Thesis

The role of peripheral knowledge, organizational learning capability and knowledge sharing in outsourcing success

*Is peripheral knowledge required for outsourcing success in the public sector?*

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**Open University of the Netherlands**

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Summary

Purpose – Outsourcing and knowledge management are important ways for organizations to innovate. The purpose of this study is to examine public organizations that outsource services, their success, and to understand how some variables affect this success. Specifically, it focuses on the role of peripheral knowledge, organizational learning capability and the way knowledge is shared in public organizations.

Design/methodology/approach – The study combines outsourcing and knowledge management literature. The proposed hypotheses are tested empirically using questionnaire data collected from employees and business relations of ProRail in the Netherlands. The data include responses from 110 managers and engineers in the year 2013. Data is analyzed by means of structural equation modeling (SEM) in SmartPLS.

Findings – Results show that peripheral knowledge appears to have a significant but negative effect on outsourcing success. A direct negative association between peripheral knowledge and knowledge sharing was also found.

Research limitations/implications – Measurement that is dependent on the perceptions and experiences of the respondents in a specific public sector has its limitations. In order to compensate for these limitations, future research should be based on a more longitudinal design that emphasizes quantitative measurement techniques. Future research should also be conducted in private and other public sector organizations in different national environments, in order to obtain an overall picture of the phenomenon or to perform a comparison between public and private organizations and to establish the measurement scale of Jerez-Gomez et al. (2003).

Originality/value – To date and according to Rashman et al. (2009), organizational learning is under-researched concerning the public sector. This study combines outsourcing and knowledge management literature to address the issue of organizational learning, and it tests the theory with real-world data from a field study.
Keywords – knowledge, outsourcing, organizational learning, knowledge sharing, field research.
Preface

This thesis is the result of my final assignment for my study at the Open University. Due to the support of a few people I found the energy and motivation to actually finish this study.

The writing of the report has gone through ups and downs. Especially in the beginning I experienced some troubles finding a research topic and defining suitable research questions. This period took a few months. It was important for me to carry out a research that really interests me. Next to that, I wanted to specify a research question on which I am curious to find an answer. Therefore, my first word of thank goes to my supervisor Janjaap Semeijn for helping me defining my research question and support during the writing of this thesis.

A second word of thanks to all the respondents who took the time and effort to fill in and return the questionnaire. Without their help I would not be able to finish the research.

Last but not least, I am very grateful to my wife and children for the endless patience, support and understanding during the years of my study at the Open University.

Didam, September 2013
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1 Introduction

Organizational learning and outsourcing are research topics that have received a great deal of attention in academic literature. In recent years, outsourcing has become one of the most widely used management strategies (Giunipero, Hooker, Joseph-Matthews, Yoon and Brudvig, 2008), particularly in the service sector (Li and Choi, 2009; Tate, Ellram, Bals and Hartmann, 2009).

Outsourcing is motivated by a combination of environmental pressure, efficiency, and competitive pressure (Tate, Ellram, Bals and Hartmann, 2009). Research suggests that outsourcing is a powerful vehicle to reduce costs and improve performance (Quinn, 1999). Although outsourcing in public organizations has produced ‘leaner’ organizations and is considered to be cost effective, Kakabase (2001) noticed a decline in performance of the relationship between the service receiver and the provider. In management literature, outsourcing success is often associated with knowledge as an organizational resource and the capabilities to manage this knowledge. It has been suggested by Bustinza et al. (2010) that it would be useful to investigate the impact of various degrees of complementary knowledge and the role of organizational learning capability.

In management literature, complementary or peripheral knowledge is defined as specialized knowledge in the domain of the activity that is outsourced to an outside firm (Brusoni et al., 2001; Takeishi, 2002). Twana (2004) advocated a shift in the debate about whether firms should maintain peripheral knowledge to how peripheral knowledge matters in technological outsourcing alliances. As a consequence, know-how can be lost during the process of knowledge transfer in these alliances (Galbraith, 1990). This risk is so high that some companies draw up rules concerning such knowledge transfers (Spekman, Spear and Kamauff, 2002), including explicit rules on the handling of documents and their dissemination. It is thus evident that knowledge sharing in collaborative relationships is essential in managing outsourcing.

According to Rashman et al. (2009), the concepts of organizational learning and knowledge are under-researched in relation to the public sector. This lack of research raises wider questions about the extent to which context is taken into consideration in terms of learning and knowledge. This
study aims to investigate the role of peripheral knowledge, organizational learning capability and knowledge sharing on outsourcing success in the public sector. As suggested by Bustinza (2010), the goal is to better prepare public organizations for issues related to outsourcing services and the role of peripheral knowledge between the client and the vendor. Following Jerez-Gomez et al.’s (2003) suggestion to further investigate the measurement of organizational learning capability, this study builds on their conceptual model. This study further includes factors on outsourcing success and peripheral knowledge as developed by Lee (1999) and Tiwana (2007) and empirically validate it with field data.
2 Theoretical framework

2.1 Introduction

In the following paragraphs, the core constructs used in this study are defined and discussed in the context of technical contractual relationships. Some hypotheses are then derived and summarized in a theoretical model. First, the concepts of each construct are explored and then their antecedents and consequences in a public organization setting are investigated. Because the knowledge sharing and organizational learning capability construct is generally used to capture outsourcing success (Bustinza et al., 2010), this study posits knowledge sharing and organizational learning capability as a central construct that mediates the effects of peripheral knowledge on outsourcing success. The research model used in this study is shown in Figure 1.

![Conceptual Model](image_url)

Figure 1 – conceptual model
2.2 Peripheral knowledge

Peripheral knowledge is defined as the outsourcing firm’s specialized knowledge in the domain of the activity that is outsourced to another outside firm (Brusoni et al., 2001; Takeishi, 2002). Therefore, such knowledge refers to the content of the activity that has been outsourced. Consequently, such knowledge is core to the outsourcer (typically a specialist in the outsourced activity) but peripheral to the outsourcer. Peripheral knowledge refers also to the Resource Based View (RBV) theory in cases where a firm’s internal resources are required for performing a firm’s tasks and which are the foundation for the firm’s strategy (Priem et al., 2001). It is likely that it is costly and impractical for the outsourcer to maintain in-depth specialized knowledge in the outsourced activity’s knowledge domain. Over time, the normative logic of outsourcing is that firms will focus on activities that are core to their business and outsource noncore activities. In particular cases, risk of deskilling the organization in relevant capabilities can occur. For example, Fine (1998) pointed to the erosion of architectural knowledge and loss of control over product performance.

According to King (1994), the outsourcing decision is not a classic “make or buy” choice, since, when a contract comes up for renewal, the client may no longer have the skills that are necessary to even consider the “make” option. Previous research also suggests that it is important for firms to know how to manage their relationships with external partners in terms of the knowledge they should acquire if they do not want short-term outsourcing benefits to become long-term strategic problems (Brusoni, Prencipe and Pavitt, 2001). For example, Tiwana (2004) found that empirical studies have observed that firms sometimes continue to maintain knowledge in the domain of completely outsourced activities. For example, Toyota maintains in-depth technical knowledge of specialized auto parts whose design and manufacturing are fully outsourced (Takeishi, 2002). Similarly, Brusoni, Prencipe, and Pavitt (2001) observed that the three leading manufacturers in the aircraft jet engine industry continue to invest internally in research and development for digital control electronics even though their development is fully outsourced to outside firms.

Projects and outsourcing have been studied extensively in academic literature. For example, Tiwana (2004) made clear what types of projects require the vendor to possess in-depth knowledge of the client’s business or the client to have in-depth technical knowledge in software outsourcing.
Tiwana (2004) used the term ‘knowledge overlap’ instead of ‘peripheral knowledge’ and also made a distinction between business and technical knowledge. The key finding of Tiwana (2004) is that effective outsourcing requires knowledge congruence – that is, a good fit in terms of the business and technical knowledge across the client-vendor dyad. Here, business knowledge refers to knowledge about the client’s business problem application domain. When overlap patterns match the type of novelty characterizing a project, the project is more likely to be effectively and efficiently completed. Effectiveness here refers to the extent to which the project solves the client organization’s problem (the client organizations provided the effectiveness assessments). Efficiency refers to the extent to which the project was completed within budget. The research of Tiwana (2004) excluded empirical support for peripheral knowledge in public organization settings, where other kind of projects are also applicable. Consequently, the present study seeks to investigate the widely made assertion as observed by Tiwana (2004) that peripheral knowledge complements control in outsourcing alliances.

2.3 Outsourcing success

Gilley and Rasheed (2000) suggested that outsourcing occurs when a firm outside the organization performs a process or activity traditionally conducted within the organization. Consequently, outsourcing alliances allow firms (‘outsourcers’) to specialize deeper in their domain of core competence while relying on outside specialist firms (‘outsourcees’) for peripheral or complementary expertise and skills (Grant and Baden-Fuller, 2004). Specifically for public organizations, Gazzola (2009) mentioned the main drivers of outsourcing in the public sector. These main drivers are:

1. Focusing on specific functions
2. Greater control over activities that are difficult to manage
3. Possibility of freeing up resources for other activities
4. Accelerating processes of change
5. Use of resources not available internally
6. Reduction of operating costs
What is more, in previous research of Weigelt (2009) it was suggested that outsourcing can hurt but also benefit the outsourcer’s firms’ performance of private organizations. It remains unclear whether these findings of Weigelt (2009) are also applicable for public organizations.

