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## Information Systems Offshoring—A Literature Review and Analysis

Martin Wiener

*School of Business and Economics, University of Erlangen-Nuremberg, martin.wiener@wiso.uni-erlangen.de*

Bianca Vogel

*School of Business and Economics, University of Erlangen-Nuremberg*

Michael Amberg

*School of Business and Economics, University of Erlangen-Nuremberg*

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# Communications of the Association for Information Systems

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## Information Systems Offshoring—A Literature Review and Analysis

Martin Wiener

*School of Business and Economics, University of Erlangen-Nuremberg*  
*[martin.wiener@wiso.uni-erlangen.de](mailto:martin.wiener@wiso.uni-erlangen.de)*

Bianca Vogel

*School of Business and Economics, University of Erlangen-Nuremberg*

Michael Amberg

*School of Business and Economics, University of Erlangen-Nuremberg*

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### Abstract:

IS offshoring has become one of the most discussed phenomena in IS research and practice. Particularly due to its rapid evolution, current research on IS offshoring lacks a consolidated view on existing results. The article at hand seeks to meet this need by systematically reviewing and analyzing prior academic literature on IS offshoring. Based on a review of top-ranked IS and management journals as well as IS conference proceedings, we compile an exhaustive bibliography of ninety-six publications solely focusing on IS offshoring from a (project) management perspective. To adequately address the immense diversity of these publications, a multi-perspective research framework consisting of three perspectives, namely, research focus, research approach, and reference theory, is introduced and forms the basis for our literature analysis. The analysis results confirm the appropriateness of our framework and reveal directions for future research along the framework perspectives: Most importantly, in an effort to increase the significance and the trustworthiness of their results, researchers should apply a more theory-driven approach and provide a better description of their research context. Moreover, future research needs to pay particular attention to the pre-implementation stages of an IS offshoring initiative as well as the special nature of nearshoring and captive offshoring. Across all project stages, researchers should not only concentrate on the client point of view but incorporate multiple points of view.

**Keywords:** IS offshoring, literature review, state of the art analysis, multi-perspective framework, research foci, research approaches, reference theories

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## I. INTRODUCTION

Companies are increasingly outsourcing some or all of their information systems (IS) functions [Dibbern and Heinzl, 2009]. Alongside the concentration on core competences, the major reason for engaging in IS outsourcing projects is cost reduction [e.g., Apte and Mason, 1995; Currie et al., 2003; Allweyer et al., 2004; Rottman and Lacity, 2004]. This can primarily be reached through economies of scale and scope on the part of the service provider. However, as long as the provider operates in the same country, the achievable cost savings are limited [Buchta et al., 2004]. These restrictions on cost savings as well as the continuous increase in global competition prompted companies worldwide to look for new profitable ways to structure their IS operations. In this context, the labour costs differences and the large pool of highly qualified workers in low-wage countries like India promoted the trend to IS offshoring (ISO) [e.g., Heeks et al., 2001; Sahay et al., 2003; Willcocks and Lacity, 2006]. This specific form of international trade is existent as soon as companies relocate IS services to a supplier in low-cost destinations such as China, India, or the newly added EU countries [Broß, 2005; Carmel and Tjia, 2005].

The ISO trend has received widespread attention as it influences the activities for a diverse set of stakeholders [Niederman et al., 2006]: persons working in the IT industry or considering a career in this industry, organisations buying or offering IS services (or considering to do so), as well as nations or regions competing to retain IS work domestically or to attract the offshoring of such work. Regardless of the specific perspective, it can be argued that ISO is a significant global phenomenon that demands attention and understanding. The high relevance of this phenomenon is also confirmed and highlighted by King and Torkzadeh [2008, p. 205]:

*The offshoring of information systems and services has been one of the most discussed phenomena in IS in recent years; it has significantly influenced the thinking of both academics and practitioners. The extent of offshoring of information technology-related services has been significant and the trend seems likely to continue in the foreseeable future.*

Despite its high relevance, current research on ISO lacks a consolidated view on existing research results [Mertens et al., 2005; Wiener, 2006]. In this context, Dibbern et al. [2004] provide an extensive literature review on (national) IS outsourcing research. Even though the fields of IS outsourcing and offshoring are closely related, we believe that ISO requires a dedicated review. Primarily, this can be reasoned by the special nature of ISO, resulting from cultural [Winkler et al., 2008], geographic [Carmel and Agarwal, 2002], geopolitical [Ranganathan and Balaji, 2007], infrastructure [Rao, 2004], language [Zatolyuk and Allgood, 2004], legal and security [Balaji and Ranganathan, 2006], as well as time zone differences [Rottman and Lacity, 2004] between the client and the supplier country. Here, prior research reviews on ISO either focus on a descriptive meta analysis of relevant literature [e.g., Westner and Strahringer, 2007], limit their analysis to one specific journal (issue) [e.g., King and Torkzadeh, 2008], or only examine possible economic implications for different stakeholder groups [Niederman et al., 2006]. However, none of these studies provides an in-depth analysis of current ISO research from a (project) management perspective. The article at hand aims to fill this gap by systematically reviewing and analyzing prior academic literature on ISO. Its main objectives are to identify relevant research contributions, to organize these contributions in a multi-perspective research framework, and to derive implications and directions for future research.

In the style of Westner and Strahringer [2007], our article applies an IS managerial point of view. Furthermore, by following the methodological approach employed by Dibbern et al. [2004], it ensures continuity and comparability of research results. According to these authors, literature reviews are typically concerned with examining the progress in a specific research field. However, due to the relative newness of ISO, the article at hand rather aims at giving a first detailed overview of research activities in this field.

The article is structured as follows: the next section positions ISO in the research context. We then introduce the analytical framework, describe our literature review procedure, and present our findings. Finally, we summarize and discuss the article's implications.

## II. RESEARCH BACKGROUND

### IS Offshoring Definitions and Concepts

ISO basically refers to the relocation of IS activities and processes to any country outside the home country [Carmel and Tjia, 2005]. Here, the term *offshoring* has taken on a somewhat new meaning [Holmström Olsson et al., 2008]. From originally being used for describing tax havens such as the Cayman Islands offshore the US coast, it is commonly understood as the shifting of tasks to low-cost destinations [Carmel and Tjia, 2005]. Low-cost destination countries typically fall into the economic group of developing or emerging nations, such as Brazil, Russia, India, China (BRIC countries), or Romania and Israel.

In practice, a multitude of variations of ISO has emerged. This development can primarily be traced back to the wide array of different requirements companies pose during an ISO project. In order to create a consistent understanding of relevant concepts in the field of ISO on the one hand, while drawing a clear line between different concepts on the other hand, Amberg and Wiener [2006] distinguish between three dimensions of ISO concepts: *function* (What IS services shall be offshored?), *degree* (To what extent shall IS services be offshored?), and *ownership* (What property model shall be used?). Based on Westner and Strahringer [2007], a fourth ISO dimension can be added: *distance* (To what country or region shall IS services be offshored?). Table 1 gives an overview of these four dimensions and the associated concepts.

**Table 1: ISO Dimensions and Concepts**

Dimension	Concepts		
Function	Infrastructure	Application	Process
Degree	Selective		Total
Ownership	Internal	Partial	External
Distance	Nearshore		Farshore

It is important to note that the concepts for each dimension do *not* represent scaled variables but categories. For example, Table 1 aims at structuring the solution space rather than rating the dimension-specific concepts.

**Function:** Regarding the type of IS services relocated in an ISO initiative, it can generally be distinguished among an infrastructure, an application, and a process level [e.g., Allweyer et al., 2004]. On a process level, entire business processes, such as call centre and helpdesk operations are offshored. This concept is also referred to as *offshore business process outsourcing* (BPO). While the application level encompasses the offshoring of software (re-) development projects, the offshoring of network or server management operations is related to a company's IT infrastructure.

**Degree:** Dearden [1987] predicted that the in-house IS function would disappear. He argued that, due to their specialization on specific IS services, spinoffs and external service providers would achieve advantages in terms of quality and costs over internal IS organisations. However, in spite of the increasing number of IS outsourcing and offshoring deals worldwide, the in-house IS function has not yet disappeared. Here, instead of outsourcing their entire IS function (total), firms opted for outsourcing particular IS functions or parts of these functions (selective) [Dibbern and Heinzl, 2009]. This finding is especially true for ISO. Consequently, total offshoring can be regarded as a rather theoretical option.

**Ownership:** IS services can be offshored to a separate but captive organisational unit which is located in a foreign country (internal). If such a unit is jointly owned between the client and the vendor, this is referred to as *joint venture* or *strategic alliance* (partial). If the ownership is completely handed over to a third party vendor, we call this *traditional offshore outsourcing* (external). In this sense, ISO can be regarded as an extension and a modification of IS outsourcing: as an extension because ISO projects can be performed by both third party vendors (*offshore outsourcing*) and subsidiaries, joint ventures, or strategic alliances (*captive offshoring*); as a modification because offshored IS services are rendered by a supplier organisation located outside the borders of the client organisation's country, while the classic outsourcing of IS functions requires a service provider situated in the same country as the client [e.g., Adelakun and Jennex, 2003; Haried and Nazareth, 2005].

**Distance:** Depending on the distance between the origin and destination country, ISO can be categorized into near- and farshoring [Amberg and Wiener, 2006; Westner and Strahringer, 2007]. Nearshoring refers to sourcing IS work to a supplier country that is relatively close in distance or time zone (or both) to the client country [Carmel and Abbott, 2007]. From the perspective of a German client company, countries such as the Baltic States, the Czech Republic, Poland, and Romania are regarded as nearshore countries. Potential farshore countries include India, China, and other similarly distant nations or regions, again observed from a German client point of view.



In this article, we follow Carmel and Tjia's [2005] general definition of ISO. Consequently, offshore outsourcing and captive offshoring are considered to be options for the performance of offshored IS services. This is also compliant with Davis et al.'s [2006, pp. 771–772] ISO definition:

*Offshoring is defined as the provision of organizational products and services from locations in other countries, whether they are actually overseas or not. This may be accomplished in one of two ways. First, an organization may outsource some of its activities to service providers in other countries.... Second, the organization may set up service operations in the other countries.*

By definition, ISO incorporates the relocation of IS services from a client organisation to some kind of supplier organisation. Hence, we can differentiate between the client and supplier perspective. Moreover, the client or the supplier may ask for support by a consulting firm, an intermediary, or a “bridge” company [Holmström Olsson et al., 2008], adding a third perspective on ISO. Furthermore, in line with the definitions above, we subsume the terms *near-* and *farshoring* under the term *ISO* in the following.

## IS Offshoring History and Market

Offshoring has been discussed as an organisational and a societal issue since the dawn of the Industrial Revolution [Davis et al., 2006]. In that respect, offshoring is not a new phenomenon but rather a new version of Ricardo's [1821] principle of achieving greater total profit by specialization and trade. Until the end of the twentieth century, offshoring was limited to manufacturing [Davis et al., 2006; Holmström Olsson et al., 2008]. Since then, companies started to increasingly apply this powerful concept to IS services.

ISO made first waves in the 1980s as primarily US-based companies began to relocate labour-intensive IS services to nearby countries like Mexico or Canada. Soon thereafter, countries such as Ireland, Israel, and India emerged as attractive destination countries for ISO because of the low costs for qualified IT personnel and the English working language. In the mid 1990s, ISO evolved considerably, most notably due to the remarkable differences in labour costs [Schaaf, 2004] and the lack of qualified staff in the booming IT industry [Adelakun and Jennex, 2003].

In the late 1990s, the offshoring of software development activities particularly became popular [Adelakun and Jennex, 2003; Delmonte and McCarthy, 2003]. This can be attributed to the Y2K problem as well as the conversion of systems to accommodate the European change in currency to the euro [Amoribieta et al., 2001; Mani and Rajkumar, 2001]. Furthermore, significant advances in telecommunications technologies enabled companies in low-wage countries to provide the requested development services [Nicholson and Sahay, 2001; Gopal et al., 2002]. This was coupled with the pressure that North American and European firms were facing to meet their shortages in software development manpower. However, especially in the US, the idea of a shortage of IT labour is controversial. Here, many IT employees were laid off and find it difficult to get rehired while IT firms claim a shortage. Hence, the IT labour shortage seems to be not only a question of manpower but also of IT skills and budgets.

Since the beginning of the twenty-first century, the high demand for e-business and web-based software solutions [Mani and Rajkumar, 2001; Adelakun and Jennex, 2003], as well as the maintenance and the reengineering of legacy systems [Schaaf, 2004] can be seen as major drivers for the enduring ISO trend. In the US, to some extent this trend might even have been fortified by the reduction of the annual cap level for H-1B visas from 195,000 to 65,000 in 2004 [Gower, 2010]. At that time, already two out of five Fortune 500 companies offshored IS services [Amoribieta et al., 2001]. In addition, the implementation of ISO projects ranked high in many organisations' to-do-lists for the next years [Jacobson and Lidman, 2004].

Nowadays, ISO can be considered an established business practice in the US [Allweyer et al., 2004; King, 2005]. At present, 70 to 80 percent of all ISO projects worldwide are commissioned by US companies. In this context, approximately 20 percent of these companies' IT budgets is spent in low-wage countries, of which more than 80 percent is invested in India [Buchta et al., 2004]. Here, according to a study by Farrell [2004], the US economy gains more than one dollar of new wealth for every dollar of corporate spending abroad.

In the 2010s, the rising trend to ISO has also reached Europe. 40 percent of the 500 largest companies in Western Europe have already begun offshoring IS services [Farrell, 2004]. The majority of European companies with offshore experience are located in the UK, which accounts for almost two thirds of the European ISO market [Eichelmann et al., 2004]. Particularly culture- and language-related advantages of UK-based companies facilitate the relocation of IS services abroad [Buchta et al., 2004].

