Relationship and contract issues of IT outsourcing — An empirical study in China

Cong Qi
The Hong Kong Polytechnic University, Hong Kong, Hong Kong, mslaurel@inet.polyu.edu.hk

Follow this and additional works at: http://aisel.aisnet.org/amcis2012

Recommended Citation
Relationship and contract issues of IT outsourcing
— An empirical study in China

Cong Qi
Department of Management & Marketing
The Hong Kong Polytechnic University
mslaurel@inet.polyu.edu.hk

Patrick Y. K. Chau
School of Business
The University of Hong Kong
pchau@business.hku.hk

ABSTRACT

Though experiencing remarkable growth, many outsourcing deals failed or suffered from serious problems. The literature has explored either the relationship or contract issues in IT outsourcing success, however, few efforts have been paid to investigate the effects of both relationship and contract on IT outsourcing success from a holistic view. This study develops a conceptual model and empirically tests it through a cross-sectional survey in Mainland China. The data analysis results identify the dimensionalities of relationship, contract and IT outsourcing success. It further proved the causal relationships between these three constructs. Practically, it re-emphasizes the importance of relationship in IT outsourcing success and the fundamental role of contract in developing a sound relationship. It also gives some implications on how to evaluate IT outsourcing success in China, an emerging market for IT outsourcing.

Keywords
Relationship, Contract, IT outsourcing success.

INTRODUCTION

IT outsourcing has witnessed continuous growth since its prominent early adoption by Kodak 20 years ago. According to a report by Gartner Group (Harris, Hale, Brown, Young, and Morikawa, 2009), the global IT outsourcing market will rise to US$325 billion by 2013. In China, the IT outsourcing services market has reached $2.76 billion in 2009 and is projected to create $3.97 billion in 2011 (IDC, 2009). Despite its steep growth trend, IT outsourcing worldwide is however suffering from difficulties. In China where the IT outsourcing situation is considered different from that of western countries, problems also exist. China’s IT outsourcing market is at the initial stage: IT outsourcing decision makers are usually short of experience to select and evaluate service providers and immature in negotiating contracts, managing contracts and maintaining good relationships with the providers.

According to Alborz, Seddon and Scheepers (2003), IT outsourcing problems often happen at the contract and post-contract stages, where how to negotiate and come out with a sound contract, how to manage the contract, and how to build up and maintain a good relationship become the most critical issues. Lee, Huynh, Kwok, and Pi (2003) also suggest that the research focus of IT outsourcing should be shifted to two major aspects: the contract - the formal control mechanism of a sound relationship (Goo and Nam, 2007); and the relationship - the informal control mechanism (Barthélemy, 2003) in IT outsourcing. To further shed light on the relationship and contract issues of IT outsourcing, especially in the context of China, this study develops a theoretical model and empirically test it through a survey study in China. Evidences are found to support the research hypotheses that contract dimension is a foundation of relationship dimension, and relationship dimension is a most essential factor in determining IT outsourcing success.

PREVIOUS RESEARCH

The literature on relationship mainly focuses on the determinants and attributes of relationships that form partnership-style cooperation (Dibbern, Goles, Hirschheim and Jayatilaka, 2004). Researchers have employed the theories of relational exchange and social exchange to develop research models on the relationship aspect and empirically test them under different research context. Examples could be found in the following studies: Kern (1997), Lee and Kim (1999), Goles and Chin (2005) and Blumenberg, Beimborn and Koenig (2008). The contract literature can be roughly divided into studies addressing contract itself and contract management. For contract itself, based on transaction cost theory, Gainey and Klaas (2003) and Barthélemy and Quelin (2006) suggested that contracts need to be complex and complete in order to mitigate possible
opportunistic behaviours by the provider. In terms of contract management, many researchers (Feeny and Willcocks, 1998; Lacity and Willcocks, 2000) have addressed the significance of contract management at the post-contract stage (Alborz et al., 2003). Shi, Kunnathur and Ragu-Nathan (2005) further developed a new construct - contract management to evaluate the existing contract execution, contract development and enhancement and providers’ accountability for the evolving IS market. The arguments of the relationship between contract and relationship tend to fall into two categories: (1) formal contract is the base for relationship development; and (2) a good relationship is needed since contract is not flexible in the implementation stage. Examples could be found in the following studies: Poppo and Zenger (2002), and Goo and Nam (2007).