Previous research suggested that the success of outsourcing can manifest itself in several different ways. Generally, success may be reflected by the degree to which predefined objectives are realized. In most outsourcing cases, outsourcing objectives relate to strategic, economic and technological benefits. This would include the outsourced system’s efficiency, user and business satisfaction with the outsourced systems, service quality, cost reduction, and so on (Arnett and Jones, 1994; Grover et al., 1996; Lacity and Hirschheim, 1993). In this study, outsourcing success is measured as the match between the customer’s requirements and the outsourcing outcome. This measurement is also supported by Gazzola (2009), who mentioned reduction of operating costs and a greater control over activities that are difficult to manage as important drivers of outsourcing in the public sector: In line with previous research, we expect that:

**H1: The degree of peripheral knowledge is directly and positively associated with outsourcing success.**

### 2.4 Organizational learning capability

Organizational learning capability is related to the potential benefits of outsourcing because it allows the public organization to access the knowledge of its partner. Organizational learning capability is conceptualized by the different definitions of organizational learning (see among others Normann, 1985; Senge, 1990; Day, 1991, 1994; McKee, 1992; Wick and Leon, 1993; Sinkula, 1994). Based on previous definitions of capability (Zander and Kogut, 1995; Teece et al., 1997), Alegre (2008) understood organizational learning capability as a bundle of tangible and intangible resources or skills the firm uses to achieve new forms of competitive advantage. Rashman (2009) conducted a systematic review of the literature on organizational learning and knowledge with relevance to public service organizations and stated that organizational learning and knowledge are important to
public sector organizations, which share complex external challenges with private organizations, but have different drivers and goals for knowledge. Previous research of Garcia Morales et al. (2007) suggested the study of other organizational learning capabilities, such as technology shared vision and technology teamwork.

Public organizations are critical to national competitiveness in creating the necessary conditions and infrastructure for private sector effectiveness at national, regional and local levels (Hartley and Skelcher, 2008). They play a crucial role in leading and governing local communities and managing complex interrelationships between the state, the market and civil society (Benington, 2000). According to Maden (2011), the formation of a shared vision in these organizations is challenging, since the vision can change according to the prevalent vision and policies of governments. What is more, it is also difficult to promote a systems thinking within their boundaries since they mostly act unsystematically, in accordance with the concerns of different stakeholders. Furthermore, hierarchical relationships in the bureaucratic structure hinder team-level or interdepartmental learning and lack of opportunities for open dialogue causes existing mental models to resist organization-wide learning. Maden (2011) presented a transformation model in order to demonstrate how public organizations can convert themselves into learning organizations. These organizations are primarily advised to develop a learning climate through the creation of a favorable atmosphere for individual and collective learning; and subsequently invest in organizational learning through higher knowledge creation, or peripheral knowledge, and better knowledge management processes. Maden (2011) advocated further research that examines the different steps in the transformation process. Because the questionnaire used in the current study contained specific questions about the distribution of knowledge, this research contributes to the conceptual framework of Maden (2011), specifically the ‘knowledge management’ of the transformation process. In addition to the association between higher knowledge creation and outsourcing success, we expect that systems perspective and teamwork, as reflected in organizational learning capability, will improve if the level of peripheral knowledge increases. Consequently, we expect that:

**H2: Peripheral knowledge is directly and positively associated with organizational learning capability.**
The client's absorptive ability to recognize and assimilate the vendor’s peripheral knowledge may lead to a successful outsourcing outcome, regardless of the degree peripheral knowledge between client and vendor. For example, the literature of Dibella et al. (1996), Goh and Richards, (1997), Nevis et al. (1995), Hult and Ferrell (1997) and Jérez-Gómez et al. (2005) has revealed that learning can be promoted and guided when certain conditions or characteristics are in place. Following Senge (1990) and Sinkula (1994), the systems perspective and team work entails bringing the organization's members together around a common identity. Consequently, we expect that:

**H3: Organizational learning capability is directly and positively associated with outsourcing success.**

### 2.5 Knowledge sharing

According to Kim et al. (2006), there is an increasing emphasis on the importance of knowledge sharing for organizational performance and effectiveness in both the private and public sectors. Additionally, Hartley (2008) stated that public service organizations are subject to pressures for learning and innovation that derive from users’ expectations, other tiers of government, across a wide range of stakeholders and from the creation of complex inter-organizational structures. Al-Salti (2011) discussed key motivating factors for outsourcing, and concluded that while the key driver for outsourcing was mainly economical, particularly cost reduction, many client organizations have established close partnerships with various vendors that they found to be fertile environments for knowledge transfer and learning. Hartley (2008) argued that the sharing of knowledge is central to improvement in public services, because the aim is to add value to the public sphere. This means that good ideas and practices are not, in theory, limited to one organization or partnership, but need to be transferred (Hartley 2008).

Lee (2001) defined knowledge sharing as a set of activities of transferring or disseminating knowledge from one person, group or organization to another. Knowledge sharing or transfer can take place within a single organization (i.e. intra-organizational knowledge transfer) or across
organizational boundaries (i.e. inter-organizational knowledge transfer) (Ahmad and Daighfous, 2010; Zhao and Anand, 2009; van Wijk et al., 2008). The number of published books and articles about knowledge sharing is enormous due to the variety of perspectives that come under scrutiny in the academic literature (Vaara et al., 2010; Oshri et al., 2008; He et al., 2011; Buckley et al., 2009; Pérez-Nordtvedt et al., 2008).

Successful information exchange or knowledge sharing in an outsourcing partnership requires a clear common vision and goals for the partnership (Lee et al., 1999). Another key source of successful knowledge sharing is an organizational ability to learn or acquire needed knowledge from other organizations. Organizational knowledge is not only created within an organization but can also be acquired externally. Therefore, increasing attention has been paid to how organizations learn from their partners and develop new competencies through strategic alliances (Simonin, 1999). Extant literature on inter-organizational knowledge transfer has focused on various factors that impact knowledge transfer success. However, important gaps, especially related to the context of peripheral knowledge, still exist. Squire et al. (2009, p. 461) suggested that firms that can successfully transfer and absorb knowledge across boundaries accumulate a range of performance benefits. Therefore, we expect that:

**H4: Knowledge sharing is directly and positively associated with outsourcing success.**

Having been used to stability and continuous protection, public sector organizations face difficulties in adapting to the rapid changes in the environment and responding to the compelling demands of different stakeholders. Public organizations are primarily advised to subsequently invest in organizational learning through higher knowledge creation and better knowledge management processes (Maden, 2011). McIvor et al. (2002) argued that by supporting transparency, internet technologies\(^1\) present an immense opportunity for public sector organizations to facilitate the

\(^1\) The Internet is a public and global communication network that provides direct connectivity to anyone over a local network (LAN) or an internet service provider (ISP) (Turban et al., 2000).
change in culture that they require in order to cope effectively with the demands of their rapidly changing environment. McIlvor et al. (2002) further explained how internet technologies have the potential to facilitate the achievement of greater transparency within public sector organizations. This transparency will not be limited to the internal dimension but will also impact the way in which public sector organizations interact with their environment. In order to stimulate the organization learning capability, transparency can be seen as a socialization mechanism that encourages two-way information exchange and builds and establishes relationship trust. Few studies have empirically examined how socialization mechanisms influence the lateral flows of learning and information exchange occurring between two or more firms (Cousins and Menguc, 2006; Gupta and Govindarajan, 2000). Based on the literature of McIlvor et al. (2002) and Maden (2011), in this study we focus on the use of Microsoft Sharepoint as an internet technology. Hence, we hypothesize:

**H5: Peripheral knowledge is directly and positively associated with knowledge sharing.**

Based on the previous hypothesis, we focus on two major considerations. First, we assess technical aspects of peripheral knowledge that have been shown to facilitate/inhibit knowledge sharing and organizational learning capability. We then explore, whether or not knowledge sharing and organizational learning capability is, in fact, linked to outsourcing success. The basic conceptual model of interest is presented in Figure 1. Since this area of academic inquiry is still in its early stages of development, the framework presented is seen as one that might guide a more rigorous examination of the linkages among knowledge sharing, organizational learning capability and outsourcing success gained from peripheral knowledge in public organizations. Rather than explicitly state narrow hypotheses, we attempt to explore more generally the notion of peripheral knowledge. The following empirical results are presented as exploratory findings only and the insights are discussed as preliminary evidence regarding the issues discussed above.
3 Methodology

3.1 Design of the field study

To validate empirically the theoretically developed model, a natural field setting was chosen. This approach has the advantage of offering adequate variance across the factors that are needed to test the model. To minimize carry-over effects from experiences regarding the collaboration in outsourcing alliances, we choose to survey employees with a questionnaire about their evaluations and perceptions during this collaboration.