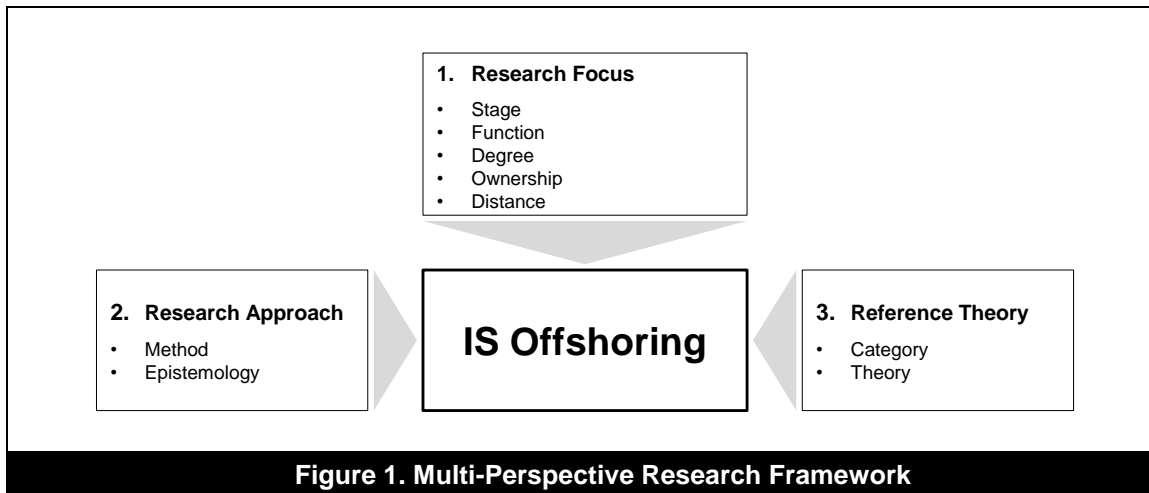
Buchta et al. [2004] assume that, in comparison to English-speaking companies, other European companies are at least three years behind. This becomes particularly evident when, for example, considering the size of the German ISO market. With a total volume of 0.4 billion euros in 2003 (compared to a 54 billion euros US market), the German

market is still in its fledgling stages [Broß, 2005]. This low market maturity can be traced back to structural issues of the German IS market (e.g., high vertical integration, small number of strong relationships with local IS service providers), cultural and linguistical issues of German companies, as well as the country's decision to fight the lack of qualified IT staff by granting green cards to IT experts from foreign countries in the 1990s [Buchta et al., 2004]. However, against the background of the existing cost-saving potential and the continuing IS worker shortage (*client push*), as well as the increasing saturation of the US market (*vendor push*), a significant growth of the German and other European ISO markets can be expected.

### III. RESEARCH APPROACH OF THE REVIEW

#### Analytical Framework

To structure prior literature in the ISO domain as well as to summarize, organise, and discuss knowledge related to this domain, we develop and apply a systematic research framework in the style of Alavi and Leidner [2001]. The three perspectives of our framework—namely, research focus, research approach, and reference theory—are adopted from the work by Dibbern et al. [2004] and illustrated in Figure 1. Each framework perspective is presented in more detail in the following sections.



#### Research Focus

ISO initiatives can be divided into several phases or stages. In this context, Dibbern et al. [2004] adapted Simon's [1960] decision-making model and derived a five-stage IS outsourcing model. Westner and Strahringer [2007] transferred this model to ISO, thereby confirming its general suitability for the field. However, their analysis also indicates that it is difficult to draw a clear line between the decision process ("which"-stage) and its implementation ("how"-stage). Therefore, we decided to consider the "which"-stage as an integral part of the subsequent "how"-stage, resulting in the following four stages:

- **"Why"** examines the determinants that lead to the consideration of ISO as a sourcing option. Research at this stage aims at understanding potential advantages (or benefits) and disadvantages (or risks) associated with ISO.
- **"What"** looks at the different design alternatives of ISO arrangements in regard to functional and structural aspects (e.g., degree and ownership).
- **"How"** analyzes the ISO decision and its implementation, especially the governance, the organisation and the management of a respective project. However, research at this stage does not take into account the project outcome or quality but focuses on the project implementation.
- **"Outcome"** addresses the results of the implementation of ISO initiatives. More specifically, it relates to best practices, types of success, and the various determinants for success.

Beside the ISO stage, the research focus perspective also deals with the four ISO dimensions (function, degree, ownership, and distance) and the related concepts introduced above.

## Research Approach

Galliers [1991] differentiates between research approaches and methods. While approaches are generic ways of doing research, methods are more focused techniques and procedures for conducting research. For this reason, Dibbern et al. [2004] consider methods as one dimension of a research approach. Another dimension is the epistemology [Lee, 1991; Orlikowski and Baroudi, 1991].

By adopting Dibbern et al.'s [2004] view on research approaches, we first differentiate between empirical and non-empirical approaches based on whether some kind of empirical method was used or not. The resulting two groups are further divided into subgroups in terms of epistemological types.

- Regarding **empirical approaches**, we distinguish between two basic types of epistemology: interpretivism and positivism. Furthermore, we treat descriptivism as a separate type of epistemology.
- **Non-empirical approaches** can be classified as either conceptual or mathematical. Mathematical research usually deals with numeric models and analyses which are based on a set of restrictive assumptions. Conceptual research typically aims at developing frameworks or providing management guidelines. In terms of epistemology, both approaches are positivist in nature.

## Reference Theory

The field of IS outsourcing/offshoring can be traced back to numerous theories. All of these theories may prove to be useful for determining which software services shall be offshored and how these services shall be managed.

Dibbern et al. [2004] adapted the structuring approach of Kim and Lee [1999], hereby combining relevant theories into three categories (in alphabetical order):

- **Economic theories** concentrate on the coordination and the regulation of economic agents or units in regard to their interactions with one another. Reference theories in this category include: agency theory, transaction cost theory, and international trade theories.
- **Social and organisational theories** focus on different types of relationships that exist between individuals, groups, and organisations. Relevant reference theories are: social exchange theory, power and politics theories, as well as relationship theories.
- **Strategic theories** deal with a company's efforts for developing and implementing strategies which give it a (sustainable) competitive advantage. This category comprises reference theories like: resource-based view, resource dependency theory, and strategic management theories.

## Review Procedure

### Identification Process

The identification process involved four sub-steps: conference and journal definition, time frame definition, manual search, and database search: In our literature review, we focused on the top international IS journals. Beside the "senior scholars' basket" of IS journals [AIS, 2009], we included four other renowned and three niche IS journals. These niche journals are particularly interesting as they either have a specific focus on global IS issues (JGIM and JGITM), or have already published a special issue on IS sourcing (ISF). Because of the newness of our research topic, our review also comprised major IS conferences. To ensure that our bibliography was as inclusive as possible, we also considered top management journals. Taking into account the strong applied nature of IS outsourcing/offshoring [Dibbern et al., 2004], we scanned applied management journals as well. Table 2 gives an overview of included sources (listed alphabetically within each category).

Beside technological advances and the increasing globalization in the last decade, the Y2K problem can be regarded as one major driver of ISO worldwide [e.g., Amoribieta et al., 2001]. For this reason, we limited our literature review to publications between 1999 and 2009. By spanning a ten year period, we believe that our review covers an adequate time frame.

To identify possibly relevant articles, we manually examined the mentioned journals and conference proceedings within the specified time frame. This manual search took place from June 2009 to February 2010. In this process, we broadly searched for keywords like *offshoring*, *offshore*, *outsourcing* in the article titles and abstracts. At this early stage, we also included papers on IS outsourcing in general. Based on the manual search, we identified a total of 443 publications. To double-check the completeness of our identification process, we conducted an additional database search for all of the included journals and conference proceedings from August 2009 to June 2010. Here,

we used advanced search methods, including Ferber's [2003] stemming approach (mapping of words to their normalized forms) and the unlimited truncation option (retrieval of all possible suffix variations of a root word). By entering both *offshor\** and *outsourc\** as search terms, we were able to find articles which do not explicitly refer to offshoring but to *global* or *international* outsourcing. The automated search identified ninety-one additional literature items, resulting in a preliminary list of 534 items at the end of the initial identification phase.

**Table 2: Overview of Included Journals and Conferences**

<b>IS Journals</b>	<b>Niche IS Journals</b>
Communications of the ACM (CACM)	Information Systems Frontiers (ISF)
Communications of the Association for Information Systems (CAIS)	Journal of Global Information Management (JGIM)
European Journal of Information Systems (EJIS)	Journal of Global Information Tech. Management (JGITM)
Information Systems Journal (ISJ)	<b>Management Journals</b>
Information Systems Research (ISR)	Academy of Management Journal (AMJ)
Information & Organization (I&O)	Academy of Management Review (AMR)
Journal of the Association for Information Systems (JAIS)	Administrative Science Quarterly (ASQ)
Journal of Management Information Systems (JMIS)	Decision Sciences (DS)
MIS Quarterly (MISQ)	Management Sciences (MS)
MIS Quarterly Executive (MISQE)	Organization Sciences (OS)
<b>IS Conferences</b>	Strategic Management Journal (SMJ)
Americas Conference on Inf. Systems (AMCIS)	<b>Applied Management Journals</b>
European Conference on Information Systems (ECIS)	California Management Review (CMR)
Hawaii Int'l Conference on System Sciences (HICSS)	Harvard Business Review (HBR)
International Conference on Inf. Systems (ICIS)	Sloan Management Review (SMR)
Wirtschaftsinformatik (WI)	

We are aware that, by concentrating on a limited number of journals and conferences, we excluded a large body of research work (not only other journals and conferences but also books and doctoral theses). However, we believe that this pre-selection resulted in a comprehensive set of papers from high-quality sources.

#### Selection Process

In an effort to select publications with a primary focus on ISO, we read each paper's abstract and introduction. A similar approach was first used by Swanson and Ramiller [1993] in their analysis of ISR submissions, and also applied by Dibbern et al. [2004].

Further, we excluded non-relevant articles in the style of Westner and Strahinger [2007], i.e., papers which do not have a managerial, but an educational, global economic, or technical focus. Additionally, we excluded conference papers that resulted in a journal article, papers with no original content, such as announcements or forewords, research in progress papers, as well as papers with a length of less than four pages.

Following this process, we excluded 438 items from our preliminary list. Consequently, ninety-six articles solely focusing on ISO were included in our analysis.

#### Classification and Analysis Process

Each selected publication was first classified according to the perspectives of our research framework. To do so, we read the paper's key sections (introduction, discussion, and conclusions). This procedure conforms to the general approach proposed by Swanson and Ramiller [1993].

During paper classification, we were concentrating on the meaning and the findings of the articles, instead of simply counting article attributes. Therefore, this step required some degree of interpretation on our part. For instance, not all papers explicitly referred to the concepts included in our framework. In addition, some papers dealt with multiple concepts within a single perspective. Each of these papers was assigned to the single concept to which it most strongly belongs (compare Table 13 in the Appendix). While the chosen approach adds a degree of subjectivity, it also adds richness from dealing with ideas and their recombination, rather than trying to solely infer meaning from quantitative attributes.



Finally, we analyzed the classified articles along the perspectives of our framework. Here, we developed literature maps for each perspective. These literature maps allowed us to identify major ISO themes and trends, as well as to point out opportunities and suggestions for future research in this field.

#### IV. LITERATURE REVIEW AND ANALYSIS

In the following, we summarize the key findings of the ninety-six articles included in our analysis along the four ISO stages. At the beginning of each stage-section, we provide a brief overview of the main topics and concepts researched (*research focus*), the applied research methods and epistemologies (*research approach*), as well as the used theoretical foundations (*reference theory*) within the respective stage. In each stage-section, paper summaries are clustered by main topics. If possible, key constructs for a main topic are structured and illustrated in an overview table. In this table, cited constructs are clustered by their focus. In addition, the table indicates whether a reference provides some kind of qualitative (QUAL) or quantitative (QUAN) support for its key constructs. Finally, at the end of each section, major topics for further research are presented. The suggested topics are based on our analysis of both the future research sections of the underlying papers and the aggregated findings of these papers.

##### “Why”-Stage

Research in the “why”-stage deals with the benefits and risks of ISO or analyzes the determinants that influence the consideration of ISO as a sourcing option. “Why”-papers seem to focus on the advantages and disadvantages of application and business process offshoring to farshore destinations. Moreover, papers in this stage are mostly empirical and not grounded in theory.

**Benefits and risks:** Smith and McKeen [2004] explore the evolution of sourcing strategies from a client perspective. Here, they particularly look at the benefits and risks of IS offshore outsourcing as well as the resulting variations in offshore sourcing models. The authors conclude that while sourcing is changing the nature of the internal IS function, it is unlikely that it will eliminate this function or reduce its value to that of a utility. Khan et al. [2003a] also examine benefits and risks from IS offshore outsourcing as well as strategies adopted by suppliers to compete in the offshore marketplace. Based on field research and secondary data, they present a benefits and risks framework. Their findings suggest that offshored work continues to be low risk and low value. The authors conclude that the development of strategies to move from body-shopping to high value contracts represents a major challenge for offshore suppliers.

Focusing on offshore software development, O Conchuir et al. [2009] examine the potential benefits and the extent to which these are actually being realized in practice by three multinational enterprises headquartered in the US. While there are many beneficial aspects of software offshoring (see Table 3), their study shows that the realization of these aspects cannot be taken for granted. Rather, many benefits are associated with significant risks. For instance, lower wages are countered by the overhead of higher managerial complexities; seeking out employees in offshore countries is countered by high attrition rates; and closer proximity to offshore markets is countered by socio-cultural problems. DeHondt and Nezlek [2009] find that the risks associated with offshore software development fall into three main categories of security, legal, and general risks, and typically result in indirect and intangible project costs. Based on their findings, the authors develop a framework for managing ISO risks and incorporating resulting extra costs into the decision process.

Using a single case study, Beverakis et al. [2009] investigate the drivers as well as the challenges and risks that a multinational company considered before entering into an offshore BPO arrangement. The researchers recognize the following three key drivers: cost reduction, global capability, and market competitiveness. Based on the identified drivers, they develop a model that illustrates the interrelationships between these drivers and the potential risks.

