last three determinants of failure focus on IT (equipment) and contractual limitations, encompassing

1 missing technical equipment or lack of tools for knowledge transfer

2 contractual limitations on time

3 latency time using IT and media, for example, in video conferences.

There are limitations to acknowledge in this study. First, the sample was exclusively from Germany. Firms in different countries have different working cultures and practices, and this limits the generalisability of our findings. Second, we focused on knowledge transfer from German clients to near- or offshore suppliers. Other knowledge transfer directions, e.g., from supplier to the client (back-sourcing) or from supplier to supplier (multi-sourcing) may include other influencing determinants.

In reference to these results, several opportunities for future research become apparent. In order to verify our results or to explain the differences, future studies could investigate other countries and knowledge transfer directions, e.g., from supplier to vendor in the context of back-sourcing or from vendor to vendor within multi-sourcing. In addition, Remus and Wiener (2008) identified that the focus of research according to critical success and failure determinants focuses on the identification of influencing determinants, while the analysis along the stages of an IS project is lacking. Hence, we recommend to further examine our findings in relation to the different phases of knowledge transfer.

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Notes

1 URL to the first questionnaire: http://offshoring-studie.de/index.php/737619?lang=en, Version: 2.50+, Build 160616.

Appendix 1

Descriptive information regarding the Delphi study expert panel (N = 32); multiple answers were possible (Figure 2 and Figure 3)

Figure 2 Industry experience (see online version for colours)

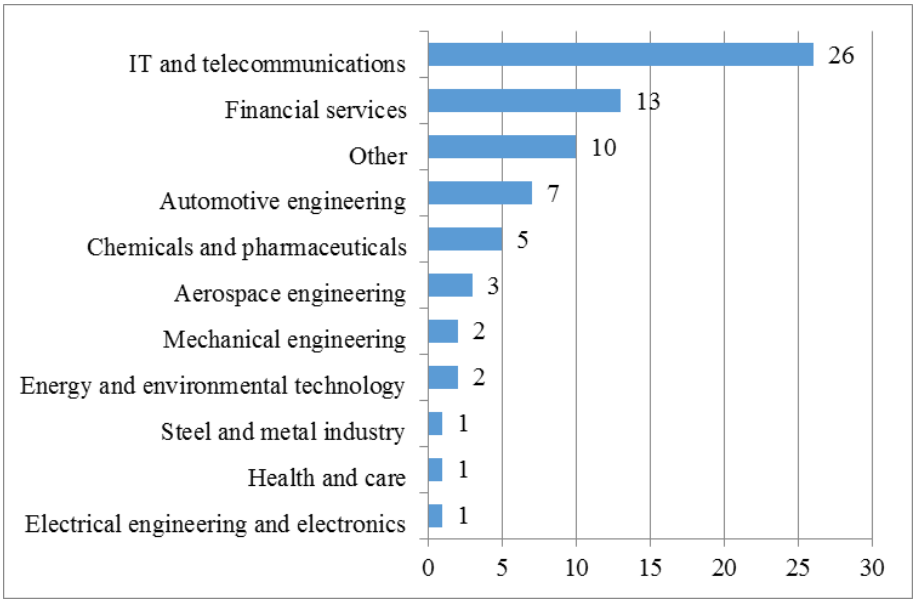


Figure 3 Positions held in is off- and nearshoring projects (see online version for colours)