The field setting is located at the government task organization ProRail in the Netherlands. ProRail takes care of maintenance and extensions of the national railway network infrastructure of traffic control. ProRail is a part of NS Railinfratrust (The Dutch railway infrastructure owner). NS Railinfratrust was founded as a result of the separation of track and trains in 1995. Due to this separation, ProRail faced numerous business process reengineering challenges. As a result, ProRail set up a department (Projects) with specialists in public tenders, project management and outsourcing alliances. With a turnover of 1.2 billion Euro, a leading position in the Netherlands in innovative models in railway infrastructure outsourcing alliances, ProRail is considered as an interesting field setting for this study.

Employees from the Railtechniek department of ProRail\textsuperscript{2} were utilized for the data collection of the questionnaire. Railtechniek is the engineering department of ProRail Projecten. The employees of Railtechniek are responsible for the technical specifications of railway projects, varying from feasibility study to detailed engineering. The demographics of the Railtechniek department are shown in figure 2. Respondents were included based on their ability to have influence on processes in outsourcing relationships and the use of Microsoft Sharepoint as an internet application in

\textsuperscript{2} ProRail is charged with the management of the Netherland railways, granted by the Ministry of Transport, Public Works and Water Management.
outsourcing alliances. Therefore, the survey questionnaire was mailed to 12 Project Managers (Teamleiders, Project Managers and Managers) and 149 systems engineers (14 Railverkeersdeskundigen and 135 Rail Systems Engineers) of ProRail. The survey questionnaire is provided in February 2013, all responses were received in April 2013. Finally, 110 responses were received, representing a response rate of about 68%. The sample consists of 12 Project Managers, 8 Railverkeersdeskundigen and 90 Rail Systems Engineers as shown in figure 2. The respondents are all higher educated (Bachelor, Master or Ph.D. Degree) in technology or applied sciences.

<table>
<thead>
<tr>
<th>Age</th>
<th>Team-leider</th>
<th>Rail-verkeers-deskundige</th>
<th>Rail Systems Engineer</th>
<th>Project-manager</th>
<th>Manager</th>
<th>Total/ (Sample)</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-30</td>
<td>1 (1)</td>
<td>14 (12)</td>
<td></td>
<td>15 (13)</td>
<td>87%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-40</td>
<td>3 (3)</td>
<td>5 (3)</td>
<td>39 (24)</td>
<td>3 (3)</td>
<td>51 (34)</td>
<td>67%</td>
<td></td>
</tr>
<tr>
<td>40-50</td>
<td>6 (4)</td>
<td>45 (31)</td>
<td>2 (2)</td>
<td>1 (1)</td>
<td>54 (38)</td>
<td>70%</td>
<td></td>
</tr>
<tr>
<td>50-60</td>
<td>1 (1)</td>
<td>3 (1)</td>
<td>32 (21)</td>
<td></td>
<td>36 (23)</td>
<td>64%</td>
<td></td>
</tr>
<tr>
<td>60-65</td>
<td></td>
<td>5 (2)</td>
<td></td>
<td></td>
<td>5 (2)</td>
<td>67%</td>
<td></td>
</tr>
<tr>
<td>Total/(Sample)</td>
<td>5 (5)</td>
<td>14 (8)</td>
<td>135 (90)</td>
<td>5 (5)</td>
<td>2 (2)</td>
<td>161 (110)</td>
<td>68%</td>
</tr>
<tr>
<td>Percent</td>
<td>100%</td>
<td>57%</td>
<td>67%</td>
<td>100%</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 2 – Demographics ProRail department Railtechniek versus sample respondents * Sample between parentheses

3.2 Questionnaire design

A questionnaire containing topically organized, structured, and disguised (i.e. not revealing the purpose of the study, see Judd et al., 1991) statements was used to measure the constructs. Multiple-item scales were constructed to increase validity and reliability (Peter, 1979). Respondents were asked to indicate the extent to which they agreed or disagreed with 27 statements. Five-point Likert-type scales were anchored by “strongly disagree” (1) and “strongly agree” (5) with the midpoint labeled “neutral.” Appendix V provides an overview of all items used in the survey.
To control for common method variance (CMV) bias, a range of procedures was followed. First, our items were formulated as clearly, concisely and specifically as possible, mostly based on previously validated scales. A pre-test was conducted among four managers of ProRail to identify and eliminate any overly complex or ambiguous items. This pre-test identified some issues regarding the wording of the items, leading to some slight changes to the questionnaire based on the comments, and three ambiguous questions, leading to substantial cross loading of items, were deleted from the questionnaire. This approach is known to limit CMV produced by item characteristics (Spector, 1994). Furthermore, test directives stressed that no right or wrong answers existed, and that the answers sought were those best describing the respondents’ specific experiences.

3.3 Measures

The questionnaire consisted of four constructs: peripheral knowledge, knowledge sharing, outsourcing success and organizational learning capability. Peripheral knowledge was measured as the extent to which the outsourcing firm has knowledge about specific technical aspects of the outsourced project. The item list from Tiwana (2007), based on Tiwana (2003, 2004) and Rus and Lindvall (2002), was adopted. Knowledge sharing refers to the activities of transferring or disseminating knowledge between the service receiver and provider. The item list was adopted from Lee (2001). Outsourcing success refers to the overall organizational advantage obtained from outsourcing. Outsourcing is motivated by the strategic, economic, and technological benefits. Thus, the success of outsourcing can be assessed in terms of attainment of these benefits. To capture these advantages of outsourcing, the item list of Lee (2001), which is based on the item list of Grover, Cheon and Teng (1996), was adopted. With this item list, the degree of achieving the strategic, economic and technological benefits of outsourcing was assessed. This item list has been used to measure outsourcing business performance and has been validated by other researchers. The item list for the organizational learning capability was adopted from Jerez-Gomez et al. (2005) and contained the dimensions systems perspective and team vision.
The questionnaire in this study was adapted with due observance of the specific area of knowledge and field of operations of the selected public organization. More specifically, the adaption was related to systems engineering (Rijkswaterstaat, 2009) and technical regulations for building Dutch railways. The questionnaire was constructed in English and then translated into Dutch. Single back-translation was used to assure equivalence of meaning. The original item lists can be found in Appendix IV, the adopted item lists for this research can be found in Appendix V.
4 Data analysis

The data were first investigated on a descriptive level while using SmartPLS (Ringle et al., 2005) and SPSS version 20. SPSS was used to calculate skewness and kurtosis. The kurtosis of the indicators is between -1.3 and -0.1; skewness is between -0.7 and +.6. Normality is confirmed with a Kolmogrov-Smirnov Test, because it would have distorted the covariance based SEM approach which relies on normal distribution. SmartPLS performs a confirmatory factor analysis (CFA) while estimating the structural model (Gefen and Straub, 2005) to the extent that convergent and discriminant validity of the factors is assessed. A listing of the retained items, the quality statistics obtained in the CFA, and means and standard deviations for the total sample, are listed in Table 1. As shown in this table, all remaining items load adequately (>0.60) and significantly on their respective constructs, with some exceptions that have item loadings <0.50, while composite reliability measures exceeded the cutoff value of 0.70 for all. The Cronbach’s alpha values ranged from 0.70 (for peripheral knowledge) to 0.85 (for knowledge sharing). Table 1 provides an overview of the items used in the analysis, their descriptive statistics, and an overview of factor loadings, means, standard deviations, t-values, skewness and kurtosis.