Haried and Nazareth [2005] explore the possible impact of ISO from an ethical perspective. Drawing on social theories, they derive a framework of ISO benefits and risks. This framework aims to assist IS decision-makers in considering not only purely economic but also social factors when preparing the ISO decision.

**Determinants for consideration:** Whitaker et al. [2005] examine the drivers of offshore outsourcing and propose a theoretical framework for the adoption of onshore and offshore BPO. Their analysis indicates that organisations with a stronger IT infrastructure and a greater business process knowledge are more likely to engage in BPO in general. They also find that a firm’s cost reduction strategy and its focus on IT innovation represent two major determinants for the consideration of offshore BPO.

##### Major Topics for Further Research

Khan et al. [2003a] stress that, so far, ISO research has tended to look at demand-side benefits and risks, thereby focusing on the perspective of US clients and Indian suppliers. By contrast, few studies have examined supply-side

aspects, especially between European clients and (nearshore) suppliers. This lack of published literature suggests significant opportunities for further research. In addition, there is a need for future research to explicitly consider the potential benefits of offshore BPO including measures such as decreased costs, increased revenues, and enhanced innovation capability [Whitaker et al., 2005].

**Table 3: ISO Benefits and Risks<sup>1</sup>**

<b>Focus</b>	<b>Construct</b>	<b>Reference</b>	<b>Support</b>
<i>Financial</i> benefits	Cost reduction (high quality IT workforce on low cost base)	Khan et al. [2003a] Smith and McKeen [2004] Beverakis et al. [2009]	QUAL
	Reduced (software) development costs	O Conchuir et al. [2009]	QUAL
	Maximization of (short-term) profits	Haried and Nazareth [2005]	QUAL
	Wealth maximization (by leveraging cost savings)		
<i>Strategic</i> benefits	Access to IT/software development skills	Khan et al. [2003a] Smith and McKeen [2004]	QUAL
	Quality standards/certifications	Smith and McKeen [2004]	QUAL
	Access to large skilled IT labour pool	Smith and McKeen [2004] O Conchuir et al. [2009]	QUAL
	Market competitiveness (e.g., reduced time-to-market)	Khan et al. [2003a] Beverakis et al. [2009]	QUAL
	Focus on core competences	Khan et al. [2003a]	QUAL
	Round the clock service (complementation of time zones)		
	Tax breaks	Smith and McKeen [2004]	QUAL
	Global capability (in terms of establishment in growing markets)	Beverakis et al. [2009]	QUAL
	Proximity to market and customer (possibility of more direct interaction)	O Conchuir et al. [2009]	QUAL
	Cross-site modularization of development work		
<i>Local</i> risks	Cultural differences (e.g., employees' attitudes to authority and security)	Smith and McKeen [2004] Beverakis et al. [2009]	QUAL
	Legal and political uncertainties (e.g., unfamiliar government regulations/restrictions)	Smith and McKeen [2004]	QUAL
	Geographic distance	Beverakis et al. [2009]	QUAL
	Language barrier		
	Disaster recovery (e.g., potential nuclear confrontation, earthquakes)	DeHondt and Nezelek [2009]	No
	Intellectual property (IP) rights (e.g., industrial espionage)		
<i>Global</i> risks	Geopolitical instability (e.g., trade agreements between countries)	Khan et al. [2003a]	QUAL
	Currency fluctuations (in less stable economies)	DeHondt and Nezelek [2009]	No
<i>Managerial</i> risks	Missing awareness and control of data privacy and security	Khan et al. [2003a] Beverakis et al. [2009]	QUAL
	Hidden costs (e.g., underestimation of setup costs)	Khan et al. [2003a]	QUAL
	Need for detailed specification		
	Threat of opportunism		
	Unexpected costs		
	High transaction/coordination costs	Smith and McKeen [2004]	QUAL
	Reduced control (in terms of service delivery)		
	Quality of service (in terms of dissatisfied customers)	Beverakis et al. [2009]	QUAL
<i>Strategic</i> risks	Network connectivity (e.g., missing mitigation techniques or backup plans)		
	Impact on (end) customers (e.g., security of personal information, dissatisfaction)	Haried and Nazareth [2005] Beverakis et al. [2009]	QUAL
	Impact on local staff (e.g., labor displacement)		
	Balancing of stakeholder interests/objectives	Haried and Nazareth [2005]	QUAL
	Social justice (in terms of issues of moving jobs)	Smith and McKeen [2004]	QUAL

<sup>1</sup> While most constructs clearly describe either a benefit or a risk, some might be interpreted as both a benefit and a risk (e.g., global capacity is a benefit, but overextension of resources to get global can also be a risk). Here, we followed the authors' interpretation of these constructs.



## “What”-Stage

In the “what”-stage, researchers examine offshoreable IS functions and services, factors determining a firm’s degree of ISO, various dimensions of client-supplier “distance,” and (emerging) sourcing models. Applying theoretical lenses from various socio-organisational and economic theories (especially transaction cost theory), “what”-papers tend to be non-empirical and conceptual.

**Function:** Murthy [2004] addresses the question which IS services are particularly suitable for offshoring. To identify respective services, he recommends considering offshore candidates from three perspectives: people, process, and products. The author finds that requirements volatility limits the sorts of projects that can be offshored effectively. For software services, the offshoreability depends on the importance of organisation-owned intellectual property and the extent of organisational specificity of the applications to be developed and/or maintained. To specify offshoreable IS services, Bagchi et al. [2007] analyze onshore and offshore software development projects. They find that offshored software projects tend to deal with new client/server-based management information systems. These systems are typically developed on mid-range computers using standard tools and programming languages such as C/C++. By contrast, software projects dealing with older languages (e.g., COBOL) seem to be offshored less frequently.

**Degree determinants:** Drawing on transaction cost theory, Li and Kishore [2006] analyze firms’ decisions and choices about IS offshore outsourcing, domestic outsourcing, and internal procurement. They find that the degree of offshore outsourcing depends on the asset specificity of the respective IS services: While offshore outsourcing is preferable when asset specificity is low, firms start to favour domestic outsourcing as asset specificity increases. When asset specificity becomes very high, firms prefer an internal service delivery. This finding is also confirmed by Tanriverdi et al. [2007]. Investigating how the modularization of business processes and their detachability from underlying IT support infrastructures influence the choice of sourcing mechanisms for these processes, the authors find that both a high IT infrastructure detachability (corresponds to low asset specificity) and a low process modularization drive a firm’s decision to accomplish ISO.

Cha et al. [2009] examine how knowledge parameters of a client-vendor relationship interact with production and coordination costs to affect the business value of alternative outsourcing strategies. This information is used to determine a firm’s optimal degree of IS (offshore) outsourcing. The authors find that the optimal outsourcing rate is dependent on the client’s ability to acquire production knowledge from its vendor and to retain its internal coordination knowledge. Specifically, when the client is unable to acquire sufficient production knowledge, its optimal outsourcing decision is to engage in either one of two extreme strategies: total in- or outsourcing (depending on the rate at which its coordination knowledge depreciates).

Chen and Kishore [2007] study why organisations vary in their extent of IS offshore outsourcing. They propose a conceptual model consisting of four constructs that influence a firm’s adoption level. According to their model, the functional system complexity is negatively associated with the degree of ISO, while the levels of cultural similarity, peer pressure, and trust toward the offshore vendor are all positively correlated with the offshoring degree (compare Table 4). In this context, Srivastava et al. [2007] test whether a decrease in firm performance (in terms of profitability, productivity, as well as market and debt management efficiency) influences the degree of ISO. Their findings suggest that a firm’s offshoring degree is not associated with a performance downturn. On the contrary, they find that the adoption level of ISO is positively related to firm-level parameters like employee productivity and international experience.

**Distance (dimensions):** Carmel and Abbott [2007] analyze the constructs that constitute nearshoring. Based on an analysis of textual sources, they identify seven distance dimensions that claim advantages of nearshore destinations over farshore destinations: geographical proximity, time difference, cultural similarity, historical linkage, linguistic similarity, political alignment, and economic grouping. By extending Carmel and Abbott’s [2007] distance dimensions, Vogt et al. [2009] develop a conceptual model for client-vendor distance in IS offshore outsourcing relationships. Their model includes ten country-level dimensions that go beyond language barriers as well as cultural and geographical distance. Based on this model, they identify subtle differences between near- and farshore countries with regard to the relevance and strength of individual dimensions (e.g., the existence of a competitive educational system in Middle and Eastern Europe).

Hahn et al. [2009] explore the firm-level and environment-level factors that drive firms to accept increasingly greater levels of host country risk in the location of ISO projects. Based on a proprietary data set of more than 850 ISO projects in fifty-five host countries, the authors find that the firm-specific experience and the core “risk gap” between home and host country are predictive of companies pursuing progressively riskier offshore locations. In addition, their analysis suggests that broader dynamics in the competitive environment are powerful contributors to the overall observation that ISO is moving to increasingly high-risk locations.



**Table 4: (Dimensions of) Sourcing Mode Determinants**

Focus	Construct	Influence on ( <i>type</i> <sup>2</sup> )	Reference	Support	
Degree	IT infrastructure detachability	Offshoring (+)	Tanriverdi et al. [2007]	QUAN	
	Cultural similarity		Chen and Kishore [2007]	No	
	Peer pressure (“bandwagon” phenomena)				
	Trust level				
	Employee productivity			Srivastava et al. [2007]	QUAN
	International experience				
	Process modularity	Offshoring (-)	Tanriverdi et al. [2007]	QUAN	
	Functional system complexity		Chen and Kishore [2007]	No	
	Asset specificity		Li and Kishore [2006]	No	
	Production knowledge transfer rate	Selective offshoring (+)	Cha et al. [2009]	QUAN	
	Coordination knowledge depreciation rate	Backshoring (+)			
Distance	Cultural similarity	Nearshoring (+) <sup>3</sup>	Carmel and Abbott [2007] Vogt et al. [2009]	No	
	Geographical proximity				
	Economic grouping				
	Historical linkage				
	Linguistic relationship				
	Political alignment (e.g., access to visas)				
	Time difference				
	Commercial relationship (import/export of goods and services)		-		Vogt et al. [2009]
	Educational system				
	Availability of secondary information on foreign country				
	Dynamics in competitive environment (“herd” behavior)	Acceptance of greater host country risk (+)	Hahn et al. [2009]	QUAN	
Firm-specific ISO experience					
Home country risk					

**Sourcing model:** Levina and Su [2008] argue that committing to a few strategic partners may prevent a client firm to discover new offshore suppliers and regions. In this context, they explore how a global sourcing process can support multisourcing in the context of offshoring IS functions and services. Their study results in a theory of factors influencing the value of a multisourcing strategy. This theory emphasizes three focal points: advantages of a multiple supplier strategy in rapidly changing global markets, the critical role of middle managers in enabling continuous innovation in the supplier structure, and the importance of the global sourcing process combining top-down and bottom-up decision making in multisourcing.

Holmström Olsson et al. [2008] investigate two-stage ISO as experienced by two Irish sites acting as a bridge between their US parent organisation and the Indian offshore subsidiary. The authors develop a theoretical model of the dual bridge role in a two-stage offshoring relationship. Their study indicates that overlapping time zones are a major selling point for a bridge location such as Ireland. Further, it shows that company-specific approaches for the realization of the Irish bridge differ with regard to team integration, organisational level implementation, and site hierarchy. In addition, their research supports the view that ISO tends to advance through a staged sequence of progressively lower cost destinations. This suggests that two-stage offshoring might become multi-stage offshoring in the future. Building on the notion of multi-stage supplier networks, Gannon and Wilson [2009] describe how ISO organisations are changing in response to increased globalisation of the practice of software development. Drawing on Hedlund’s [1986] notion of the heterarchy, the authors posit the emergence of a new form of offshore vendor, referred to as a “modern heterarchy.” This construct describes a networked organisational model that seeks to exploit competitive advantage from any part of the global organisation, not just from the “home” market. According to their research, this finding applies to both offshore vendors that have their origins in industrialised economies (e.g., Accenture) and vendors that originated from newly industrialising countries (e.g., Wipro).

<sup>2</sup> *Type* refers to the supported direction of the hypothesis, i.e., the positive (+) or negative (-) influence of the construct.

<sup>3</sup> As opposed to farshoring



## Major Topics for Further Research

Future research is needed to examine the overlaps and the differences between client-supplier distance in near- as opposed to farshoring in order to identify the factors that constitute the special nature of respective ISO projects [Chen and Kishore, 2007; Vogt et al., 2009]. Furthermore, future research should also study the impact of additional firm-level characteristics, such as the extent of global operations, and environment-level trends on the client's risk-related behaviour along the ISO distance dimension [Hahn et al., 2009].

Holmström Olsson et al. [2008] argue that two-stage ISO might become what they term *multi-stage offshoring* in the near future. Clearly, this evolution will require further research, as it might heavily change existing business models of offshore vendors and create additional management challenges for clients. In this context, researchers should also study the impact of different company sizes and management philosophies (e.g., more or less centralized) on the value of a multisourcing strategy [Levina and Su, 2008].

## “How”-Stage

The main issues researched in the “how”-stage include the sourcing decision, the supplier selection, the contract choice, the transfer of knowledge, the management of the offshore relationship, the project governance and control, the (agile) management of ISO projects, as well as the organisation and management of globally distributed project teams. A closer examination of the “how”-papers shows that they strongly focus on software application offshoring (forty-six papers), especially in farshore outsourcing arrangements (nineteen papers). In addition, “how”-research is dominated by empirical research using interpretive case studies. Here, ISO researchers seem to preferably rely on social and organisational theories such as control theory, coordination theory, goal-setting theory, and psychological contract theory.