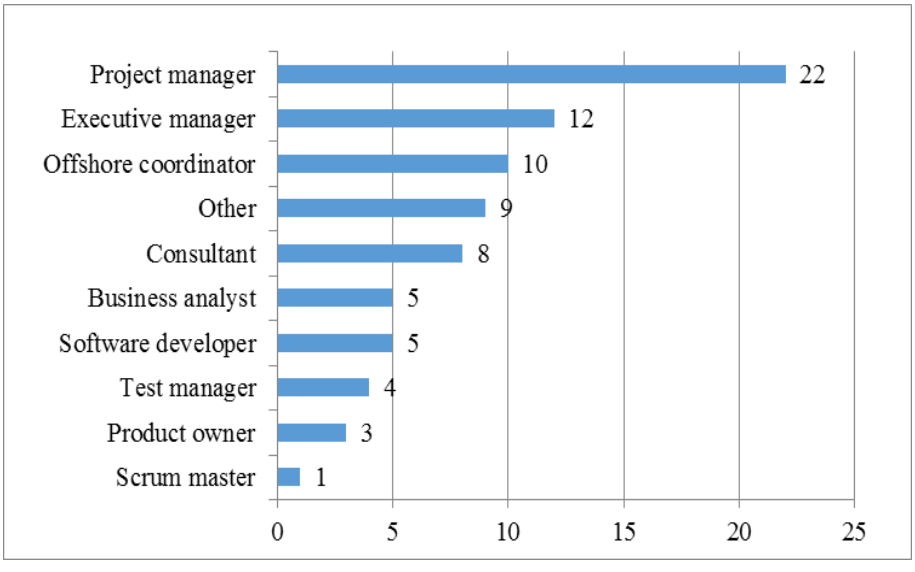


Figure 4 Years of IS off- or nearshoring experience (see online version for colours)

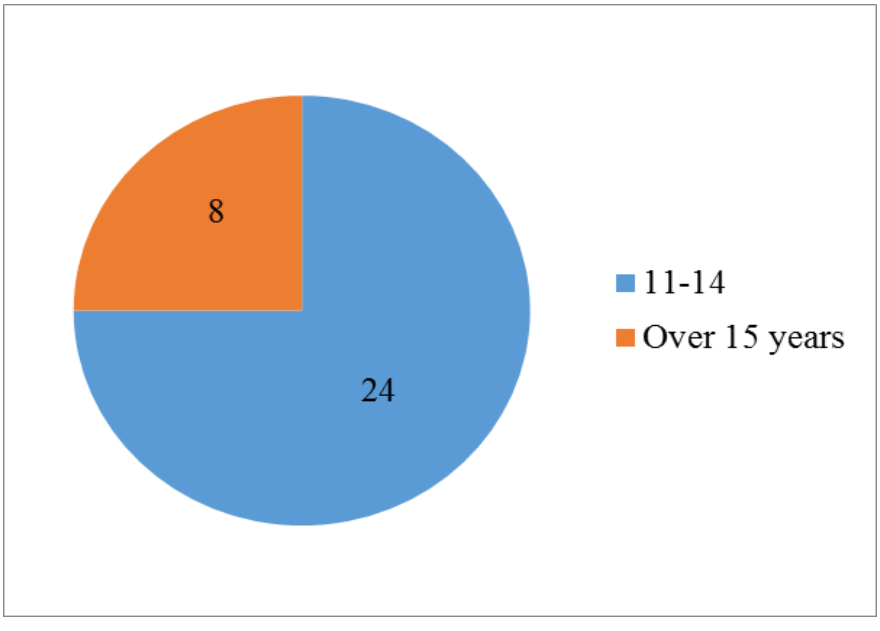
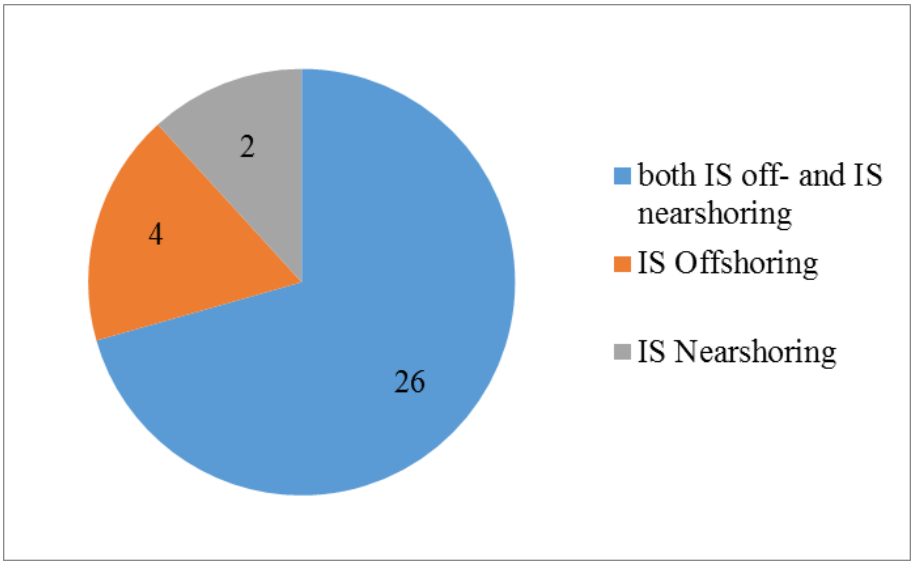


Figure 5 IS near and/or IS offshoring experience (see online version for colours)



Appendix 2

Round 1 results according to determinants from literature influencing knowledge transfer positively or negatively.