Fornell and Larcker (1981) suggested that the average variance shared between a construct and its measures should be greater than the variance shared between that construct and other constructs in the model. Discriminant validity is therefore considered adequate if the square root of the average extracted (AVE) for a given factor is greater than the correlations between this factor and any of the other factors. The square root of AVE and correlations between constructs are presented in Table 2. From this table, it can be seen that the discriminant validity is adequate. Table 2 also shows which correlations are significant between the dependent and independent variables. All of the hypothesized relationships implying weak to even negative correlations.
The hypotheses were tested by simultaneously estimating the proposed structural equations using a partial least squares (PLS) approach (Chin, 1998). PLS path modeling, a prediction-oriented, variance-based approach, was used to simultaneously estimate all hypothesized relationships. In PLS, the amount of explained variance in the dependent variable(s) is maximized (Henseler et al., 2009; Streukens et al., 2010). We choose to use PLS because it allows the analysis of complex models with relatively small sample sizes (Cassel et al., 2000), while being robust in the case of non-normality as a result of heterogeneity among groups of observations (Streukens et al., 2010). Given the exploratory nature of the present research, the PLS approach was particularly useful given its prediction-oriented nature (Barclay et al., 1995; Fornell and Cha, 1994)
<table>
<thead>
<tr>
<th></th>
<th>Loading</th>
<th>t-value</th>
<th>Mean</th>
<th>SD</th>
<th>Skewness*</th>
<th>Kurtosis*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Peripheral knowledge</strong></td>
<td>(CR=0.818)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>P2</strong></td>
<td>0.865</td>
<td>21.062</td>
<td>0.516</td>
<td>0.089</td>
<td>0.235</td>
<td>-0.283</td>
</tr>
<tr>
<td><strong>P3</strong></td>
<td>0.845</td>
<td>16.603</td>
<td>0.488</td>
<td>0.100</td>
<td>0.153</td>
<td>-0.392</td>
</tr>
<tr>
<td><strong>P4</strong></td>
<td>0.597</td>
<td>3.994</td>
<td>0.210</td>
<td>0.137</td>
<td>0.333</td>
<td>-0.482</td>
</tr>
<tr>
<td><strong>Organisational LC</strong></td>
<td>(CR=0.803)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>S1</strong></td>
<td>0.515</td>
<td>2.450</td>
<td>0.262</td>
<td>0.151</td>
<td>-0.631</td>
<td>-0.257</td>
</tr>
<tr>
<td><strong>S2</strong></td>
<td>0.445</td>
<td>1.818</td>
<td>0.110</td>
<td>0.185</td>
<td>0.046</td>
<td>-0.476</td>
</tr>
<tr>
<td><strong>S3</strong></td>
<td>0.746</td>
<td>4.204</td>
<td>0.358</td>
<td>0.107</td>
<td>0.319</td>
<td>-0.446</td>
</tr>
<tr>
<td><strong>T1</strong></td>
<td>0.611</td>
<td>3.067</td>
<td>0.212</td>
<td>0.131</td>
<td>0.551</td>
<td>-0.783</td>
</tr>
<tr>
<td><strong>T2</strong></td>
<td>0.718</td>
<td>3.719</td>
<td>0.286</td>
<td>0.171</td>
<td>-0.670</td>
<td>-0.102</td>
</tr>
<tr>
<td><strong>T3</strong></td>
<td>0.753</td>
<td>4.089</td>
<td>0.202</td>
<td>0.148</td>
<td>-0.199</td>
<td>-0.843</td>
</tr>
<tr>
<td><strong>Knowledge Sharing</strong></td>
<td>(CR=0.886)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>E1</strong></td>
<td>0.629</td>
<td>5.172</td>
<td>0.127</td>
<td>0.083</td>
<td>-0.014</td>
<td>-0.763</td>
</tr>
<tr>
<td><strong>E2</strong></td>
<td>0.742</td>
<td>8.452</td>
<td>0.147</td>
<td>0.062</td>
<td>-0.125</td>
<td>-1.281</td>
</tr>
<tr>
<td><strong>E3</strong></td>
<td>0.662</td>
<td>5.716</td>
<td>0.163</td>
<td>0.074</td>
<td>-0.214</td>
<td>-0.556</td>
</tr>
<tr>
<td><strong>E4</strong></td>
<td>0.673</td>
<td>8.742</td>
<td>0.169</td>
<td>0.064</td>
<td>0.209</td>
<td>-0.381</td>
</tr>
<tr>
<td><strong>I1</strong></td>
<td>0.834</td>
<td>23.337</td>
<td>0.282</td>
<td>0.067</td>
<td>0.070</td>
<td>-0.803</td>
</tr>
<tr>
<td><strong>I2</strong></td>
<td>0.774</td>
<td>13.341</td>
<td>0.254</td>
<td>0.060</td>
<td>-0.305</td>
<td>-0.908</td>
</tr>
<tr>
<td><strong>I3</strong></td>
<td>0.754</td>
<td>13.489</td>
<td>0.191</td>
<td>0.052</td>
<td>0.039</td>
<td>-0.396</td>
</tr>
<tr>
<td><strong>Outsourcing Success</strong></td>
<td>(CR=0.862)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SO1</strong></td>
<td>0.775</td>
<td>15.310</td>
<td>0.241</td>
<td>0.037</td>
<td>-0.551</td>
<td>-0.730</td>
</tr>
<tr>
<td><strong>SO2</strong></td>
<td>0.776</td>
<td>16.319</td>
<td>0.228</td>
<td>0.045</td>
<td>-0.212</td>
<td>-0.432</td>
</tr>
<tr>
<td><strong>SO3</strong></td>
<td>0.676</td>
<td>8.077</td>
<td>0.142</td>
<td>0.047</td>
<td>0.053</td>
<td>-0.564</td>
</tr>
<tr>
<td><strong>SO4</strong></td>
<td>0.461</td>
<td>4.369</td>
<td>0.058</td>
<td>0.062</td>
<td>0.058</td>
<td>-0.827</td>
</tr>
<tr>
<td><strong>SO5</strong></td>
<td>0.504</td>
<td>4.456</td>
<td>0.153</td>
<td>0.060</td>
<td>0.318</td>
<td>-0.525</td>
</tr>
<tr>
<td><strong>SO6</strong></td>
<td>0.708</td>
<td>10.970</td>
<td>0.220</td>
<td>0.041</td>
<td>-0.020</td>
<td>-1.194</td>
</tr>
<tr>
<td><strong>SO7</strong></td>
<td>0.688</td>
<td>8.910</td>
<td>0.192</td>
<td>0.053</td>
<td>0.050</td>
<td>-0.549</td>
</tr>
<tr>
<td><strong>SO8</strong></td>
<td>0.673</td>
<td>7.626</td>
<td>0.206</td>
<td>0.053</td>
<td>-0.543</td>
<td>-0.646</td>
</tr>
</tbody>
</table>

Table 1 – Descriptive statistics of items used  
* Skewness and Kurtosis presented in z-value
<table>
<thead>
<tr>
<th>Construct</th>
<th>Cronbach’s Alpha</th>
<th>CR</th>
<th>AVE</th>
<th>Peripheral knowledge</th>
<th>Organizational Learning Capability</th>
<th>Knowledge sharing</th>
<th>Outsourcing success</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peripheral knowledge</td>
<td>0.70</td>
<td>0.818</td>
<td>0.606</td>
<td>0.7787</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Organizational learning</td>
<td>0.71</td>
<td>0.803</td>
<td>0.412</td>
<td>-0.0452</td>
<td>0.6422</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>capability</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge sharing</td>
<td>0.85</td>
<td>0.886</td>
<td>0.529</td>
<td>-0.2239*</td>
<td>0.3750</td>
<td>0.7271</td>
<td>-</td>
</tr>
<tr>
<td>Outsourcing success</td>
<td>0.82</td>
<td>0.862</td>
<td>0.444</td>
<td>-0.3360**</td>
<td>0.2937</td>
<td>0.3507</td>
<td>0.6681</td>
</tr>
</tbody>
</table>

Table 2 - Reliability and discriminant validity

| Notes: Significant at *0.05 and **0.01 levels; square root of AVE on diagonal in bold, latent variable correlations are shown in italic. |

4.1 Results

Not as expected, a strong and negative association was found between outsourcing success and peripheral knowledge (β = -0.336; t = 4.103), as seen in Figure 3. A direct and negative association between peripheral knowledge and knowledge sharing was also found (β = -0.224; t = 2.305). Therefore, the data does not support hypotheses H1 and H5. The PLS results show a direct positive association between knowledge sharing and outsourcing success (β = 0.199; t = 1.899), supporting hypothesis H4.
Regarding H2, a weak and negative association between peripheral knowledge and organizational learning capability was found (\( \beta = -0.048; t = 0.267 \)). The PLS results show a direct positive association between organizational learning capability and outsourcing success (\( \beta = 0.204; t = 1.747 \)), supporting hypothesis H4.

We also would like to know if knowledge sharing mediates the effect of peripheral knowledge on outsourcing success. To test for mediation, the direct effect of the independent variable (IV), peripheral knowledge, on the dependent variable (DV), outsourcing success was first estimated. This effect was negative and significant (\( \beta = -0.401; t = 5.060 \)), explaining approximately 16 percent of the variance in the DV. When including the mediating variable (MV), knowledge sharing, the direct relationship between IV and DV remained significant and negative. This implies that the effects of peripheral knowledge on outsourcing success are partially mediated by knowledge sharing.

A mediation test was also performed with organizational learning capability as mediating variable. To test for mediation, the results of the direct effect of the independent variable (IV), peripheral knowledge, on the dependent variable (DV), outsourcing success were used, as stated above. When including the mediating variable (MV), organizational learning capability, the direct relationship between IV and DV remained significant and negative. This implies that the effects of peripheral knowledge on outsourcing success are partially mediated by organizational learning capability. To confirm the mediation effect, we bootstrapped the product of the effects between IV and MV and MV and DV, according to the method proposed by Efron and Tibshirani (1993). The t-value of the mediation effect of knowledge sharing is -1.72, which points at a non-significant partial mediation. The t-value of the mediation effect of organizational learning capability is -0.300, which also points to a non-significant partial mediation. Standardized PLS path coefficients as well as the corresponding t-values and R² metrics for each explained variable are shown in Figure 3.
Figure 3 – Empirically validated model
5 Discussion and conclusion

The objective of this study was to assess the impact of peripheral knowledge, organizational learning capability, and knowledge sharing on outsourcing success. Insight from this study allows managers of public organizations to better prepare their organizations for issues related to outsourcing services and the role of peripheral knowledge.

We investigated a public organization that outsources services and examined how some variables affect the success of outsourcing. Hypotheses were developed based on recent literature and then tested in a field study of a public organization in the Netherlands.