**Sourcing decision:** Sayeed [2006] investigates the decision making process that underlies the offshore sourcing of IS work. He finds that the decision process is influenced by several client- and vendor-related factors. These include the client's core competency, internal efficiencies achieved by ISO, negative publicity in popular media, project modularity, virtual team management, as well as the offshore vendor's local presence and employee turnover rate. Drawing from economic and strategic theories, Schwarz et al. [2009] extend Sayeed's [2006] work by deriving ten attributes that firms consider when deciding upon sourcing of software applications, and testing the relative strength of these attributes in application service providing (ASP), domestic, and offshore outsourcing contexts. The authors find that the key drivers of the sourcing decision vary in importance among the three basic options. With regard to the IS offshore outsourcing decision, the four most important drivers are vendor capabilities, production costs, knowledge risk, and transaction costs (in descending order).

Sakthivel [2007] analyzes the impact of risk factors on different ownership models and system types and weights them against production and transaction costs. He finds that companies ignoring transaction costs in offshore development may not achieve their cost-saving objectives. Thus, development plans should consider the portfolio of software projects and evaluate the candidate systems in various types of offshore facilities, with all costs included, to determine the expected savings. Another portfolio approach is proposed by Zimmermann et al. [2008]. By adapting Markowitz's Modern Portfolio Theory to IS sourcing, they suggest a decision model for allocating (offshore) software development projects to available sites in a cost- and risk-efficient way. Beside sourcing costs and risks, their model also covers interdependencies between (offshore) sites and projects. Additionally, it includes methods for quantifying the required input parameters.

**Supplier selection:** Khan et al. [2003b] examine the key issues related to IS offshore outsourcing between UK clients and Indian vendors. Drawing on the experiences of three client firms, they propose a model for offshore outsourcing that elaborates eight essential criteria for selecting an offshore vendor (see Table 5). Here, Cong et al. [2008] develop a variable precision fuzzy rough group decision-making model to evaluate the risks associated with IS offshore outsourcing. Their model distinguishes between three types of operational risk factors: transaction, client, and vendor risks. Based on a numerical case, the authors show that the model improves fairness and efficiency of the risk evaluation process, and thus supports the selection of the most appropriate offshore vendor. Concentrating on offshore software vendors, Sakaguchi and Raghavan [2003] identify and analyze a list of vendor capabilities from prior literature to create a set of evaluation metrics. By employing factor analysis techniques, the authors elicit eight constructs to measure the capabilities of an offshore software vendor. These constructs provide a structured approach to evaluating and ranking possible vendor options.

Li et al. [2006] propose a method for selecting an IS offshore outsourcing location. The authors argue that five major categories need to be considered when selecting an offshore location: infrastructure, government policy, country risk, human capital, and cost. Further, they propose the use of both the analytic hierarchy process (AHP) and the

PROMETHEE method as aids for the selection process. Based on a case example, the authors show that their hybrid method is well suited for supporting the offshore location decision.

Gannon and Wilson [2007] propose a maturity model for ISO suppliers. Their model classifies offshore suppliers in terms of strategic imperatives. Here, the supplier evolution is described in four stages: domestic, tactical offshore, niche offshore, and multi-shore supplier. For client firms, the suggested maturity model may support the supplier selection process by providing a framework for categorising potential offshore partners. Applying a maturity model on an industry level, Carmel et al. [2008] analyze the Chinese offshore IT services industry, thereby focusing on the dominant players, and derive implications for potential clients of Chinese offshore providers. Their analysis shows that the Chinese IT services industry is still at the early “initial growth” stage of maturity, although the “shake out/consolidation” stage may soon be reached. The authors categorize the top thirty-nine offshore service providers into three types: multinational ventures, legacy, and new generation. They find that, in selecting a Chinese provider, offshore clients need to make trade-offs determined by the specific attributes of each provider type. Major distinctions between the three types include their management style, culture, origins, and ownership structure.

**Table 5: ISO Supplier Selection Criteria**

Focus	Construct	Reference	Support
Firm characteristics	Expertise (knowledge of industry and business processes)	Khan et al. [2003b] Sakaguchi and Raghavan [2003]	QUAL/ QUAN
	Quality (certifications)		
	Contract (e.g., service level contract)	Khan et al. [2003b]	QUAL
	IT infrastructure		
	Project management		
	Trust and security (awareness for sensitive data)		
	National presence/subsidiary		
	Nearshore capabilities	Sakaguchi and Raghavan [2003]	QUAN
	Maturity of processes and methodology		
	Speed of delivery		
	Technical capability (e.g., ability to work with different hardware/operating systems)		
	Cost rates	Gallaugher and Stoller [2003]	QUAL
	Financial backing		
	Staff (e.g., education, language skills)		
	Management style	Carmel et al. [2008]	No
	(Organisational) culture		
Origins of ISO business			
Ownership structure			
Location characteristics	(National) culture	Khan et al. [2003b]	QUAL
	Trade policy (in terms of rules and regulations)	Sakaguchi and Raghavan [2003]	QUAN
	Political climate (e.g., threat of war)		
	Post-reform timing (state-sponsored privileges)	Gallaugher and Stoller [2003]	QUAL
	(IT) infrastructure	Li et al. [2006]	QUAN
	Government incentives (e.g., tax rate)		
	Human capital (e.g., workforce size, technical and language skills)		
	Labour cost		
Political and economic risk			

Taking on a supplier perspective, Gallaugher and Stoller [2003] examine factors that influence the attractiveness of offshore vendors for potential partner firms abroad. Based on a case study with a successful Vietnamese software vendor, they identify critical success factors that enable firms in less developed nations to emerge as strategic technology partners. These success factors relate to cost, funding, workforce, and timing aspects (with regard to government- and industry-specific developments). In this context, Sá et al. [2003] explore the SW-CMM (Capability Maturity Model for Software) level 2 certification process by a captive offshore development centre of a global IT company. They find that quality management, more specifically the CMM certification, may result in a competitive advantage for an offshore subsidiary. Based on their case findings, the authors identify four critical factors for the successful implementation of the SW-CMM in a globally distributed environment.

**Determinants of contract choice:** Gopal et al. [2003] study the determinants of contract choice in offshore software development projects, and examine how this choice affects project profits on the part of the vendor. They provide evidence that project-, client-, and vendor-related aspects such as task uncertainty, firm size, and resource shortage (compare Table 6) significantly explain the choice of contract in offshore software projects. Furthermore, their analysis suggests that contract choice significantly determines project profit. Extending prior research, Gopal and Sivaramakrishnan [2008] show that profit equations are distinctly different for fixed-price (FP) and time-and-material (T&M) contracts. Using the corresponding profit equations, the authors identify contingencies under which an offshore vendor prefers an FP to a T&M contract. The authors find that the vendor's ability to leverage information asymmetry about capabilities and experiences translates into the vendor's preference for a FP contract. Further, their results suggest that vendors prefer a FP contract for larger and longer projects with greater team size, while they prefer a T&M contract when the risk of employee attrition within the project team is high.

**Table 6: Determinants for ISO Contract Choice**

Focus	Construct	Influence on (type)	Reference	Support
Project aspects	Project duration	FP contract (+)	Gopal and Sivaramakrishnan [2008]	QUAN
	Project team size			
	Project importance	T&M contract (+)	Gopal et al. [2003]	QUAN
	Requirements uncertainty			
Client aspects	Company size	FP contract (+)	Gopal et al. [2003]	QUAN
	IS experience			
Vendor aspects	Availability of trained personnel	T&M contract (+)	Gopal et al. [2003]	QUAN
	Competition in offshore country			
	Number of prior projects (completed for the same client)			
	Employee turnover (from project team)	Gopal and Sivaramakrishnan [2008]	QUAN	

**Knowledge transfer:** Chua and Pan [2006] look at the key activities of the knowledge transfer process in captive offshoring (from preparation to integration). They find that costs and risks are the key drivers in deciding whether or not to send knowledge work offshore. Furthermore, their two case studies provide insights on the prerequisites to optimize knowledge absorption, the various techniques used to transfer knowledge, and finally the strategy involved to stabilise organisational change.

Gregory et al. [2009] analyze managerial mechanisms for the effective knowledge transfer from the client to the vendor organisation in IS offshore outsourcing relationships. Their analysis indicates that stimulating the motivation at the individual level as well as finding the right balance between formal (e.g., explicit documentation) and informal mechanisms (e.g., cross-cultural learning) facilitate the effective transfer of knowledge. Further, the authors find that client firms cannot rely solely on the vendor capabilities; rather they need to actively involve themselves in the transfer, accumulation, and use of business, process, and functional knowledge in the client-vendor relationship. In this context, Cha et al. [2008] illustrate the conditions under which knowledge transfers in IS offshore outsourcing projects may reduce a client firm's internal production costs, leading to total cost savings in both the short and the long term. Their key finding is that although offshore projects may generate substantial cost savings in the short run, they may cause a disruption in the knowledge supply chain in the long run, resulting in substantial losses of firm knowledge. However, client firms may overcome such a disruption by transferring the learning-by-doing knowledge generated by the offshore vendor. Firms that fail to overcome this disruption may find themselves locked into disadvantageous offshore outsourcing agreements.

Focusing on the supplier perspective, Oshri et al. [2007] examine the issue of how to manage expertise dispersed across (onsite, onshore, nearshore, and offshore) sites in global IT outsourcing. Based on a longitudinal study with the Indian IT provider Tata Consultancy Services (TCS), they identify two major expertise management challenges in multisite work: the relationship and the organisational challenge. To address these challenges, TCS uses eight key practices: (1) implement an organisational structure that is a mirror image of the client's structure; (2) implement a knowledge transfer methodology; (3) implement a knowledge retention methodology; (4) monitor expertise development and retention at project and organisational levels; (5) make expertise development a key organisational value; (6) offer mechanisms to search for expertise at project and organisational levels; (7) implement a reuse methodology at the global level; (8) continuously measure the contribution of reusable assets. While the first four practices deal with the relationship challenge of absorbing client expertise, the second four practices address the organisational challenge of sharing and leveraging (supplier) expertise.



Aman and Nicholson [2009] examine the role of co-present interaction and the extent to which this can be supplanted by information and communication technology (ICT)-based interaction for managing knowledge transfer in offshore software development. Drawing on two cases, their study provides evidence of the contribution of co-present and ICT-based interaction to transferring knowledge in a distributed setting. Both modes support the knowledge transfer process along four patterns of interaction—namely, socialization, externalization, combination, and internalization, thereby extending the concepts of knowledge creation theory. Concentrating on the “socialization pattern,” Ghosh and Scott [2009] explore organisational practices that facilitate knowledge sharing by building social capital in offshore software projects. Their field study reveals six practices supporting the development of social capital: vendor mentoring, domain portfolio planning teams, joint quarterly training sessions, rapid application development, reciprocal site visits, and knowledge management systems. In the client organisation under study, these practices improved knowledge sharing which, in turn, helped close knowledge gaps that had hindered relational alignment, and led to improved project outcomes.

**Relationship management:** Drawing on a longitudinal case study, Noonan et al. [2007] examine and illustrate how comfort is produced in an ISO relationship involving high risk and immature development processes. A striking feature of their study is the amount of effort, care, and attentiveness that is required to establish productive social relations between the offshore partners. These efforts contribute to the creation of important social capital that may give the ISO project an improved robustness. In this context, Alami et al. [2008] discuss relationship issues between a multinational IS vendor and its offshore centre in a global outsourcing model. Their research demonstrates that the relationship between the vendor and its subsidiary suffers from numerous interconnected issues, such as cultural differences, communication barriers, cost saving objectives, isolation, as well as lack of trust and client involvement. The authors assert that a harmonious and perhaps a successful relationship within a (captive) software development offshoring model can be achieved by the combination of three elements: trust, collaboration, and autonomy. Here, Kefi and Mlaiki [2009] explore the role of trust in shaping the offshoring relationship between a global IS vendor, its offshoring units in Tunisia, and its clients. Their study confirms the structuring and mobilizing role of trust in terms of transferability effect between the client and the vendor's offshoring unit. In this relationship, the global IS vendor seems to act as trust intermediary. Their findings also indicate that trust influences ISO relationships when it is situated at the inter-organisational level and not only at the interpersonal level. Focusing on collaborative aspects, Nicholson and Sahay [2004] analyze the nature and management of embedded knowledge in an offshore software development relationship between a UK firm and its Indian subsidiary. In their analysis, they concentrate on two central organizing principles: project management leakage and “creativity through conflict.” The authors identify barriers hampering the migration of these principles across different local contexts. These barriers are related to the manner in which the organisational principles are embedded at the interconnected societal, organisational, and cognitive levels of the relationship.

Mehta and Mehta [2009] examine four key human resources (HR) challenges faced by offshore IT vendors in India (skill shortage, employee turnover, motivation/well-being, and training/development costs) and how their clients can mitigate the risks posed by these challenges. Based on focus interviews, they find strong evidence that clients need to make relational investments in (at least) some of their offshore vendors' HR functions: (1) invest in vendor relationship management; (2) share skill forecasts well in advance; (3) assist vendors in coping with skills shortage; (4) collaborate with vendors on specialized training programs; (5) interact with and motivate vendors' offshore employees; (6) facilitate the social and cultural integration of vendors' onsite employees; (7) use current economic crisis as an opportunity (to intensify vendor relationships). The authors conclude that these investments help clients minimize their own risks.