Despite the literature has addressed the relationship and contract issues toward IT outsourcing success, few of them have put both aspects into one single theoretical framework and tested their relationship in the IT outsourcing context. For relationship, there is no consistency in the formation of relationship dimension; and for contract, though numerous studies have addressed the significance of contract, little research has mentioned contract management at the post-contract stage. For IT outsourcing success, the “why” issue discussed in the literature have suggested a multi-dimensional criterion to measure this construct, however the dimensionality of this construct has neither been confirmed in the literature nor tested in regions where IT outsourcing practice is at the initial stage. This research tries to understand the components of both relationship and contract in successful IT outsourcing and the relationship between the two seemingly opposite relationship governance mechanisms. It also investigates the effects of relationship and contract dimensions on IT outsourcing success. In short, this research addresses: (1) What kind of role do relationship and contract dimensions play in the success of IT outsourcing? (2) What is the relationship between contract and relationship in successful IT outsourcing? (3) How is IT outsourcing success evaluated within the special context of China?

THEORIES AND RESEARCH MODEL

Social Exchange Theory (SET), Relational Exchange Theory (RET), Transaction Cost Theory (TCT) and Relational Governance Theory (RGT) are used to explain the relationship and contract issues. The first two theories were used frequently in the literature (Kern, 1997) to explore the relationship issues of IT outsourcing; TCT is borrowed from the field of Economics to address the importance of contract; and RGT, starting from the governance perspective, helps to understand the structure and governance aspects of IT outsourcing process. Details of these theories will be introduced in another research paper and the research model is presented in Figure 1.

![Figure 1 Research Model](image)

Notes: R=Reflective; F=Formative

Three major hypotheses are presented in the research model. The constructs involved are relationship dimension, contract dimension and IT outsourcing success. All three constructs are second-order ones consisting of several first-order constructs.
The dependent variable (IT outsourcing success) is measured from four perspectives. Relationship dimension is consisted of trust, commitment, knowledge sharing and communication quality; and the two sub-dimensions of contract dimension are contractual complexity and contract management. The specific definition and measure of each sub-construct are displayed in another paper.

**IT outsourcing success** refers to the overall organizational advantage gained from IT outsourcing strategy. It is a performance measure of inter-organizational exchange and a criterion to evaluate whether IT outsourcing relationship is satisfactory. Grover, Cheon and Teng (1996) have evaluated IT outsourcing success by the satisfaction of benefits client company could achieve through outsourcing activities. Lee and Kim (1999) and Saunders, Gebelt and Hu (1997) further suggested developing another dimension (satisfaction) to measure IT outsourcing success. Summarizing the above researchers’ work, IT outsourcing success is viewed as a multi-dimensional construct measured from four perspectives – strategic, economic, technological benefits and overall satisfaction.

**Hypothesis 1**: IT outsourcing relationship dimension will have a positive influence on IT outsourcing success.

**Contract dimension** is broadly defined as the characteristics and process related with drafting the text contract and contract management activities at the contract and post-contract stages. Based on the definition and the literature (e.g., Shi et al., 2005), this construct is divided into two aspects: contractual complexity and contract management.

**Contractual complexity** is the extent to which outsourcing contracts are composed of elaborate clauses (Barthélemy and Quelin, 2006). It is a criterion to measure the quality of text contract. A detailed and complex contract is more effective in IT outsourcing deals, since it gives enough space to involve preciseness, completeness, flexibility, balance, and other necessary controls to guide outsourcing behaviors (Barthélemy, 2003; Gainey and Klaas, 2003). From TCT’s perspective, contracts represent promises or obligations to perform particular actions in the future (Macneil, 1978), and contractual control is one of the mechanisms to mitigate risks. Barthélemy and Quelin (2006) believed that when asset specificity increases, contracts need to become increasingly complex because contracts could help to mitigate possible opportunistic behaviors by the provider, could help the client to avoid over-dependence on the vendor, and is flexible enough to respond to changes in the environment. To summarize, a more complex contract leaves less room for opportunistic behavior in face of unforeseen events, and thus guarantees the success of IT outsourcing.

**Contract management** is an action-oriented competence that provides the performance measurement process and final performance information for the diagnosis of problems and the prescription of solutions in managing the IT outsourcing dyad’s behavior (Shi et al., 2005). Prior studies have stressed the importance of well developed contracts to the success of IT outsourcing deals; however, most of them did not differentiate between contract itself and actual behaviors of the parties aimed at enforcing the contractual terms. They have no idea whether both parties actually comply with contractual terms or are guided by them in their day-to-day exchanges. Therefore, contract management is equally essential to make sure the execution of existing contracts and future contracts, and the accountability of service provider at the post-contract stage (Feeny and Willcocks, 1998; Shi et al., 2005).
In a holistic view, from RGT’s aspect, contract dimension is another governance mechanism to ensure the success of IT outsourcing. Compared with the informal or relational governance mechanism, formal contractual governance is traditionally taken as the major governance tool in an inter-organizational relationship, and serves to provide structure, guidance, and control to the implementation of IT outsourcing activities (Poppo and Zenger, 2002; Goo, Kishore, and Rao, 2009). A well-designed contract or Service Level Agreement (SLA) and an effective execution of the contract terms are consistent with IT outsourcing dyad’s purposes and interests, which will lead to the success of IT outsourcing.