The results of this study indicates that peripheral knowledge is significantly and negative associated with the degree of outsourcing success; this means that the degree of peripheral knowledge is reverse-contributing to the accomplishment of the strategic, economic, and technological benefits of outsourcing. More specifically, the empirical results do not support hypothesis 1 from a knowledge-based perspective on knowledge sharing between the service receiver and provider. These insights are not consistent with Tiwana (2004), who stated that effective outsourcing requires business and technical knowledge on the side of the company that is outsourcing certain tasks.

The effect of peripheral knowledge is partially mediated by organizational learning capability and knowledge sharing. These results imply that there is limited importance of organizational learning capability and knowledge sharing in the peripheral knowledge through the outsourcing relationship. These insights are not consistent with Jones (2000), who emphasized the importance of organizational learning for organizational performance.

The significant and negative relationship between peripheral knowledge and knowledge sharing indicates that the current level of peripheral knowledge is not fostering a cooperative attitude between service receiver and provider. These findings are in contrast with the literature of McIvor et al. (2002) and Maden (2011). Finally, the not significant relationship between knowledge sharing
and outsourcing success are not consistent with the indications of Squire et al. (2009, p. 461), who asserted that firms that can successfully transfer and absorb knowledge across boundaries, accumulate a range of performance benefits.

5.1 Theoretical implications

This study explored issues in three areas of academic and managerial endeavor which are rapidly becoming ubiquitous in the field of outsourcing services (Busi et al, 2008). These are peripheral knowledge, knowledge sharing and organizational learning capability. The central theoretical assertion explored in this paper is whether peripheral knowledge of the outsourced activity is a key factor that facilitate or inhibit outsourcing success. As noted by Tiwana (2007), there is a lack of empirical evidence in this research area. Analyses of data from 110 employees show that the degree of peripheral knowledge is reverse-contributing to outsourcing success. These insights have two important theoretical implications for organizing interfirm outsourcing alliances.

First, peripheral knowledge can facilitate specifying technical contracts, it nevertheless remain difficult to enforce this knowledge across organizational boundaries. Since prior research of Levina and Ross (2003) has shown that outsourcers with higher peripheral knowledge expertise have a propensity to implement detailed process control, this has important implications. Moreover, this behavior can invoke effectively lowering performance in outsourcing alliances.

Second, this study provides a contrasting view that rejects earlier, widely held beliefs that higher peripheral knowledge is one of the major predictors for outsourcing success. In other words, the results does not emphasizes the need for internally maintaining peripheral knowledge. This finding is in contrast with the empirically observed phenomenon of outsourcers maintaining knowledge in the domain of fully-outsourced activities (Brusoni et al., 2001; Takeishi, 2002) and can be considered as the major theoretical contribution of this study.
The effects of knowledge sharing related to peripheral knowledge in this study were found not to be similar to those found in prior studies such as Hartley (2008), who argued that the sharing of knowledge is central to improvement in public services.

The mediating role of organizational learning capability creates further questions regarding existing academic literature regarding the importance of organizational learning for organizational performance, as with the study of Ellinger et al. (2002, pp. 163-172), whose exploratory research suggests a positive association between learning organization practices and firms’ financial performance.

To further complete the model, in order to give a novel understanding of what is needed when public organizations consider outsourcing and as suggested by Weigelt (2009), we advocate the study of the way partner characteristics can affect firm’s capabilities and performance.

5.2 Managerial implications

The present study provides managers of public organizations with a better understanding of the role of peripheral knowledge in outsourcing alliances. Based on the results of this study, several actionable recommendations can be made to managers in charge of public organizations.

Our results suggest a negative, direct and strong relationship between peripheral knowledge and outsourcing success. The questionnaire as used in this study contained specific questions about the application of systems engineering. Our study shows that the current application of systems engineering by employees of the public organization is contributing in a negative way to outsourcing success. Therefore, operational management can play a key role in building the required peripheral knowledge by focusing on those operational elements in systems engineering that directly affect the success in outsourcing alliances.
A major implication of this study is that public organizations are committed to European government procurement and tender legislation. We therefore recommend a dialogue between client and vendor and discuss the current cooperation, contracts, possibilities and disabilities, in order to determine a good balance in peripheral knowledge.

Also, discussing the results of this study with managers of the specific public sector, it seems that the current outsourcing alliances between client and vendor are not considered equivalent. Another major implication is the persistent traditional culture which is considered as a limitation for further development of the cooperation between parties. In order to improve this cooperation, new innovative procurement systems are applied by the public sector. For example, the results of experiments with Best Value Procurement (Kelleher et al., 2010) are promising. We encourage the current experiments with new procurement systems and recommend a broad research of the outsourcing alliances from a social point of view.

Our results suggest a direct negative relationship between peripheral knowledge and knowledge sharing. This finding might be caused due to a lack of knowledge or attention regarding the use of internet applications. Therefore, we encourage operational management to support and promote the use of internet applications in outsourcing alliances.

The role of organizational learning capability, specifically systems perspective and teamwork, was shown to be indirect, but other authors attach significant value to this issue (Senge, 1990; Sinkula, 1994). We therefore recommend taking the systems perspective between client and vendor seriously in outsourcing alliances.

This study can be sum up by noting that it was conducted in a relatively new domain, where mature, empirically based studies are scarce. In conclusion, it could be argued that results of this research will be of direct practical value as well as contributing to theoretical understanding.
5.3 Limitations and future research

Although this research provides meaningful implications and draws valuable lessons with regard to peripheral knowledge, there are some limitations that are worth noting as they open up fruitful avenues for future research.

Firstly, this study investigated the service receiver’s perspective, which is only one side of the knowledge perspective. A bilateral perspective of the research questions (i.e. from both sides) permits a balanced understanding and fuller examination and comparison between the perceptions of the two sides of the relationship. This represents a worthy route of inquiry for future scholars.

Secondly, data collection was largely exploratory and restricted to one country (i.e. the Netherlands) and one sector (i.e. public sector, railway industry); consequently, the findings need to be interpreted with caution. Although the research context is quite specific, it is believed that the findings are of relevance to other sectors and other countries. Future research conducted in private and public sector organizations and different national environments would verify the findings of this study and may yield additional interesting and complementary insights. Conducting future study in the private and public sector would enable researchers to obtain an overall picture of the phenomenon or perform a comparison between the public and private organizations.

Thirdly, this research is conducted within a specific time period, with a snapshot nature of research methodology and does not consider the fact that the outsourcing relationship changes over time. Future research is recommended to include the longitudinal type of study so that the outsourcing relationship over time can be analyzed. Such future longitudinal studies may improve new insights of the results presented in this study.

Finally, Subramanian (2013) developed a theory and concluded that firm boundaries in knowledge-intensive firms differ from those in physical-asset-intensive firms. Therefore, additional research is needed to determine a better understanding of generalizability to other domains.
References


Denscombe, M. (2010). *The good research guide for small-scale social research projects*.


Appendix I – Research framework

H1: The degree of peripheral knowledge is directly and positively associated with outsourcing success.

H2: Peripheral knowledge is directly and positively associated with organizational learning capability.

H3: Organizational learning capability is directly and positively associated with outsourcing success.

H4: Knowledge sharing is directly and positively associated with outsourcing success.

H5: Peripheral knowledge is directly and positively associated with knowledge sharing.

Figure 4 – Research framework
Appendix II – Strategy of search

The strategy of search for the theoretical framework is described point by point below:

1. Search method: Primary is started with the overview articles and key publications of Bustinza et al. (2010), Rashman et al. (2009), Garcia-Morales et al. (2007) and Jerez-Gomez et al. (2003). These publications give an extended overview of the knowledge that is gained on the field of organizational learning. Rashman et al. (2009) positioned this knowledge in a well-arranged way for public service organizations. Based on these publications with the help of the 'snowball method' (Verschuren & Doorewaard, 2005) a search is done for recent scientific publications, as much as possible not older than 10 years.

2. Sources:
   - Databases : IEEE en ScienceDirect;
   - Search engines: Google Scholar and ACM;
   - Theses: theoretical frameworks of OU theses, in order to find relevant publications.

3. Language: Dutch and English.

4. Keywords:
   - “Organizational learning”; this concept is part of the problem definition.
   - “Organizational learning capability”; this concept is part of the problem definition.
   - “Outsourcing”; this concept is part of the problem definition.
   - “Knowledge”; this concept is part of the problem definition.
   - “Make-or-buy”; associated in literature with outsourcing.
   - “Uitbesteding”; Dutch translation of outsourcing.
   - “Motivation”; used in many publications as English translation of “overweging”. In combination with other keywords directly related to the theoretical questions.
   - “Overheid, government, public (administration), publiek”; English and Dutch synonym which are in combination with other keywords directly related to the theoretical questions.

6. Type publications: journals, proceedings, theses and a selected number of "referred" books.
8. Quality: In order to guarantee the scientific base and independency of the sources, only peer-reviewed scientific publications are used.

For the answers to the research questions, use was made of peer-reviewed literature from the library of Maastricht University. This library consists of a large collection of publications just as online facilities in order to get access to primary sources. The different parts of the research plan are described in this appendix. By analyzing of the summary, introduction and conclusions, 148 publications are selected for studying concerning content. These publications are evaluated on scientific value. Aspects during this selection were methods used, analyses and verification of the peer-reviewed character. All the selected publications meet the criteria as mentioned above. From the selected literature, 124 publications have delivered a contribution towards the answering of the theoretical questions; these publications are processed in the literature research.
Appendix III – Research strategy

Based on the key decisions for a research strategy as stated by Verschuren en Doorewaard (2005), the survey was chosen as a research strategy in the cross sectional variant. The justification for the adoption of this strategy is described below.