**Governance and control:** Sabherwal [2003] studies the use and the dynamics of coordination mechanisms in software (offshore) outsourcing. He classifies coordination mechanisms into standards, plans, as well as formal and informal mutual adjustment. His results show that the client pulls the outsourcing relationship toward a hierarchy structure, characterized by informal mutual adjustment, while the vendor pulls the relationship toward a market structure, based on standards, plans, and formal mutual adjustment. Extending Sabherwal's [2003] work, Gopal and Koka [2009] examine the interacting effect of relational governance and formal contracts on vendor profitability in the software (offshore) outsourcing industry. They find that requirements uncertainty, employee turnover rate, human asset specificity, prior interactions between client and vendor, as well as the client's outsourcing experience are positively associated with the use of relational governance. Furthermore, the authors find that relational governance has a positive effect on vendor profitability even in the presence of formal contracts. However, their analysis shows that this direct effect seems to be entirely driven by FP contracts. Focusing on a micro level, Kotlarsky et al. [2006] develop a knowledge-based perspective on coordination and demonstrate its applicability in the context of globally distributed software projects. Here, they illustrate micro coordination practices in relation to four types of knowledge processes. Their research suggests that: technologies are most useful for allowing knowledge sharing; organisation design facilitates knowledge flows; work-based mechanisms make knowledge explicit and accessible; and social mechanisms are required to build social capital and exchange knowledge. Compared to prior research, a contrasting



coordination approach is presented by Hertzum and Pries-Heje [2009]. Based on a case study, they lay out the story of how interaction between client and vendor was successfully minimized in a offshore software project. The authors conclude that minimizing interaction can be a viable strategy when clients face large cultural and maturity inequality in software offshore outsourcing.

Choudhury and Sabherwal [2003] examine the evolution of portfolios of controls during the course of (offshore) outsourced software development projects. They find that the portfolios in outsourced projects are dominated by outcome controls, especially at the start of the project. Behavior and self-controls are often added later in the project. Clan controls are used only in the case of shared goals and frequent interactions between client and vendor, leading to shared values. The authors conclude that (offshore) outsourcing projects tend to begin with relatively simple controls but often require additional controls after experiencing performance problems. Complementing Choudhury and Sabherwal's [2003] research, Prifling et al. [2009b] study the dynamics of the control portfolio in ISO projects. They show that different project phases are characterized by the use of distinct control modes and changing control amounts. Here, the type and amount of control depend on the complexities of the development tasks, the security demands of the software product, and the level of mutual trust. The trust level, in turn, is influenced by the quality and reliability of former deliveries by the offshore vendor. To theorize the evolution of control modes employed by the client upon the vendor during the course of an ISO project, Prifling et al. [2009a] apply a psychological contract perspective. Their findings suggest that psychological contracts between the client and vendor personnel influence the selection and implementation of control modes, varying between behaviour, outcome, and clan control. The authors also find that incidents like unfulfilled expectations can lead to a change of the psychological contracts, thus leading to the employment of different control modes.

Nath et al. [2008] conduct a quasi experiment with students from India and the US to determine the quality of offshored requirements analysis projects as well as to identify forms of control facilitating high-quality outcomes in such projects. Their findings suggest that the project quality of offshore teams is comparable to that of collocated teams. However, the effect of formal controls (e.g., user project monitoring) on the quality of offshored requirements analysis artefacts is ambiguous: While behavioural and outcome control have a positive effect on one measure of quality (completeness/adherence), they do not have any effect on the other two measures (consistency and user-perceived quality). In an effort to substantiate and extend these findings, Yadav et al. [2009] perform another student experiment to analyze the antecedents of requirements analysis success in a flexible and globally distributed project environment. The authors find that formal control modes and process facilitation by client site coordinators have a direct positive impact on project success during requirements analysis. In addition, they find that facilitation by vendor site coordinators has a control-mediated effect on requirements analysis success.

**(Agile) project management:** Prikladnicki and Audy [2009] compare management challenges in captive offshoring with those in offshore outsourcing. In their comparison, they focus on three management levels: strategic, tactical, and operational. The researchers find that challenges related to organisational aspects are more critical in an offshore outsourcing context. By contrast, in captive offshoring, technical challenges outrank organisational ones. Focusing on operational challenges of IS offshore outsourcing, Tiwari [2009] examines the transition stage. Using an longitudinal case study of an offshore outsourcing engagement, the author develops a transition process model, consisting of three phases: familiarize, adapt, and accelerate. In the "familiarize" phase, the client and vendor firm align their expectations and conduct the knowledge transfer. In the "adapt" phase, the vendor increases its knowledge, the client restructures its retained organisation, and both firms jointly modify the governance model, involving task division, communication structure, and delivery processes. In the "accelerate" phase, the firms validate the governance model and perform the ramp-up. On a more strategic level, Erickson and Ranganathan [2006] explore client project management capabilities that are required for effective software offshore outsourcing. Using the lens of dynamic capabilities and the resource based view, they identify three key capabilities: project planning and control, project governance, and team management. Also on a strategic level, Chen and Bharadwaj [2009] address the issue of IP rights in onshore and offshore software development projects. Using data from 153 software contracts across fourteen countries, they examine two IP protection mechanisms: rights-sharing arrangements and restrictive covenants. The authors show that software customization and modularity are positively associated with both mechanisms. Furthermore, they find the strength of the overall IP legal protection in the vendor country to be negatively associated with the level of restrictive covenants.

Levina and Vaast [2008] investigate how differences in national and organisational contexts give rise to social boundaries and associated status differences in offshore software development projects, and how these boundaries and status differences can be renegotiated to establish an effective offshore collaboration. They find that differences in national contexts cause a number of social boundaries that inhibit collaboration effectiveness, while differences in organisational contexts are largely mediated by managerial practices. They also find that key onshore managers are able to alleviate status differences and facilitate effective offshore collaboration across diverse national contexts by drawing on their organisational position, domain expertise, and financial resources. Concentrating on the national

context, Damian and Zowghi [2003] study the impact of geographical distance on requirements engineering (RE) in offshore software development. They identify four major problems of geographical distribution of RE stakeholders: cultural and time differences as well as inadequate communication and knowledge management. Based on these generic problems, the authors present a model of nine specific RE challenges and activities affected by these problems. On a related note, Huang and Trauth [2008] examine the influence of culture on temporal separation and coordination of globally distributed software development. They find that cultural differences contribute to time separation in the workplace and, in turn, time separation impacts on temporal coordination of global software projects. In particular, their findings suggest that cultural differences at the societal level have an indirect effect on temporal separation and coordination. Here, the authors identify time-based behaviours that link cultural differences to temporal separation: language issues, time estimation and commitment, adherence to a schedule, (un)availability for synchronous interaction. Complementing prior research, Beck et al. [2008] analyze both the risks that result from cultural distance in IS offshore outsourcing projects and the management practices required to mitigate these risks. The authors find that the use of formal project management techniques is driven by the cultural intelligence of the responsible managers. They also find that informal project management techniques stimulate the accumulation of cultural intelligence by the individual team members. Therefore, their findings suggest that cultural intelligence and project management techniques interact with each other in a reinforcing virtuous circle.

Lane and Agerfalk [2004] explore the written and unwritten expectations, or obligations, between parties playing similar roles in global (offshore) software development. Based on case experiences from a multinational software organisation, they present a basic set of mutual obligations that make up the psychological contract in global software development collaborations (see Table 7).

**Table 7: ISO Project Management Challenges**

Focus	Construct	Reference	Support
Cultural distance	Difficulty in achieving common understanding	Damian and Zowghi [2003]	QUAL
	Difficulty in managing conflict and having open discussions		
	Diversity in customer culture and business		
	Reduced awareness of local working context		
	Reduced level of trust		
	Hierarchy orientation and communication style	Beck et al. [2008]	QUAL
	Quality perception and attitude to timelines		
	Risk attitude and formality in work procedures		
	Working style and activity orientation		
Geographic distance	Achieving appropriate participation of system users	Damian and Zowghi [2003]	QUAL
	Delay		
	Ineffective decision-making meetings		
	Lack of informal communication		
	Protection of IP rights	Chen and Bharadwaj [2009]	QUAN
Psychological contract	Being culturally aware	Lane and Agerfalk [2004]	QUAL
	Being empowered to do job		
	Building effective inter-organisational teams		
	Building relationships		
	Performing effective task handovers		
	Providing clear leadership		

Sarker and Sarker [2009] seek to provide a deeper understanding of agility through an intensive study of the globally distributed IS development experience in a multinational high-tech organisation. Their study shows that agility should be viewed as a multifaceted concept having three dimensions: resource, process, and linkage. Resource agility is based on the distributed team's access to necessary human and technological resources. Process agility originates in the team's IS development method to guide the project, its environmental scanning and sense-making routines to anticipate possible crises, and its work practices to enable collaboration across time zones. Linkage agility arises from interactional relationships within the project team and with relevant project stakeholders, and is composed of cultural and communicative elements. In this context, Ramesh et al. [2006] examine the challenges that arise from blending agility with (globally) distributed software development. They conclude that careful incorporation of agility in distributed development environments is essential in addressing several challenges to communication, control, and trust across distributed teams. Here, the authors identify a set of five practices that demonstrate how a balance

between agile and distributed approaches can help meet these challenges. Batra [2009] extends Ramesh et al.'s [2006] work by evaluating the transferability of standard agile practices from small to medium and large projects. Based on his evaluation, he recommends modified agile practices for (offshore) outsourced software projects. The author argues that some of the twelve principles of the "Agile Manifesto" are highly feasible in an (offshore) outsourcing context, a few are infeasible, and the remainder need to be adjusted. With regard to the last group of principles, he concludes that especially large projects need some degree of hierarchical structure and defined roles to ensure accountability.

**Team organisation and management:** Espinosa and Carmel [2004] present and evaluate a dyad collaboration model to analyze the effect of time separation on coordination costs in global software teams. Their evaluation provides evidence that the model adequately represents time-separated work. Further, it shows that time-separation effects are different and more complex than distance-separation effects, as well as dependent on the type and the amount of work time overlap between the global teams. In this context, Hanisch and Corbitt [2007] report on a case study to explore impediments and issues to the RE process in global software development. Their case findings indicate that, although a "truly" global RE approach may be desirable in achieving economy of resources, a hybrid approach is beneficial in achieving RE activities and forming lasting client-vendor relationships. Their case also provides support for the authors' proposition that the main impediment to the RE process is communication. Communication issues can be traced back to geographical, time zone, and cultural differences between as well as within the client and the supplier team. Investigating communication processes in offshore software development, Ramesh and Dennis [2002] propose a new type of organisation for global virtual teams: the object-oriented team. In contrast to the traditional approach, this approach strives to decouple team members through the use of well-defined processes and semantically rich media that clarify, extend, and constrain meaning.

Kotlarsky and Oshri [2005] study the contribution of social ties and knowledge sharing to successful collaboration in (globally) distributed software development teams. Their results suggest that human-related issues, such as rapport and transactive memory, are important for collaborative work in distributed teams. Expanding their prior research, Kotlarsky et al. [2007] also explore the process through which social ties in globally dispersed software development teams are created and renewed. The authors argue that because face-to-face (F2F) meetings and ICT only provide limited support for the build-up and renewal of social ties, other activities should be introduced before and after F2F meetings. Drawing on case studies, they conclude that globally distributed teams should be "re-socialized" to ensure that interpersonal ties do not fade away and collaborative work is not hampered.

Edwards and Sridhar [2003] analyze the factors that significantly influence the performance of global virtual teams during the requirements definition phase in offshore software development. Their study indicates that ease of technology use, trust between teams, and well-defined task structure are positively associated with the efficiency, effectiveness, and satisfaction level of global virtual teams. Focusing on the (virtual) team members in IS offshore outsourcing projects, Gregory et al. [2008] identify four essential drivers for individual motivation and performance: a cascading approach to meet deadlines enhancing the self-efficacy of the team members; a work coordination tool to support the transparency of roles, responsibilities, and goals; the clarification of mutual expectations and obligations between client and vendor as well as superiors and subordinates; and the development of cultural intelligence for successful cross-cultural adaptation. Also on an individual level, Narayanan et al. [2009] examine how exposure to task specialization and variety jointly drive employee productivity in offshore software support services operation. In addition, they investigate how the productivity of individuals in a workgroup is affected by member entry and exit (in terms of gained and lost experience). The authors find that specialization enhances productivity. By contrast, variety has a nonlinear influence on productivity, i.e., too much variety can impede learning. They conclude that achieving a proper balance between specialization and variety leads to the highest productivity. Furthermore, their analysis shows that the degree of variety experience lost by member exit has a greater impact on productivity than the degree of specialized experience lost.

#### Major Topics for Further Research

Present studies primarily investigate the decision process of ISO client firms and global IS service providers. Here, future studies on the vendor's decision to subcontract work packages to suppliers in other low-cost countries ("two-stage offshoring") would complement the findings of current research [Sayeed, 2006]. In this context, there is also a need for further research to understand and assess the effectiveness of multi-shoring as a sourcing paradigm, as well as to investigate how this phenomenon will cause IS organisations to adapt their project methodologies and practices [Gannon and Wilson, 2007]. Furthermore, it would be an interesting extension to examine ISO projects in which the phases of the software development lifecycle are distributed among multiple virtual teams. Respective studies might help client firms to minimize risks and maximize benefits by selectively offshoring single project phases [Edwards and Sridhar, 2003].



Gopal et al. [2003] state that cost is the primary reason to move offshore. Hence, it would be useful to analyze the determinants of the cost advantage and how these determinants accrue over different contract types. Further, Gopal and Sivaramakrishnan [2008] find casual evidence that mixed contracts, which include aspects of both FP and T&M contracts, represent an emerging issue for future research. Another issue of interest is the relationship between contract preferences and profitability. Here, an integrated assessment of both client and vendor payoff would provide additional insights [Gopal and Koka, 2009]. Moreover, while prior research has focused on project-level variables, other factors such as cultural differences may also influence contract preferences. Finally, there is a lack of research studies that focus on client preferences over contracts.

Given the networked nature of the future firm and the increased complexity of the global IS services marketplace, it is critical to develop a more comprehensive understanding of the risks associated with knowledge transfer [Schwarz et al., 2009]. Here, future research may explore the relative importance of managerial mechanisms for the effective transfer of the different types of knowledge, i.e., business, process, and functional knowledge [Gregory et al., 2009], as well as the acquisition and depreciation of a client's learning-by-doing knowledge and the transfer of such knowledge between client and vendor [Cha et al., 2008]. Furthermore, it would be interesting to explore whether and why knowledge gained from task variety depreciates or is shared differently compared to knowledge gained from task specialization [Narayanan et al., 2009]. In this context, additional methodological approaches may contribute to further understand the relationships between social ties, knowledge sharing, and successful collaboration in globally distributed teams [Kotlarsky and Oshri, 2005].