**Hypothesis 2**: IT outsourcing contract dimension will have a positive influence on IT outsourcing success.

According to TCT, formal contract exists and works most effectively in discrete transactions, and “the idea of a discrete transaction is the foundation on which concepts of relationship are built” (Dwyer et al., 1987). Based on this fundamental statement, researchers from RGT’s perspective investigated the causal relationship between formal contract and relational governance: Ring and Van de Ven (1994), Poppo and Zenger (2002) believed that relational norms evolve from using contractual safeguards to protect relational specific assets. Lacity and Hirschheim (1995) argued that a well-developed contract greatly influences the resulting quality of the relationship. Kern and Willcocks (2002) mentioned that contracting needs careful consideration, as it is traditionally seen as the beginning and foundation of the outsourcing relationship. Finally, Goo and Nam (2007) claimed that a well-structured SLA plays an important role in cultivating favorable relationships in the course of outsourcing engagements. Studies in Marketing or Management literature also emphasize the importance of contract management. They believed that the contractual governance involves not only the text contract but also the implementation of the contract in the established service exchange (Ferguson, Paulin, and Bergeron, 2005).

**Hypothesis 3**: IT outsourcing contract dimension will have a positive influence on IT outsourcing relationship dimension.

**RESEARCH METHODOLOGY**

The research model was tested through a cross-sectional survey in Mainland China. The survey instruments were developed based on the literature and the formal discussions with faculty members. Measures borrowed from the Marketing or Management fields were refined to fit in the context of IT outsourcing.

**Pilot test and questionnaire design**

In the pilot test, face to face meetings with 15 IT executives were arranged. Based on the comments and feedback, face and content validities of the measures were guaranteed. Questions were developed in a seven-point Likert scale. Two questions (objective and subjective) were used to check the informant’s competency (Kumar, Stern and Anderson, 1993). The objective question is to ask how long has the IT executive been staying in the current position; and the subjective question is to ask the level of involvement with his/her company’s IT outsourcing relationship. Any response with less than one year’s working experience in the current position or with an answer to the subjective question lower than 4 (where 1 = the lowest involvement and 7 = the highest involvement) was removed and excluded from further analysis.

**Main study procedures**

Dun and Bradstreet’s database was selected to find IT executives’ contact information in Mainland China. 967 valid records from Beijing, Shanghai, Shenzhen, Dalian, and Guangzhou were used as the sample pool. To increase the response rate, Dillman’s (2000) approach was followed. After two rounds of solicitation, a total of 167 responses were received (with a response rate of 17.3%). After a further data cleaning, 150 records were sustained. Early and late respondents were compared to check for possible non-response bias (Armstrong and Overton, 1977).

**DATA ANALYSIS**

**Exploratory Factor Analysis**

Exploratory Factor Analysis (EFA) is used to remove inappropriate items and to reduce the number of measurement items into a smaller set of dimensions to be utilized in further data analysis (Hair, Anderson, Tatham and Black, 1998). The purpose of using EFA in this study is to identify the dimensionality of each construct, especially that of IT outsourcing success. Formative variables are not included in EFA since high loadings are not necessary and applicable (Chin, 1998). After two rounds of EFA, two problematic items are excluded and three factors (instead of four) are found loaded on the IT outsourcing success. After a careful study of the items, we rename the three factors as strategic and economic benefits, IT related benefits and overall satisfaction toward IT outsourcing.
Measurement model

After EFA, the factor structure is confirmed. The data are now ready to be input in a Structural Equation Model (SEM). Partial Least Squares (PLS) procedure is used to conduct the data analysis, since it allows variables with either reflective or formative in nature and their existence in the higher-order factor structures (Chin, 1998).

PLS allows the calculation of composite reliabilities of reflective variables. The results show that all values of composite reliability and the squared roots of Average Variance Extracted (AVEs) are above the recommended thresholds (0.7 (Nunnally, 1978) and 0.5 (Hair et al., 1998) respectively). This demonstrates good reliability and internal consistency of the measures.