1. Breadth versus depth
This research clarifies the role of organizational learning and outsourcing success. The institutional context of this research, the public sector in the Netherlands, allows the possibility to analyze different situations where outsourcing relationships are applicable. Furthermore, in the public sector a large amount of knowledge and experience is available, which means that a large number of research units is available. These arguments advocate for research in breadth instead of depth.

2. Quantitative data versus qualitative data
The evaluation of situations can be based on quantitative or qualitative evaluation criteria. It is interesting, based on qualitative data, to explain cause-effect relations. Nevertheless, a compare of collected quantitative data can support conclusions based on qualitative data. The research strategy must be able to deal with quantitative as well as qualitative data. Obviously, due to the large number of research units and corresponding research material, quantitative processing and analyzing of the data is logical.

3. Empirical versus desk research
In consideration of this question, it is important to determine the location where the information for answering the research questions can be obtained. In case of the evaluation of a process (outsourcing), only empirical information from practical reality is useful. Theoretical information will therefore not be included in the analysis of data. Practical experiences in outsourcing relations offers the opportunity to collect data about the effects of outsourcing on the organizational learning capability by providing a
questionnaire to concerned parties. It can be concluded that collecting of data has to be realized empirical.

Denscombe (2010) describes five possible research strategies that are all applicable for different situations: the experiment, the survey, the case study, the grounded theory and desk research. Reviewing these strategies, the survey is the only research strategy that is possible for this research. The experiment is not suitable because there are no equal groups with the possibility to change an independent variable at each time. In outsourcing relations, no equal groups can be defined, because every outsourcing relationship is unique due to the specific context. Furthermore, there are too many possible combinations of variables possible, which can influence the observations. The case study is not suitable, due to the limited range for the phenomenon’s that have to be studied. The grounded theory could be possible, in this strategy empirical phenomenon’s can be explained with the help of existing theory. Grounded theory is characterized by a continuous comparison of phenomena in practice with theoretical reference points. These observations could be declared from theoretical reference points, but the purpose of this research is not to come exclusively to a theoretical explanation of a certain phenomenon. Finally, desk research is also not suitable because the necessary information has to been found in the empirical reality. According to Babbie (2012), there are different variations on the survey research, dependent on the question if collecting of data is made on one or more points of time and if the data is collected from one and the same group or different groups. The following variations are applicable according to Babbie (2012): cross sectional research, panel research and time series research. Cross sectional research meets the requirements as described in this paragraph and furthermore the collection of data for this research takes place on one point of time with one group. With panel research, data is collected on multiple moments from the same group. This type of research is suitable if changes within research units have to been measured. For time series research not only multiple measurements from one group is applicable, also random samples are applicable. The purpose of this kind of research is mostly the identification of a trend. Based on the arguments as mentioned above, the research is continued as a cross sectional research.
The item lists for the hypotheses as mentioned in Chapter 2 are used for the survey for the following reasons:

1. Scientific need to examine the questionnaire in another context;
2. Standardized and validated in earlier scientific research.

The respondents who fill the item lists are relevant for the scope of this research; they meet the following requirements:

1. Related to the public organization;
2. Member of an outsourcing relation/agreement;
3. Sharing of knowledge in the outsourcing relation/agreement;
4. Frequent users of Microsoft Sharepoint in outsourcing alliances.
## Appendix IV – Item list

<table>
<thead>
<tr>
<th>Items measuring peripheral knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>To which extend understanding of:</td>
</tr>
<tr>
<td>The programming language</td>
</tr>
<tr>
<td>Detailed technical design</td>
</tr>
<tr>
<td>Technical design constraints</td>
</tr>
<tr>
<td>Code testing and debugging procedures</td>
</tr>
<tr>
<td>Development tools and coding environment</td>
</tr>
<tr>
<td>Effective vs. Ineffective development practices</td>
</tr>
<tr>
<td>The systems development process</td>
</tr>
<tr>
<td>Source: Simonin (1999)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Items measuring systems perspective</th>
</tr>
</thead>
<tbody>
<tr>
<td>All employees have generalized knowledge regarding this firm’s objectives.</td>
</tr>
<tr>
<td>All parts that make up this firm (departments, sections, work teams, and individuals) are well aware of how they contribute to achieving the overall objectives.</td>
</tr>
<tr>
<td>All parts that make up this firm are interconnected, working together in a coordinated fashion.</td>
</tr>
<tr>
<td>Source: Jerez-Gomez et al. (2005)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Items measuring team vision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Errors and failures are always discussed and analyzed in this firm, on all levels.</td>
</tr>
<tr>
<td>Employees have the chance to talk among themselves about new ideas, programs, and activities that might be of use to the firm.</td>
</tr>
<tr>
<td>In this firm, teamwork is not the usual way to work.</td>
</tr>
<tr>
<td>The firm has instruments (manuals, databases, files, organizational routines, etc.) that allow what has been learnt in past situations to remain valid, although the employees are no longer the same.</td>
</tr>
</tbody>
</table>
Source: Jerez-Gomez et al. (2005)

<table>
<thead>
<tr>
<th>Items measuring knowledge sharing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Explicit knowledge sharing</strong></td>
</tr>
<tr>
<td>We and our service provider share business proposals and reports with each other</td>
</tr>
<tr>
<td>We and our service provider share business manuals, models, and methodologies with each other</td>
</tr>
<tr>
<td>We and our service provider share each other’s success and failure stories</td>
</tr>
<tr>
<td>We and our service provider share business knowledge obtained from newspapers, magazines, journals and television.</td>
</tr>
<tr>
<td><strong>Implicit knowledge sharing</strong></td>
</tr>
<tr>
<td>We and our service provider share know how from work experience with each other</td>
</tr>
<tr>
<td>We and our service provider share each other’s know-where and know-whom</td>
</tr>
<tr>
<td>We and our service provider share expertise obtained from education and training</td>
</tr>
<tr>
<td>Source: Lee (1999)</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Items measuring success of outsourcing</th>
</tr>
</thead>
<tbody>
<tr>
<td>We have been able to refocus on core business</td>
</tr>
<tr>
<td>We have enhanced our IT competency</td>
</tr>
<tr>
<td>We have increased access to skilled personnel</td>
</tr>
<tr>
<td>We have increased economies of scale in human resources</td>
</tr>
<tr>
<td>We have increased economies of scale in technological resources</td>
</tr>
<tr>
<td>We have increased control of IS expenses</td>
</tr>
<tr>
<td>We have reduced the risk of technological obsolescence</td>
</tr>
<tr>
<td>We have increased access to key information technologies</td>
</tr>
<tr>
<td>We are satisfied with our overall benefits from outsourcing</td>
</tr>
</tbody>
</table>

## Appendix V – Adapted item list

### Items measuring peripheral knowledge

To which extend understanding of:

Kennis van ProRail Ontwerpvoorschriften.

Kennis van relevante vakdisciplines (civiele techniek, elektrotechniek, bouwkunde etc.).

Kennis van geschikte verificatie- en validatiemethoden t.b.v. de ontwikkel-, realisatie- en gebruiksfase van een project.

Kennis van Systems Engineering.

In welke mate kunt u Systems Engineering op een praktische wijze toepassen in het ontwerpproces?

Kennis van het ontwerpproces bij een ingenieursbureau.

Source: Simonin (1999)

### Items measuring systems perspective

Medewerkers van ProRail Projecten zijn bekend met de doelstellingen (Programma 2012-2015) van ProRail.

Medewerkers, projectteams en afdelingen van ProRail Projecten zijn zich ervan bewust hoe een bijdrage kan worden geleverd aan de doelstellingen (Programma 2012-2015) van ProRail.

Medewerkers, projectteams en afdelingen van ProRail Projecten werken op efficiënte en effectieve wijze met elkaar samen.

Source: Jerez-Gomez et al. (2005)

### Items measuring team vision

Fouten en tekortkomingen worden binnen ProRail Projecten op elk niveau met elkaar besproken en geanalyseerd.

Medewerkers van ProRail Projecten worden gestimuleerd om waardevolle ideeën met elkaar uit te wisselen.
ProRail Projecten stelt voldoende faciliteiten ter beschikking om 'learned lessons' vast te leggen.