Kotlarsky et al. [2007] suggest that the development of a coordination framework for globally dispersed software teams would be a topic for valuable research. On the basis of such a framework, future research may compare the coordination mechanisms used in captive offshoring and offshore outsourcing, as well as the perception differences concerning these mechanisms between client and supplier perspectives [Sabherwal, 2003]. In addition, it would be a promising route for future research to explore the impact of cross-cultural factors and flexibility on control modes in ISO projects [Prifling et al., 2009a; Yadav et al., 2009]. In this context, even though most IS research focuses on the national level of cultural analysis and often treats culture as a static concept, Huang and Trauth [2008] stress that culture represents a multi-levelled and dynamic construct. Therefore, there is a need for more studies that explore (the dynamics of) cultural influences at different levels and in different case contexts. Further, there is also a need to develop RE processes that address the social issues resulting from cultural and geographical differences in ISO projects [Damian and Zowghi, 2003]. Finally, unanswered issues such as the design of a hybrid approach that harmonizes agility and discipline, and that adapts to the context and the environment should be addressed in the future [Batra, 2009].

### “Outcome”-Stage

Research in the “outcome”-stage focuses on best practices for ISO project implementation, determinants for project performance and project success (or failure), and other effects resulting from ISO. Analogous to the “how”-stage, “outcome”-research shows a strong focus on application farshore outsourcing and empirical interpretive case study research. However, in contrast to the previous stage, the majority of papers on ISO project outcomes seem to lack a theoretical foundation.

**Best practices:** Using a trans-organisational development model, Rao et al. [2007] analyze the reasons behind the failure of two globally dispersed software development teams within the same parent organisation to meet the scheduled release deadline. Based on the case findings, the authors offer a framework of lessons learned and best practices for captive software offshoring. This framework comprises two categories: candidate evaluation (Which project is a viable offshore candidate?) and project control (How to mitigate offshore risks?). The importance of both categories is also confirmed by Krishna et al. [2004]. Studying the management of cross-cultural difficulties, they suggest numerous practices to address major challenges in cross-border outsourcing. These practices deal with the strategic choice of appropriate projects, ways of managing the client-vendor relationship, and approaches to staffing and training. In this context, Winkler et al. [2008] explore the nature of cultural differences in ISO projects involving German clients that outsource software development tasks to Indian vendors, and analyze the relationship between those differences and project success. Their results indicate that cultural differences in terms of power distance, IS designer values, and activity versus passivity critically affect several dimensions of relationship quality, thereby influencing offshore outsourcing success. The authors find that a clear definition of roles and mechanisms, a strong leadership, and an active adaptation to either the client's or the vendor's national culture seem to be effective ways to mitigate cultural differences. On a more operational level, Prifling et al. [2008] investigate project management techniques for coping with cross-cultural differences in IS offshore outsourcing. They identify three major techniques to overcome problems resulting from differences in power distance and uncertainty avoidance: cascading deadline approach, operational process documents, as well as tight controlling and testing. Furthermore, they find that outcome control is more effective than behaviour control in an offshore context.



Ranganathan and Balaji [2007] examine the fundamental capabilities required for superior outcomes in offshore software development. Based on a study of eighteen firms, the authors identify ten critical capabilities and group them in four categories: (1) systemic thinking on offshore sourcing, (2) global IS vendor management, (3) global IS resource management, and (4) IS change management. They conclude by presenting five key lessons for leveraging offshore outsourcing capabilities. Rottman and Lacity [2006] derive fifteen ISO best practices from 159 expert interviews, with a particular focus on Ranganathan and Balaji's [2007] "vendor/supplier management" capability category. The authors find that US clients micromanage their offshore suppliers to a much greater degree than their domestic suppliers. Even though micromanagement increases transaction costs, it is needed to mitigate risks, to build trust, and to coordinate remote and culturally diverse delivery teams. Building on their prior research, Rottman and Lacity [2008] carry out a longitudinal case study to explore the offshore outsourcing experiences of a US-based biotechnology firm from twenty-one IT projects with six Indian suppliers. They find evidence that strong social networks between a company's internal IT employees and domestic contractors cannot be easily replicated with offshore workers. Furthermore, they find that the internal project management processes are often incompatible with those of offshore suppliers. The authors conclude with six characteristics that differentiate highly-rated projects from poorly-rated ones (e.g., supplier size, contract value, project duration) and four overall insights for clients and suppliers. Supplementing Rottman and Lacity's [2006, 2008] research, Poston et al. [2009] perform a case study of a multinational organisation to draw best practices for managing multiple vendors (a "vendor set") in global software outsourcing. They find that client firms need to establish an appropriate balance between building strong relationships and encouraging market competition among vendors to ensure best price and service quality. To implement such a balance, the authors propose a set of seven guidelines for managing the vendor set (see Table 8). Concentrating on Ranganathan and Balaji's [2007] third "resource management" category, Hawk et al. [2009] describe the specific knowledge transfer barriers associated with IT infrastructure offshore outsourcing, and the solutions used to successfully overcome these barriers. Their examination of the outsourcing partnership between a global client and an Indian vendor provides eight important lessons learned for organisations considering contracting with an offshore provider to manage (some of) their IT infrastructure. While half of these lessons deal with pre-contract activities (e.g., vendor selection), the other half focuses on post-contract activities (e.g., meeting structure).

**Table 8: ISO Best Practices**

Focus	Construct	Reference	Support
Candidate evaluation	Concrete set of requirements	Rao et al. [2007]	QUAL
	Incremental increase from past project experiences		
	Fit of offshore strategy with the client's norms and practices	Rottman and Lacity [2008]	QUAL
	Greater success with bigger commitments		
Capability management	Adopt a systematic approach to building offshore outsourcing capabilities	Ranganathan and Balaji [2007]	QUAL
	Focus on the entire outsourcing lifecycle		
	Invest in structure and people		
	Periodically perform capabilities audits		
	Recognize the dynamic nature of capabilities		
Cultural differences	Active management of the relationship	Krishna et al. [2004]	QUAL
	Strategic choice of projects		
	Systematic on-the-job cross-cultural training		
	Use of cultural bridging staff		
	Use of locally relevant recruitment and retention incentives		
	Active adaptation to either the client's or the vendor's national culture	Winkler et al. [2008]	QUAL
	Clear definition of roles and mechanisms		
	Strong leadership		
	Cascading deadline approach	Prifling et al. [2008]	QUAL
	Operational process documents		
Tight controlling and testing			
	Social capital to facilitate knowledge transfer	Rottman and Lacity [2008]	QUAL
Process management	Bring in a CMM expert with no domain expertise to flush out ambiguities in requirements	Rottman and Lacity [2006]	QUAL
	Elevate internal CMM level to close gap with supplier		
	Negotiate "flexible CMM"		



**Table 8 - Continued**

Focus	Construct	Reference	Support
Project management	Create balanced scorecard metrics	Rottman and Lacity [2006] Rao et al. [2007]	QUAL
	Factor in the use of an on-site engagement manager into the staffing models and ratios		
	Allow business users to share in the offshore benefits	Rottman and Lacity [2006]	QUAL
	Break projects into segments for IP protection		
	Ready the infrastructure		
	Clear project goal	Rao et al. [2007]	QUAL
	Focal point for any escalation		
	Formal agreements for project communication		
	Specific project milestones and checkpoints		
	Sufficient slack time to account for latency	Rottman and Lacity [2008]	QUAL
Robust measures and independent audits to manage and assess offshore outsourcing programs			
Knowledge transfer ( <i>pre-contract activities</i> )	Assess the provider's knowledge transfer capabilities as part of the selection process	Hawk et al. [2009]	QUAL
	Begin rationalizing your infrastructure assets and processes as soon as possible		
	Help potential providers to understand the complexity of your infrastructure as part of the RfP process		
	Place a high priority on knowledge transfer planning and execution		
Knowledge transfer ( <i>post-contract activities</i> )	Apply a visible phased approach for managing knowledge and asset transfer	Hawk et al. [2009]	QUAL
	Ensure employees are retained until knowledge has been transferred		
	Prepare both to-be-retained employees and business users for the new environment		
	Use synchronous (physical and virtual) meetings to understand complex problems	Rottman and Lacity [2006]	QUAL
	Overlap onshore presence to facilitate supplier-to-supplier knowledge transfer		
Supplier management	Diversify supplier portfolio to minimize risks and maximize competition	Rottman and Lacity [2006]	QUAL
	Escalate learning curve with program of pilot projects		
	Give offshore suppliers domain-specific training to protect quality and lower development costs		
	Select offshore destination based on business objectives		
	Understand how different contracts give suppliers different incentives		
	Use offshore competition to lower domestic supplier rates		
	Encourage price and service quality transparency	Poston et al. [2009]	QUAL
	Foster flexibility in the relationship		
	Negotiate fixed-price contracts with SLAs		
	Put new work out to bid to multiple members of vendor set		
	Retain a small set of trusted vendors		
	Share operational knowledge while seeking out new ideas and innovations		
Use formal and informal communications inside and outside the vendor set	Sutherland et al. [2007]	QUAL	
Daily meetings of product owner team			
Daily Scrum team meetings of all developers			
Hourly automated builds from one central repository			
No distinction between developers at different sites			
Seamless integration of XP practices			

Scrum is an agile software development process designed to achieve productivity levels significantly above industry average. Sutherland et al. [2007] examine whether and how a large, globally distributed, outsourced Scrum team can achieve the promised hyper-productive state. Based on a case study of two software companies, the authors recommend five best practices for agile offshore development teams. While similar practices have been successfully implemented on small distributed Scrum teams, their research demonstrates the Scrum hyper-productivity for a large distributed team in an offshore outsourcing context.

**Determinants of success:** Dibbern et al. [2008] argue that offshore software outsourcing involves different types of client extra costs that account for the economic project failure. Using multiple case studies, the authors analyze these extra costs in order to explain why they vary between offshore software projects. Their results indicate that offshore clients incur extra costs for four types of activities: requirements specification and design, knowledge transfer, control, and coordination. Here, the level of client-specific knowledge required by an offshore project substantially increases the level of extra costs. Challenging the predominant transaction cost logic of market failure, these costs most often arise independently from the threat of opportunistic behaviour. Moreover, the lack of absorptive capacity and the turnover of vendor staff, as well as the cultural and geographic distance between client and vendor are found to increase extra costs. However, the authors find slight evidence that the impact of these factors is moderated by the level of required client-specific knowledge. Narrowing down their research to small client firms, Carmel and Nicholson [2005] analyze mitigation approaches that reduce transactions costs for such firms. Drawing on the three generic stages of transaction cost theory (contact, contract, control), the authors identify nine mitigation approaches. While three of these approaches adopt a client perspective, six approaches deal with the involvement of the offshore marketplace from a vendor perspective.

Iacovou and Nakatsu [2008] examine the effective management of offshore software development projects. Here, they aim to produce a set of project risks that specifically apply to offshore outsourcing. Their findings show that offshore projects face a combination of traditional risks as well as fairly unique threats. Based on a delphi survey, the authors identify a list of ten top risk factors. These factors can be categorized in three major areas of concern: client-vendor communications, client project management, and vendor capabilities. Delmonte and McCarthy [2003] look at both benefits and risks of offshore software outsourcing in order to develop a set of management recommendations for potential client firms. Based on an intensive literature review, the authors derive four critical success factors. As summarized in Table 9, these factors deal with the maturity of the client management team, the maturity of the process landscape, the clarity of the project objectives, as well as the level of preparation. Building on Delmonte and McCarthy's [2003] findings, Remus and Wiener [2009] identify and structure success factors of offshore software development projects. Moreover, they analyze the relevance of the identified factors from several perspectives, such as type of company, company size, geographical location, as well as project type, size, and experience. The authors derive twenty-nine success factors and classify them into internal and external as well as suitability and management factors, resulting in a two-dimensional model. The results of their study suggest that external management factors are most important for the success of an offshore software project. By contrast, cultural issues play only a minor role. This might be explained by the channelling of client-vendor communication through a few "bridging" employees in both case studies. Their findings are in particular relevant for client countries where English is not the first language and where ISO is still an emerging field. Complementing prior success factor research in the offshore development area, Fabriek et al. [2008] analyze nineteen custom software projects to derive unique characteristics of (un)successful projects. Their results suggest that a project manager should focus on proper planning and informal mutual adjustment, which means facilitating the informal communication between the team members, in order to be successful. By contrast, the implementation of standards was not mentioned as a major reason for project success/failure.

Ghosh and Scott [2007] apply social capital theory to study the antecedents necessary for the creation of social and intellectual capital in an offshore BPO relationship, and their downstream impact on knowledge sharing and project outcome. A case study of a knowledge management system indicates that investments toward the client-vendor relationship in BPO can be worthwhile. Such investments create social and intellectual capital, which improves knowledge sharing behaviours that lead to an improved BPO outcome in terms of better system utilization and lower coordination costs. In this context, Rai et al. [2009] apply a social embeddedness perspective to theorize how and why relational and cultural factors affect the success of strategic ISO projects. They find that information exchange, joint problem solving, and trust significantly improve client satisfaction and reduce project cost overruns. In contrast, agency factors and project characteristics only explain a limited proportion of variance in client satisfaction and cost overruns. In addition, the authors identify organisational and interpersonal cultural differences as critical success factors in the offshore context. Concentrating on the organisational level, Ang and Inkpen [2008] assume that the performance of international business ventures is determined by the quality of organisational intelligence. Based on this critical assumption, they discuss the importance of firm-level cultural intelligence in the context of international ventures such as ISO. Drawing on the conceptualization of cultural intelligence on an individual level and the resource based view of the firm, the authors develop a framework of firm-level cultural intelligence. This framework consists of three dimensions of intercultural firm capabilities: managerial, competitive, and structural. The

managerial dimension emphasizes the relevance of the cultural intelligence of executives and offshore project managers. The competitive dimension highlights the required capability of the firm to deal with offshore risks. The structural dimension stresses the importance of developing culturally intelligent structural norms.