Table 6 Round 1 results regarding determinants from literature positively influencing knowledge transfer

Determinants from literature	*Designation after feedback in round 2 and round 3*	*Number of references*	*Considered for rankings*
Willingness to participate and cooperate	Willingness to help and support the offshore team and share own knowledge and experiences.	38	Yes
Support from the knowledge source	Providing all relevant information and technical material of business processes and features accessible to all team members to support knowledge transfer, e.g., via Confluence or SharePoint.	37	Yes
Good impressions of each other	Good common intercultural understanding among all team members.	34	Yes
Sufficient planning and careful implementation	Sufficient planning and careful performing of the knowledge transfer process.	33	Yes
Readiness to take over responsibility	Receiving site's readiness to take over the responsibility.	32	Yes

Note: Determinants with more than 26 references (from 53; i.e., > 50% of the participants) considered for rankings in round 2 and round 3.

Table 6 Round 1 results regarding determinants from literature positively influencing knowledge transfer (continued)

Determinants from literature	*Designation after feedback in round 2 and round 3*	*Number of references*	*Considered for rankings*
Gain tacit knowledge by incorporation within the client	Inviting people of the offshore team to the onshore location, improving tacit knowledge exchange.	30	Yes
Stimulating motivation to share knowledge	Stimulating intrinsic and extrinsic motivations to share knowledge and collaborate.	29	Yes
Codified knowledge through formal training	-	18	No
Right balance between formal and informal techniques	-	18	No
Use of active learning mechanism	-	18	No

Note: Determinants with more than 26 references (from 53; i.e., > 50% of the participants) considered for rankings in round 2 and round 3.

Table 7 Round 1 results regarding determinants from literature negatively influencing knowledge transfer

Determinants from literature	*Designation after feedback in round 2 and round 3*	*Number of references*	*Considered for round 2*
Challenging to address knowledge gaps in the midst of the project and to ask questions that would unveil a lack of technical knowledge	Offshore team does not ask questions in case of ambiguity or makes knowledge gaps transparent because it would unveil a lack of technical knowledge.	39	Yes
Lack of communication and cooperation competency	Two determinants specified: 1 Lack of soft skill competencies in the offshore team. 2 Insufficient language skills onsite and offshore	38	Yes
Cultural differences	Lack of cultural understanding leads to cultural differences in knowledge transfer process	37	Yes
Difficulty maintaining informal networks	Lack of informal network relationships to share knowledge.	34	Yes
Unwillingness and disability to share knowledge	Unwillingness and disability of the onsite team to share knowledge due to, e.g., anxiousness about losing work or fear of change.	33	Yes

Note: Determinants with more than 26 references (from 53; i.e., > 50% of the participants) considered for rankings in round 2 and round 3.

Table 7 Round 1 results regarding determinants from literature negatively influencing knowledge transfer (continued)

Determinants from literature	*Designation after feedback in round 2 and round 3*	*Number of references*	*Considered for round 2*
Little background or business knowledge on provider side	Limited background knowledge relevant to the project on the provider side.	32	Yes
Communication barriers	Specified to two determinants:		
	1 Offshore team does not ask questions in case of ambiguity or makes knowledge gaps transparent because it would unveil a lack of technical knowledge.		
	2 Insufficient language skills onsite and offshore.	32	Yes
Strong data protection laws in western countries	Laws and regulations that do not allow the transfer of processes or data into other countries.	31	Yes
Only following instructions and not using their initiative or experience to achieve positive results	Limited initiative or use of experience to achieve positive results and only following instructions.	29	Yes
Lack of transparency regarding what knowledge is available and where	Lack of transparency regarding what knowledge is available and where.	28	Yes
Latency time using IT and media	Latency time using IT and media, e.g., in video conferences.	27	Yes
Lack of common rules	Lack of common rules.	27	Yes
Missing backflow of knowledge	-	20	No
Lack of equivalence in individual competence	-	17	No
Difficulties in knowledge cooperation	-	15	No
Hidden (extra) costs	-	14	No
Using usual media mix without any adaptation to the project context by the client	-	11	No

Note: Determinants with more than 26 references (from 53; i.e., > 50% of the participants) considered for rankings in round 2 and round 3.