Source: Jerez-Gomez et al. (2005)

<table>
<thead>
<tr>
<th>Items measuring knowledge sharing</th>
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<tbody>
<tr>
<td><strong>Explicit knowledge sharing</strong></td>
</tr>
<tr>
<td>ProRail Projecten en het ingenieursbureau delen voorstellen, rapportages en verslagen met elkaar.</td>
</tr>
<tr>
<td>ProRail Projecten en het ingenieursbureau delen werkwijzen en methodes met elkaar.</td>
</tr>
<tr>
<td>ProRail Projecten en het ingenieursbureau delen succesverhalen met elkaar.</td>
</tr>
<tr>
<td>ProRail Projecten en het ingenieursbureau deelt kennis verkregen uit media en vakbladen met elkaar.</td>
</tr>
<tr>
<td><strong>Implicit knowledge sharing</strong></td>
</tr>
<tr>
<td>ProRail Projecten en het ingenieursbureau delen kennis en ervaring uit voorgaande projecten met elkaar.</td>
</tr>
<tr>
<td>ProRail Projecten en het ingenieursbureau wijzen elkaar op informatie of kennis die aanwezig is in elkaars netwerk.</td>
</tr>
<tr>
<td>ProRail Projecten en het ingenieursbureau delen expertise opgedaan uit opleiding, cursus en training.</td>
</tr>
<tr>
<td>Source: Lee (1999).</td>
</tr>
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<tr>
<th>Items measuring success of outsourcing</th>
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<tbody>
<tr>
<td>Dankzij het uitbesteden van taken aan het ingenieursbureau:</td>
</tr>
<tr>
<td>zijn wij in staat om ons meer te richten op onze kernactiviteiten.</td>
</tr>
<tr>
<td>zijn onze kerncompetenties verbeterd.</td>
</tr>
<tr>
<td>beschikt Projecten over meer medewerkers met de gewenste competenties.</td>
</tr>
<tr>
<td>kunnen we beschikken over meer technische kennis.</td>
</tr>
<tr>
<td>hebben we meer inzicht en controle over de engineeringskosten in een project.</td>
</tr>
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</table>
hebben we het risico op het gebrek aan technische kennis verlaagd.
hebben we de beschikking gekregen over de laatste technische inzichten.
We zijn over het algemeen tevreden over het uitbesteden van taken aan het
ingenieursbureau.

Appendix VI – Introduction to organizational learning

The number of published books and articles about organizational learning is enormous due to the variety of perspectives that come under scrutiny in the academic literature. The most famous books are certainly Argyris and Schön’s (1978) double-loop learning notion, Senge’s (1990) The Fifth Discipline and Pedler et al.’s (1991) learning company model. The idea of organizational learning was popularized by Senge (1990), who argued that organizational learning incorporates the five disciplines\(^3\) of systems thinking, personal mastery, mental models, shared vision and team learning. Senge (1990) defined organizational learning as “a continuous testing of experience and its transformation into knowledge available to whole organization and relevant to their mission” (Senge, 1990, p. 6), while Huber (1991) saw it as a combination of four processes: information acquisition, information distribution, information interpretation and organizational memory. Argyris and Schön (1996) were even less restrictive in their definition by declaring that organizational learning emerges when organizations acquire information (knowledge, understandings, know-how, techniques and procedures) of any kind by any means. Jones (2000) emphasizes the importance of organizational learning for organizational performance. He defined it as “a process through which managers try to increase organizational members’ capabilities in order to better understand and manage the organization and its environment” (Jones, 2000, p. 472).

Besides a number of separate theories as mentioned above, a few authors give an overview of existing theories. Dimovski (1994) provided an overview of previous research and identified four varying perspectives on organizational learning. His model managed to merge informational, interpretational, strategic and behavioral approaches to organizational learning and defined it as a process of information acquisition, information interpretation and resulting behavioral and cognitive changes that should, in turn, have an impact on organizational performance. Through an extensive literature review, Wang (2003) provide a clarified and updated understanding of organizational learning by introducing

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\(^3\) According to Senge a discipline is a “body of theory and technique that must be studied and mastered to be put into practice. A discipline is a developmental path for acquiring certain skills or competencies.”
five focuses: focus on collectivity of individual learning; focus on process or system; focus on culture or metaphor; focus on knowledge management and focus on continuous improvement. Örtenblad (2004) stated that organizational learning implies two things: being aware of the need for different levels of learning, and the storing of knowledge in the organization that is actually used in practice. The individuals learn as agents for the organization and what each individual learns is stored in the memory of the organization (Hedberg, 1981), i.e. outside single individuals (see Blackler, 1995). This makes the learning and knowledge organizational. The organizational memory consists of routines, standard operating procedures (SOP), shared mental models, documents, manuals etc. The organizational memory regulates the organization’s behavior and that of its members as well as directs attention to what they should learn. Organizational learning is often divided into three levels. For instance, Argyris and Schön (1978) use the terms single-loop learning, double-loop learning and deutero learning. They argue that organizations should be able to learn at all three levels. Consequently, they should continuously improve current ways of doing things (single-loop learning), have the capacity to question these courses of action (double-loop learning), and become aware of how they single- and double-loop learn (deutero learning) (see Figure 5). A more detailed explanation about the theory of Argyris and Schön (1978) can be found in Appendix VIII.

![Organizational learning diagram](image)

**Figure 5 – Örtenblad (2004) Organizational learning**

Rashman (2009) made a systematic review at literature on organizational learning and knowledge relevant to public service organizations and explored implications for the field of organizational learning and knowledge more generally. The review of Rashman (2009) focused primarily but not exclusively on
theoretical developments and empirical studies in inter-organizational learning and knowledge transfer in public services. As stated above, the vast area of interest in the organizational learning field has created diversified understandings of the concept of organizational learning.
Appendix VII – Organizational learning capability vs. outsourcing

Outsourcing is regarded as a powerful vehicle to reduce costs and improve performance. For example, specialists in supply markets can develop greater knowledge depth, invest more in software and training systems, be more efficient, and therefore offer higher salaries and attract more highly trained people than many integrated companies (Quinn, 1999). Outsourcing can also be employed to cope with demand uncertainty and to obtain the benefits of supplier scale economies in a range of business areas. The term ‘outsourcing’ was coined in the late 1980s for the subcontracting of information systems. In that respect, many of the consulted sources identify ‘outsourcing’ with the function of information systems (Aubert et al., 2004; Lacity and Hirschheim, 1993; Loh and Venkatraman, 1992; Teng et al., 1995). However, recent years have seen the term applied to other types of function or activity. In referring to outsourcing, other interpretations have been used, such as ‘make or buy’ or ‘integration/disintegration of activities’ (Gilley and Rasheed, 2000; Perry, 1992). There are several different types of outsourcing (Dibbern et al., 2004), which can be general or detailed in order to emphasize a specific aspect. Espino-Rodriguez (2006) reviewed and presented the most significant definitions from the literature. The review of the different works revealed that most authors agree that outsourcing means going outside the firm to acquire determined activities that are not processed internally. Espino-Rodriguez (2006) classified the definitions into three types:

1) those that consider that outsourcing entails a stable, long-term collaboration agreement in which the supplier becomes a strategic partner and where there are exchange relations with independent firms (Mol et al., 2005; Quélín and Duhamel, 2003; Sacristán, 1999);

2) those definitions that indicate the type of activity or service that can be outsourced, i.e. activities and services that are not nonstrategic for the firm (Casani et al., 1996; Lei and Hitt, 1995; Quinn and Hilmer, 1994);

3) those definitions that consider that outsourcing is an action that transfers planning, responsibility, knowledge and administration of activities, all through contracts (Blumberg, 1998; Greaver, 1999; McCarthy and Anagnostou, 2004; Rothery and Roberson, 1996).
There is little in the literature analyzing specificity and outsourcing in the service sector (Erramilli & Rao, 1993; Murray et al., 1995; Murray & Kotabe, 1999). Erramilli and Rao (1993) describe unique or idiosyncratic services as those requiring high-professional skill, greater investment and specialized knowledge. Service outsourcing is defined as a “conscious choice of replacing internal service functions with the use of external agents to perform one or more service activities” (Li and Choi, 2009, p.28). Maltz and Sautter (1995) underlines an important difference between similar definitions provided for product outsourcing and service outsourcing). The specific characteristics of service outsourcing make knowledge management particularly important in this kind of outsourcing (Blumenberg, Wagner and Beimborn, 2009), as the need for greater coordination and a direct relationship with the supplier of the service obliges companies to take more care with knowledge transfers, improve mechanisms for integration with the supplier and encourage the creation of shared knowledge.

Kakabadse (2001) states that re-engineering of the public services by means of privatization and outsourcing have produced ‘leaner’ organizations that are considered more cost effective but stand accused of providing diminishing quality of service. Dibbern, 2004, Lee, et al., 2000 states nine frequently used theories of which two are important and related to resources and capabilities:
- Resource based theory
- Resource dependence theory

Both theories note the centrality of a firm’s resources as being the foundation for a firm’s strategy. The basic difference between the two is that resource-based theory focuses on a firm’s internal resources and capabilities while resource-dependency theory focuses on resources in the external environment. Resource dependence theory in general states that all organizations are dependent on some elements of their external environments to varying degrees due to the control these external environments have on the resources (Pfeffer and Salancik, 1978; Thompson, 1967). Resource-based theory defines resources as inputs required for performing a firm’s tasks. In order to explain outsourcing from the resources and capabilities perspective, it is necessary to refer to the conceptual framework established by Grant (1991) and shown in Figure 6. In this framework, a firm’s resources and capabilities are the
main considerations in formulating strategies. Moreover, Grant (1991) establishes five stages in his model for strategy formulation, in which he associates strategy, competitive advantage and resources and capabilities. The last of these five stages refers to “identifying the resource gaps, which need to be filled and invest in replenishing, augmenting and upgrading the firm’s resource base” where there is a place for outsourcing.