**Table 9: Determinants for ISO (Project) Performance / Success**

Focus	Construct	Influence on (type)	Reference	Support			
Project aspects	Required client-specific knowledge	Client extra costs (+)	Dibbern et al. [2008]	QUAL			
Client aspects	Clarity of objectives	-	Delmonte and McCarthy [2003]	No			
	Level of preparation						
	Management team maturity						
	Process maturity						
	Formal mutual adjustment	-	Fabriek et al. [2008]	QUAL			
	Informal mutual adjustment						
	Project planning						
	Team selection	-	Remus and Wiener [2009]	QUAL			
	Clear project goals						
	Continuous controlling of project results						
	Detailed project specification	-	Ang and Inkpen [2008]	No			
	Firm-level cultural intelligence						
	Failure to consider all costs				Risk of project failure (+)	Iacovou and Nakatsu [2008]	QUAL
	Failure to manage end user expectations						
Inadequate user involvement							
Lack of offshore project management know-how							
Lack of top management commitment							
Client-vendor aspects	Knowledge sharing	System utilization (+) Coordination costs (+)	Ghosh and Scott [2007]	QUAL			
	Client participation	Client satisfaction (+) Cost overruns (-)	Rai et al. [2009]	QUAN			
	Client visits						
	Trust	Transaction costs (-)	Carmel and Nicholson [2005]	QUAL			
	Shared cultural norms and values						
	Gaining experience						
	Liaisons of knowledge flows						
	Overcoming opportunism	Client extra costs (+)	Dibbern et al. [2008]	QUAL			
	Cultural distance						
	Geographic distance						
	Conceptual learning investments	Quality (+)	Ramasubbu et al. [2008]	QUAN			
	Operational learning investments	Productivity (+)					
	Composition of project team	-	Remus and Wiener [2009]	QUAL			
	Continuous communication flow						
	Language barriers				Risk of project failure (+)	Iacovou and Nakatsu [2008]	QUAL
Miscommunication of original requirements set							
Poor change controls							
Vendor aspects	Expert intermediaries	Transaction costs (-)	Carmel and Nicholson [2005]	QUAL			
	Onshore presence						
	Providing control channels						
	Reducing contact costs						
	Simplifying contracting						
	Standardization of services						
	Lack of absorptive capacity	Client extra costs (+)	Dibbern et al. [2008]	QUAL			
	Personnel turnover						
	Language skills	-	Remus and Wiener [2009]	QUAL			
	Quality of employees						
	Lack of business know-how	Risk of project failure (+)	Iacovou and Nakatsu [2008]	QUAL			
Lack of required technical know-how							





Ramasubbu et al. [2008] develop a learning-mediated model of project performance to examine whether widely adopted structured software processes are effective in mitigating the negative effects of work dispersion in offshore software development. Their results indicate that investments in structured processes have both a direct and a learning-mediated effect in mitigating the negative effect of work dispersion. The authors also find that the effectiveness of process investments on offshore project performance is heavily affected by learning investments. While investments in conceptual learning are associated with improved quality, investments in operational learning contribute to improved productivity.

Based on a field survey in Singapore, Suang et al. [2009] analyze the antecedents predicting vendors' intention to terminate IT (offshore) outsourcing contracts. Integrating various theories, they propose antecedents reflecting three dimensions: strategic, economic, and relational. Their results indicate that low reusability, low resource dependence, negative referencing power (all strategic), low penalty and late payment (both economic) trigger the termination decision. Regarding the relational dimension, the authors observe two unexpected findings: Vendors are less likely to terminate an unequal contract and/or clients with a negative social relationship.

**Effects:** Whitaker et al. [2006] study the relationship between ISO and (end) customer satisfaction, expressed through the American Customer Satisfaction Index (ACSI). The authors find that ISO is positively associated with both perceived value and perceived quality, the two key components of customer satisfaction. Their results suggest that firms should consider offshoring as one mechanism to improve the cost and the quality of their products and services, and ultimately to increase the satisfaction of their end customers.

#### Major Topics for Further Research

Winkler et al. [2008] find that managerial perceptions of ISO success change over time and are improved by the successful implementation of management practices. Thus, future research may analyze project dynamics and the effects of specific practices (e.g., control and coordination) in the light of cultural differences. In this context, Fabrick et al. [2008] suggest a comparative analysis between domestic and offshore software development projects. Such an analysis may help to identify coordination mechanisms which exclusively increase the chance of success in offshore software projects, and mechanisms which contribute to the success of all software projects. Furthermore, future research could examine the influence of firm-level cultural intelligence on meaningful performance outcomes such as (non)financial performance and product/service quality.

It would also be interesting to examine whether the client-vendor "distance" is really smaller in nearshore projects (as compared to farshore projects), and whether a smaller client-vendor distance would lead to comparatively lower extra costs on the client side [Dibbern et al., 2008]. In this context, Carmel and Nicholson [2005] find that the offshore marketplace, and especially the offshore vendors' standardization of services, has a significant potential to reduce transaction costs. These cost levers represent a fertile area for further research. In addition, future research should also evaluate the tension between cost overruns and maintenance costs associated with bugs and bug fixes [Rai et al., 2009].

In their study, Whitaker et al. [2006] observe a positive relationship between ISO and (end) customer satisfaction. However, they also state that there is a need for future research to use outcome variables which are more directly related to the specific IS functions being offshored. In addition, different ISO functions and ownership models might have a differential impact on customer satisfaction as well as perceptions of value and quality.

## V. SUMMARY AND CONCLUSIONS

### Current State of Research

Since the end of the twentieth century, we can observe a steady increase in the number of ISO publications per year (except for 2003/4). While only one relevant paper was published in the selected sources between 1999 and 2002, twenty-nine papers were published solely in 2009 (see Table 10). This finding confirms the rising attention directed to ISO. Further, it approves the appropriateness of the time frame selected for our literature review.

Almost half of the selected ISO papers were published in conference proceedings (forty-five papers). To some extent, this can be traced back to the time-consuming journal review process. However, it also demonstrates that not all journals have yet recognized the growing importance of ISO. While some IS journals have reacted on this trend by announcing special issues on ISO (e.g., MISQ in 2008), others have (almost) completely ignored this topic so far.

It is also noticeable that the three IS conferences with a US focus (AMCIS, ICIS, HICSS) rank first, second, and third with regard to the number of ISO publications. In contrast, the most prestigious European IS conferences (ECIS, WI) have only published five and two ISO papers respectively within the last decade. One possible reason for this discrepancy may be given in the lower maturity and the smaller size of the European ISO market compared to the

US market [Eichelmann et al., 2004; Broß, 2005]. Against the background of significant market growth potential [Buchta et al., 2004], we see an urgent need for ISO research from a European point of view.

**Table 10: Included ISO Publications by Source and Year**

Category	Source	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Σ
(Niche) IS Journals	CACM						1		1	2	1	2	7
	CAIS						2						2
	EJIS							1		1			2
	I&O					1	1						2
	ISF										2		2
	ISR					1				1	1	1	4
	JAIS											1	1
	JGIM							2			2	3	7
	JGITM									2	1	1	4
	JMIS											1	1
	MISQ										5	2	7
	MISQE									2	1	4	7
IS Conferences	AMCIS					5		1	4	4	2	3	19
	ECIS						1			1	1	2	5
	HICSS				1	2	1		1	1		2	8
	ICIS							1	2	1	3	4	11
	WI											2	2
(Applied) Management Journals	DS										2		2
	MS					1						1	2
	SMR								1				1
Σ	-	0	0	0	1	10	6	5	9	15	21	29	96

#### Research Focus

**Stage:** Our analysis shows that research seems to concentrate on the later stages of an ISO arrangement. In total, seventy-six papers deal with either the “how”- or the “outcome”-stage (see Table 11). The great majority of these papers focus on the ISO project implementation (fifty-four papers). Here, the low number of decision-related papers is particularly remarkable (only four papers). This research deficit is also confirmed by Westner and Strahringer [2007]. By contrast, less than one fourth of the selected articles are concerned with the pre-implementation stages of an ISO initiative (“why”- and “what”-stage). This observation is quite surprising as Dibbern et al. [2004] find that the “why”-stage represents the most mature branch of the IS outsourcing research stream. One possible explanation for our observation might be that “why”-research in the IS outsourcing domain also largely applies to ISO. Thus, instead of conducting dedicated studies on the motivations and drivers of ISO, researchers may prefer to transfer and adapt available IS outsourcing results to the ISO domain.

**Table 11: Research Foci of Included ISO Publications**

Stage	Σ	Function				Ownership				Distance			
		Infra-structure	Application	Process	n/a	Internal	Partial	External	n/a	Nearshore	Farshore	Both	n/a
Why	7		3	2	2	2		1	4		3		4
What	13	1	4	1	7	1		4	8	1	4	3	5
How	54	1	46		7	15		30	9	1	38	4	11
Outcome	22	1	15	1	5	1		16	5		13	4	5
Σ	96	3	68	4	21	19	0	51	26	2	58	11	25

**Function:** Studies on software application offshoring account for more than two thirds of our paper set (sixty-eight papers), thereby clearly dominating ISO research. This finding is particularly true for the (post-)implementation stages. The existing research focus on application offshoring may be ascribed to the inherent complexity of software projects and the generally higher level of knowledge and skills required for managing software development services (as compared to other IS services) [Niedermaier et al. 2006].

**Ownership:** ISO research focuses on offshore outsourcing, i.e., the relocation of IS services to an external third party vendor (fifty-one literature items). In contrast, offshoring to internal subsidiaries (nineteen items) or joint ventures is only sparsely or not at all discussed in prior literature. Moreover, a significant number of papers refers to ISO in general (twenty-six items), not mentioning the specific ISO ownership model under study. This lack of information may reduce the trustworthiness of the research results in terms of credibility and transferability [Guba and Lincoln, 1985].

**Distance:** The vast majority of ISO research papers concentrate on farshoring (fifty-eight items). Although most of these papers do not explicitly define farshoring as their research focus, they implicitly do by specifying both an origin (e.g., the United States) and a destination country (e.g., India). On the contrary, we only found two items solely focusing on nearshoring. Furthermore, twenty-five papers consider ISO at large, neither referring to the client nor the supplier country under study. From our perception, an inaccurate description of the research context represents a major shortcoming of current ISO research. Consistent with Niederman et al. [2006], we believe that, on one side, there is no reason to expect that research findings which pertain to one specific ISO variation also apply to other variations. On the other side, we believe that research studies which examine several ISO variations at once risk washing out interesting findings specific for one variation.

In summary, our analysis of prior ISO literature points to a strong focus on software application offshore outsourcing to farshore destinations, especially Indian vendors. In addition, it indicates that research on ISO predominantly takes on a client point of view (fifty-eight items). Only with respect to the implementation stage (“how”), we find a more balanced picture between the client (twenty-six items), the supplier (twelve items), and the dual perspective (sixteen items). The relatively high number of client-related research studies can also be traced back to extensive research efforts dealing with in-house ISO activities of global IS service providers (e.g., Accenture, HP, and IBM). These providers typically leverage their global network of software development centres, thereby acting as a “client *within* the supplier.”

**Research Approach**

The great majority of the selected ISO papers employ some kind of empirical research approach (seventy-seven items), applying either a descriptive, interpretive, or positivist epistemological lens (compare Table 12). Consistent with Dibbern et al.’s [2004] observation in IS outsourcing, we find that interpretive research also dominates the ISO research stream (fifty-five items), followed closely by positivist research (thirty-eight items, including conceptual and mathematical items). This finding contradicts the general dominance of positivist research in the IS domain [Alavi et al., 1989; Orlikowski and Baroudi, 1991], which may be explained by the inclusion of European journals in our literature review. While these journals seem to be more receptive to interpretive (and descriptive) research, North American journals tend to prefer positivist research [Walsham, 1995].

**Table 12: Research Approaches and Theories of Included ISO Publications**

Stage	Σ	Research Approach ( <i>Epistemology</i> )					Reference Theory ( <i>Category</i> )				
		Descriptive	Interpretive	Positivist	Conceptual	Mathematical	Economic	Social/org.	Strategic	Others	n/a
Why	7	1	4	1	1		1			6	
What	13		3	3	5	2	3	5	1	4	
How	54	1	34	10	4	5	4	21	1	2	
Outcome	22	1	14	5	2		2	3	2	15	
Σ	96	3	55	19	12	7	9	30	4	51	

Across all stages, (interpretive) case study research represents by far the most popular research method in the ISO domain (fifty-three items). Other frequently applied methods are field study research (ten items), survey research (six items), and experimental research (four items). However, especially “what”-papers seem to widely abandon the use of any research method by mostly relying on non-empirical conceptual (five items) and mathematical research (two items). This finding might be attributed to the rather theoretical nature of the “what”-stage, significantly hampering the conduction of empirical research.

## Reference Theory

Most importantly, it has to be highlighted that more than half of the selected ISO publications lack a clear theoretical foundation (fifty-one items). This finding is particularly noteworthy for two reasons: First, because our literature review only encompassed renowned high-quality academic sources. Second, because prior research has already identified a significant number of relevant theories [e.g., Dibbern et al., 2004] that can also be transferred to ISO. The prevailing theoretical lack could be interpreted as one major reason why ISO research has been completely disregarded by some top IS and management journals until now (see Table 10).

As shown in Table 12, social and organisational theories seem to be predominant in ISO research (thirty items). In this category, control theory, coordination theory, and relational exchange theory can be singled out as major reference theories. Other important theories include agency theory and transaction cost theory (both economic), as well as the resource-based view (strategic). Here, it is particularly noticeable that even widespread IS outsourcing theories, like agency theory<sup>4</sup> [Dibbern et al., 2004], are not more frequently used. This shortcoming might be explained by the fact that the ISO research community is still in the process of establishing an initial understanding of the phenomenon and its underlying theories [Westner and Strahinger, 2007].

## Implications and Directions for Future Research

In this article, we systematically reviewed and analyzed the current state of the ISO research stream from a (project) management perspective. Based on Dibbern et al. [2004], we developed an analytical framework consisting of three perspectives—namely, research focus, reference theory, and research approach—and nine associated dimensions. By organizing relevant ISO concepts, this framework facilitates a common understanding of basic terms and formed the basis for our analysis of prior academic ISO literature. The analysis results confirmed the appropriateness of our framework and revealed directions for future research along the framework perspectives:

- **Research focus:** Future research should pay due attention to the preparatory stages of an ISO initiative. In this context, relevant research questions may deal with supply-side benefits and risks, and emerging ISO sourcing models. Concerning the later stages, the vendor's sourcing decision process, the management of risks associated with the transfer of knowledge in global supply networks, the development of agile project management techniques suitable for ISO, and the dynamics of cultural influences at different levels seem to be promising areas for further research. Across all stages, future ISO research should not only concentrate on the client point of view but incorporate multiple points of view. The integration of different stakeholder perspectives might also enhance the robustness of ISO research results. Moreover, future research should examine the special nature of nearshoring and captive offshoring. Based on such research, comparisons between different ISO variations can be drawn.
- **Research approach:** Due to the current predominance of ISO research from an interpretive epistemological lens, a more balanced application of the interpretive and the positivist lens would be eligible. This might also contribute to an increasing diffusion of ISO articles in European *and* North American journals. Additionally, beside case study research, the (greater) use of other methods (e.g., field study research, action research) and design research approaches should be taken into account.
- **Reference theory:** ISO studies often lack any theoretical foundation. Therefore, researchers should adopt a more theory-driven approach by building their studies on some kind of reference theory. Here, particularly well-known economic theories such as agency theory (e.g., in terms of cross-cultural project management) and transaction cost theory (e.g., in terms of sourcing decision) still offer a considerable potential for future research. Alternatively, the observed practice-oriented approach could be interpreted as a sign of strength. It shows that ISO researchers are directly in contact with the phenomenon rather than trying to force it through some external and possibly distorting lens. This might be an opportunity to build unique IS theories from the phenomenon.

In conclusion, our article has significant implications for researchers. Most importantly, it clearly points to the need for further research on ISO. Especially from the perspective of European client organisations, a significant research backlog exists. By providing respective research results, researchers may support European firms in their efforts to effectively leverage ISO services. Furthermore, our analysis suggests that ISO researchers should provide a more comprehensive and accurate description of their research context. Such a description increases the trustworthiness of the presented research results [Guba and Lincoln, 1985] and enables both other researchers and practitioners to correctly interpret and build on these results. For this purpose, researchers may use our multi-perspective analytical framework to systematically structure and describe the study context.

<sup>4</sup> Less than 5 percent of the ninety-six ISO papers included in our review adopt this theory as basis for their research.



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*Editor's Note:* The following reference list contains hyperlinks to World Wide Web pages. Readers who have the ability to access the Web directly from their word processor or are reading the article on the Web, can gain direct access to these linked references. Readers are warned, however, that:

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## APPENDIX: LITERATURE CLASSIFICATION

**Table 13: Classification of Selected ISO Publications (Sorted by Stage and Reference)**

No.	Reference	Research focus				Res. approach	Ref. theory
		Stage	Function	Ownership	Distance	Epistemology	Category
1	Beverakis et al. [2009]	Why	Process	Internal	n/a	Interpretive	n/a
2	DeHondt and Nezek [2009]	Why	Application	n/a	n/a	Conceptual	n/a
3	Hariet and Nazareth [2005]	Why	n/a	External	Far	Interpretive	Social/org.
4	Khan et al. [2003]	Why	Application	n/a	Far	Descriptive	n/a
5	O Conchuir et al. [2009]	Why	Application	Internal	Far	Interpretive	n/a
6	Smith and McKeen [2004]	Why	n/a	n/a	n/a	Interpretive	n/a
7	Whitaker et al. [2005]	Why	Process	n/a	n/a	Positivist	n/a
8	Bagchi et al. [2007]	What	Application	External	n/a	Positivist	Strategic
9	Carmel and Abbott [2007]	What	n/a	n/a	Near	Conceptual	n/a
10	Cha et al. [2009]	What	n/a	External	n/a	Mathematical	Economic
11	Chen and Kishore [2007]	What	n/a	n/a	n/a	Conceptual	Social/org.
12	Gannon and Wilson [2009]	What	Application	External	Far	Interpretive	Social/org.
13	Hahn et al. [2009]	What	n/a	n/a	n/a	Mathematical	n/a
14	Holmström Olsson et al. [2008]	What	Application	Internal	Far	Interpretive	Social/org.
15	Levina and Su [2008]	What	n/a	n/a	Both	Interpretive	n/a
16	Li and Kishore [2006]	What	Application	n/a	Far	Conceptual	Economic
17	Murthy [2004]	What	Infrastructure	n/a	Far	Conceptual	n/a
18	Srivastava et al. [2007]	What	n/a	n/a	n/a	Positivist	Social/org.
19	Tanriverdi et al. [2007]	What	Process	n/a	Both	Positivist	Economic
20	Vogt et al. [2009]	What	n/a	External	Both	Conceptual	Social/org.
21	Alami et al. [2008]	How	Application	Internal	Far	Interpretive	n/a
22	Aman and Nicholson [2009]	How	Application	Internal	Far	Interpretive	Social/org.
23	Batra [2009]	How	Application	External	n/a	Conceptual	n/a
24	Beck et al. [2008]	How	Application	External	Far	Interpretive	Social/org.
25	Carmel et al. [2008]	How	n/a	External	Far	Conceptual	n/a
26	Cha et al. [2008]	How	Application	External	Far	Mathematical	Social/org.
27	Chen and Bharadwaj [2009]	How	Application	External	n/a	Positivist	Others
28	Choudhury and Sabherwal [2003]	How	Application	External	Both	Interpretive	Social/org.
29	Chua and Pan [2006]	How	Infrastructure	Internal	Far	Interpretive	n/a
30	Cong et al. [2008]	How	Application	External	Far	Mathematical	n/a
31	Damian and Zowghi [2003]	How	Application	Internal	Far	Interpretive	n/a
32	Edwards and Sridhar [2003]	How	Application	n/a	Far	Positivist	n/a
33	Erickson and Ranganathan [2006]	How	Application	External	Far	Interpretive	Strategic
34	Espinosa and Carmel [2004]	How	Application	n/a	n/a	Mathematical	Social/org.
35	Gallaughner and Stoller [2003]	How	Application	External	Far	Interpretive	n/a
36	Gannon and Wilson [2007]	How	Application	External	Far	Conceptual	n/a
37	Ghosh and Scott [2009]	How	Application	External	n/a	Interpretive	Social/org.
38	Gopal and Koka [2009]	How	Application	External	Far	Interpretive	Social/org.
39	Gopal and Sivaramakrishnan [2008]	How	Application	External	Far	Positivist	Economic
40	Gopal et al. [2003]	How	Application	External	Far	Positivist	Economic
41	Gregory et al. [2008]	How	Application	External	Far	Interpretive	Social/org.
42	Gregory et al. [2009]	How	Application	External	Far	Interpretive	n/a





**Table 13: Classification of Selected ISO Publications (Sorted by Stage and Reference)**

No.	Reference	Stage	Research focus			Res. approach	Ref. theory
			Function	Ownership	Distance	Epistemology	Category
43	Hanisch and Corbitt [2007]	How	Application	External	Far	Interpretive	Social/org.
44	Hertzum and Pries-Heje [2009]	How	Application	External	Far	Interpretive	n/a
45	Huang and Trauth [2008]	How	Application	Internal	Far	Interpretive	Social/org.
46	Kefi and Mlaiki [2009]	How	n/a	Internal	Far	Interpretive	n/a
47	Khan et al. [2003]	How	n/a	External	Far	Descriptive	n/a
48	Kotlarsky and Oshri [2005]	How	Application	Internal	Far	Interpretive	Social/org.
49	Kotlarsky et al. [2006]	How	Application	Internal	Far	Interpretive	n/a
50	Kotlarsky et al. [2007]	How	Application	Internal	Far	Interpretive	n/a
51	Lane and Agerfalk [2004]	How	Application	Internal	n/a	Interpretive	Social/org.
52	Levina and Vaast [2008]	How	Application	n/a	Both	Interpretive	Social/org.
53	Li et al. [2006]	How	n/a	n/a	n/a	Mathematical	n/a
54	Mehta and Mehta [2009]	How	n/a	External	Far	Interpretive	n/a
55	Narayanan et al. [2009]	How	Application	External	Far	Positivist	n/a
56	Nath et al. [2008]	How	Application	n/a	Far	Positivist	Social/org.
57	Nicholson and Sahay [2004]	How	Application	Internal	Far	Interpretive	Social/org.
58	Noonan et al. [2007]	How	Application	External	Far	Interpretive	n/a
59	Oshri et al. [2007]	How	n/a	External	Far	Interpretive	n/a
60	Prifling et al. [2009a]	How	Application	External	Far	Interpretive	Social/org.
61	Prifling et al. [2009b]	How	Application	External	Far	Interpretive	Social/org.
62	Prikladnicki and Audy [2009]	How	Application	n/a	n/a	Interpretive	n/a
63	Ramesh and Dennis [2002]	How	Application	External	Far	Interpretive	Social/org.
64	Ramesh et al. [2006]	How	Application	Internal	Far	Interpretive	n/a
65	Sá et al. [2003]	How	Application	Internal	Near	Interpretive	n/a
66	Sabherwal [2003]	How	Application	External	Both	Interpretive	Social/org.
67	Sakaguchi and Raghavan [2003]	How	Application	External	n/a	Positivist	n/a
68	Sakthivel [2007]	How	Application	n/a	n/a	Conceptual	n/a
69	Sarker and Sarker [2009]	How	Application	Internal	Far	Interpretive	Social/org.
70	Sayeed [2006]	How	n/a	n/a	n/a	Positivist	Economic
71	Schwarz et al. [2009]	How	Application	External	n/a	Positivist	Economic
72	Tiwari [2009]	How	Application	External	Far	Interpretive	n/a
73	Yadav et al. [2009]	How	Application	n/a	Far	Positivist	Social/org.
74	Zimmermann et al. [2008]	How	Application	Internal	Both	Mathematical	Others
75	Ang and Inkpen [2008]	Outcome	n/a	n/a	n/a	Conceptual	Strategic
76	Carmel and Nicholson [2005]	Outcome	Application	External	Far	Interpretive	Economic
77	Delmonte and McCarthy [2003]	Outcome	Application	External	Far	Conceptual	n/a
78	Dibbern et al. [2008]	Outcome	Application	External	Far	Positivist	Economic
79	Fabrie et al. [2008]	Outcome	Application	n/a	Both	Interpretive	n/a
80	Ghosh and Scott [2007]	Outcome	Process	External	n/a	Interpretive	Social/org.
81	Hawk et al. [2009]	Outcome	Infrastructure	External	Far	Interpretive	n/a
82	Iacovou and Nakatsu [2008]	Outcome	Application	External	Far	Interpretive	n/a
83	Krishna et al. [2004]	Outcome	Application	External	Both	Interpretive	n/a
84	Poston et al. [2009]	Outcome	Application	External	Both	Interpretive	n/a
85	Prifling et al. [2008]	Outcome	Application	External	Far	Interpretive	Social/org.
86	Rai et al. [2009]	Outcome	Application	External	Far	Positivist	Social/org.
87	Ramasubbu et al. [2008]	Outcome	Application	External	Far	Positivist	n/a
88	Ranganathan and Balaji [2007]	Outcome	Application	External	n/a	Interpretive	n/a
89	Rao et al. [2007]	Outcome	Application	Internal	Far	Interpretive	n/a

**Table 13: Classification of Selected ISO Publications (Sorted by Stage and Reference)**

No.	Reference	<i>Research focus</i>				<i>Res. approach</i>	<i>Ref. theory</i>
		Stage	Function	Ownership	Distance	Epistemology	Category
90	Remus and Wiener [2009]	Outcome	Application	n/a	Both	Interpretive	n/a
91	Rottman and Lacity [2006]	Outcome	n/a	n/a	Far	Interpretive	n/a
92	Rottman and Lacity [2008]	Outcome	n/a	External	Far	Interpretive	n/a
93	Suang et al. [2009]	Outcome	n/a	External	n/a	Positivist	Strategic
94	Sutherland et al. [2007]	Outcome	Application	External	Far	Descriptive	n/a
95	Whitaker et al. [2006]	Outcome	n/a	n/a	n/a	Positivist	n/a
96	Winkler et al. [2008]	Outcome	Application	External	Far	Interpretive	n/a



## ABOUT THE AUTHORS

**Martin Wiener** is an Assistant Professor in Information Systems at the School of Business and Economics at the University of Erlangen-Nuremberg and the Managing Director of the Dr. Theo and Friedl Schoeller Research Centre for Business and Society. After having received his Ph.D. in 2006, he has been working in management consulting for three years. His primary areas of research are control and success of IS outsourcing/offshoring projects as well as IT support for open innovation management. His research has been published in international IS journals such as *Business & Information Systems Engineering (WIRTSCHAFTSINFORMATIK)*, *Information Systems Journal*, and *Journal of Global Information Technology Management*.

**Bianca Vogel** is a doctoral student at the Department for Information Systems at the School of Business and Economics at the University of Erlangen-Nuremberg. Her research interests are IS offshoring and network effects in open innovation management.

**Michael Amberg** is a Full Professor in Information Systems and presently the Dean of the School of Business and Economics at the University of Erlangen-Nuremberg. He previously held a full professorship at the RWTH Aachen, and earned his Ph.D. and his postdoctoral lecture qualification from the University of Bamberg. He has twenty years of experience in the field of IT management, including the development, implementation, and evaluation of complex software systems and mobile applications, IS outsourcing and offshoring, as well as service-oriented architectures and business IT alignment.

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