![Figure 6 – Practical framework Grant (1991)](image)

As shown in the figure, a firm is a collection of resources and competitive advantage can occur only when there is heterogeneity and immobility of the firm’s resources (Barney, 1991; Penrose, 1959). In order to realize the full competitive potential of its resources and capabilities, a firm must organize its business processes efficiently and effectively (Barney and Wright, 1998). According to Grant (1991), outsourcing must result from the desire to obtain specific types of resources that an organization does not otherwise possess and that are provided more efficiently by third parties. The willingness to outsource an activity depends on how strategic it is that is the extent to which outsourcing provides competitive advantage. For public organizations competitive advantage is not important, but for instance effective and efficient spend of budget is (“are we doing the right things” and “are we doing things right?”). In order to understand how organizational learning capabilities can be utilized to the maximum,
the article of Örtenblad (2004) provides more insight. Örtenblad (2004) presented an integrated model of the learning organization. This model is based on empirical research of the learning organization literature, as well as on practitioners' understandings of the concept where learning organizations were often described in terms of four distinct individual aspects. Örtenblad (2004) argues that these aspects cannot be treated as separate, and that the four aspects have to be combined in order to create a true learning organization. The four aspects are: learning at work, organizational learning, developing a learning climate and creating learning structures. The article of Örtenblad (2004) suggests that only those organizations that have implemented all of the aspects should be called ‘learning organizations’, and those organizations that have implemented only one aspect should be called ‘partial learning organizations’. Further explanation of the integrated model from Örtenblad (2004) can be found in Appendix VIII.
Appendix VIII – Integrated model Örtenblad

According to Örtenblad (2002, 2004) and Argyris and Schön (1974, 1978, 1996) four aspects may be distinguished that must be present for an organization to be appropriately labeled a learning organization. These four aspects are also known as the integrated model (Örtenblad, 2004).

Organizational learning
The first aspect is organizational learning, in which agents learn for the organization, the results of which are stored in organizational memory. Central to such learning, according to Argyris and Schön, is the cyclical relationship between knowledge and action. Human action should lead to more effective knowledge, which in its turn should lead to more effective action. Argyris and Schön expressed this relationship in the cognitive concept of theory of action, which has the general form: “in situation S, if you want to achieve consequence C, under assumptions a1…aN, do A” (Argyris and Schön, 1974, p. 6). The assumptions constitute a model of the world, in which it is likely that action strategy A will lead to consequence C in situation S. Besides these elements, theories of action contain governing variables, norms, and values that make consequence C desirable or worthwhile to achieve. Learning starts when actual consequences of an action strategy do not correspond with expected consequences. This discrepancy between expectation and result is considered an error and leads to a problematic situation, which calls for a period of reflection and inquiry by the acting organizational members. Learning then involves the detection and correction of error on the basis of inquiry. It may be accomplished by single-loop learning (in which members mitigate the discrepancy between expected and actual consequences by adjusting their action strategy A and assumptions a1…aN, but without changing their norms and values that make consequence C desirable) or by double-loop learning (in which members mitigate the discrepancy between expected and actual consequences by adjusting their action strategy A, assumptions a1…aN, and by changing their norms and values that make consequence C desirable). Double-loop learning thus involves a more profound and deep way of learning than single-loop learning. In addition, Argyris and Schön (1978, 1996) distinguish deutero-learning as a form of higher learning, relative to single-loop learning and double-loop learning. To learn in single-loop learning implies
learning to improve performance at an increasing rate. To learn in double-loop learning implies learning to carry out reflection on and inquiry into the governing variables, norms, and values underlying organizational action.

Argyris and Schön link individual to organizational learning by pointing out that, by virtue of delegated responsibilities, some organizational members are empowered to speak and act on behalf of the whole organization, not only in top positions, but in every role or function dealing with external relations. Those members learn when they experience the discrepancy between consequences of an action, expected on the basis of organizational theory of action, and actual consequences. If the organization as a whole is to learn, then the corrective actions these members undertake on the basis of a reflective inquiry into the causes of that discrepancy should become embedded in organizational memory (the whole of individual and shared maps and images of organizational theory of action) and in organizational routines and procedures.

Learning climate
The second aspect is learning climate, in which an organization facilitates the learning of its members. Argyris and Schön have inquired into the ways in which the learning climate (or behavioral world) of an organization inhibits or promotes reflection and inquiry. Based on their consulting and seminar experience, Argyris and Schön asserted that most organizations are driven by a Model O-I theory of action. This model is characterized by a defensive attitude among individuals and a defensive learning climate in the organization as a whole, making collaborative reflection on and inquiry into the causes of error hard to achieve. As an alternative to Model O-I, Argyris and Schön advocate a Model O-II theory of action. This model is characterized by an open attitude among individuals and a productive learning climate in the organization as a whole, enabling collaborative reflection and inquiry. Argyris and Schön regarded Model O-II as a crucial condition for double-loop learning, and double-loop learning in its turn as a crucial condition for organizational survival in the long run. Model O-II organizations, however, are rarely found in practice, and often external interventions are necessary to create a productive learning climate.
Learning at work
The third aspect is learning at work, in which most learning takes place in the workplace and not in formal training courses. Given the difficulties surrounding the transfer of learning and knowledge from the formal training situation to the daily workplace and given the context dependent nature of learning, most learning takes place on-the-job (Örtenblad, 2002, 2004). Argyris and Schön implicitly adopted the same approach, since for them learning is directly tied to error detection and correction in the context of daily work practices.

Learning structure
The fourth aspect is learning structure, in which an organization has an organic and flexible structure to meet external demands, in three ways. First, such a structure is decentralized, leaving members sufficient discretion to make their own decisions in response to external demands. Second, such a structure is team-based, in which team members are able to replace each other, to perform each other’s tasks and thus to acquire a holistic view of team and organizational functioning. Third, such a structure is flat, although it may be possible that an organic structure is hierarchical (Örtenblad, 2002, 2004). Argyris and Schön (1978) implicitly adopted the same approach, when they asserted that specialization of work tasks and centralization of power and information in hierarchically structured organizations reinforces Model O-I theories of action and singe-loop learning and thus hinders the double loop learning necessary for long-term survival of the organization.
Appendix IX - Introduction to peripheral knowledge

Complementary or peripheral knowledge is defined as the outsourcing firm’s knowledge in the domain of the activity that is outsourced to another outside firm (Brusoni et al., 2001; Takeishi, 2002). Tiwana (2004) constructed a model that summarizes the knowledge overlaps across client and vendor organizations necessary for effective outsourced software development in the presence and absence of novelty. In Figure 7, the characteristics of illustrations ‘a’ up to and including ‘d’ can be briefly described as follow:

A. Routine projects require no overlaps.
B. Conceptually novel projects require vendors to have higher business domain expertise.
C. Projects involving novel development processes demand higher technical expertise in the client organization.
D. Totally novel projects require extensive client-vendor communication across all phases of the development process.

Figure 7 – Knowledge overlaps in outsourced software development
In this figure, business knowledge refers to knowledge about the client’s business problem application domain. When overlap patterns match the type of novelty characterizing a project, the project is more likely to be effectively and efficiently completed. Effectiveness here refers to the extent to which the project solves the client organization’s problem (the client organizations provided the effectiveness assessments). Efficiency refers to the extent to which the project was completed within budget.

According to Twana (2004), overlaps that are consistent with the patterns in Figure 7 enhance the design process quality. Improved design processes increase software development efficiency by reducing defect rates throughout the development trajectory and eventual rework-related cost overruns. Similarly, they improve design effectiveness by achieving a closer fit between the delivered system and client needs. The study from Twana (2004) does not show that software development organizations should invest in increasing their developers’ business knowledge, and organizations that outsource development should increase their employees’ technical expertise. A vendor that regularly develops routine applications doesn’t directly benefit from acquiring additional expertise in prospective clients’ business domains. In such cases, a high level of technical expertise in client organizations actually reduces the design effectiveness for the project. In projects involving process novelty, a high level of business knowledge in the vendor organization negatively affects the development process (therein lies the underappreciated danger of knowing too much). This finding could indicate that vendors with very high levels of business knowledge can sometimes be blind to the intricacies of the client’s problem and thus make assumptions that impede the integration of contextual knowledge during the development process. The key take-away: blindly acquiring knowledge outside of the software development domain is as perilous for vendors as is technically educating their clients. Managers considering outsourcing should therefore form carefully pruned outsourcing partnerships consistent with the patterns in Figure 7.

When an outsourcing relationship matches the profile in Figure 7d (that is, total novelty), the single most effective compensating mechanism is close vendor-client interaction throughout the development process. To evaluate knowledge congruence, or fit between the nature of the project and the vendor to which the project might be outsourced, client organizations must first assess the extent to which a
project is conceptually innovative and involves novel development processes or tools. Based on this assessment, clients must seek closely to match their choice of vendor to correspond to the appropriate knowledge overlap pattern as captured in Figure 7. The knowledge congruence framework of Tiwana (2004) consists of four steps for identifying this match.