For convergent validity, the results show that all the reflective variables have factor loadings greater than 0.707 (Carmines and Zeller, 1979), and the t-values are all significant at 0.01 level. Meanwhile, AVE of each latent variable is above 0.5 (Fornell and Larcker, 1981). This demonstrates good convergent validity. For formative variables, each weight of the formative variables is significant (at 0.01 level), which indicates the items contribute significantly to the formation of the formative variables.

Discriminant validity is assessed by verifying whether the correlations between a referent construct with others are substantially different from the squared roots of the AVE scores of that construct (Fornell and Larcker, 1981). The data analysis results demonstrate a good discriminant validity of the first-order reflective variables.

Structural model

The model to be tested is a second-order factor model with reflective or formative measures for the first-order factors, and formative measures for the second-order factors. PLS supports the testing of higher-order models, using the hierarchical component model (Lohmöller, 1989). A bootstrapping procedure was used to generate t-statistics and standard errors (Chin, 1998). The purpose of the structural model testing is three-folded: (1) to assess the structure of higher-order factors, (2) to test the path coefficients between higher-order factors (hypotheses testing) and (3) to check the value of R-square – the extent to which the independent variables in the model can explain the variance in the dependent variable. The results of PLS structural analysis are discussed below.

Higher-order factors are relevant when the correlations among the lower-order factors are high (Bassellier, Benbasat and Reich, 2003). The correlation coefficients (discussed above) are significant at 0.01 level for all the first-order sub-constructs forming relationship dimension and IT outsourcing success. To further assess the structure of second-order factors, path weights of the factors forming higher-order constructs are evaluated. The path coefficients and the second-order constructs are estimated using the hierarchical component model approach (Lohmöller, 1989), where the higher-order factors are created using the indicators of its lower-order factors. This approach, which repeats the indicators, allows the model to be estimated using the standard PLS algorithm (Chin, 1998). The weights, standard errors and t-statistics of the second-order constructs are shown in Table 1.

<table>
<thead>
<tr>
<th>Second-order Constructs</th>
<th>First-order Sub-constructs</th>
<th>Weights</th>
<th>Standard Errors</th>
<th>T-statistics</th>
<th>Significant?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Relationship dimension</strong></td>
<td>Trust</td>
<td>0.4248</td>
<td>0.1087</td>
<td>3.9065</td>
<td>Yes (0.01 level)</td>
</tr>
<tr>
<td></td>
<td>KS</td>
<td>0.1889</td>
<td>0.1206</td>
<td>1.5660</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Commit</td>
<td>0.2198</td>
<td>0.1177</td>
<td>1.8669</td>
<td>Yes (0.1 level)</td>
</tr>
<tr>
<td></td>
<td>CQ</td>
<td>0.3915</td>
<td>0.1108</td>
<td>3.5320</td>
<td>Yes (0.01 level)</td>
</tr>
<tr>
<td><strong>Contract dimension</strong></td>
<td>CC</td>
<td>0.5895</td>
<td>0.1154</td>
<td>5.1081</td>
<td>Yes (0.01 level)</td>
</tr>
<tr>
<td></td>
<td>CM</td>
<td>0.5338</td>
<td>0.1120</td>
<td>4.7643</td>
<td>Yes (0.01 level)</td>
</tr>
<tr>
<td><strong>IT outsourcing success</strong></td>
<td>Strat &amp; Econ</td>
<td>0.0479</td>
<td>0.1475</td>
<td>0.3247</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>IT related</td>
<td>0.2597</td>
<td>0.0996</td>
<td>2.6079</td>
<td>Yes (0.01 level)</td>
</tr>
<tr>
<td></td>
<td>Satisf</td>
<td>0.7869</td>
<td>0.1294</td>
<td>6.0799</td>
<td>Yes (0.01 level)</td>
</tr>
</tbody>
</table>

*Table 1 Structural statistics of the second-order constructs*
Table 1 shows seven out of nine weight coefficients of the first-order sub-constructs are significant. For the relationship dimension, trust and communication quality have higher path coefficients than those of commitment and knowledge sharing. This suggests a more important role of trust and communication quality in forming relationship dimension. Knowledge sharing does not show a significant weight in forming relationship dimension. Regarding to contract dimension, the two first-order components are significant and equally important in forming this dimension. For IT outsourcing success, the results indicate that IT related benefits and overall satisfaction are two major sub-constructs whereas strategic and economic benefits do not contribute significantly to the formation of IT outsourcing success.

Upon confirming the structural components of second-order factors, the structural model of the main framework is assessed. Table 2 presents the results of path coefficients in the research model, and Figure 2 shows the overall data analysis results. The path coefficient from relationship dimension to IT outsourcing success is significant at 0.01 level. This supports H1. By the same reason, H2 is not supported and H3 is supported. The R-square values for the two dependent variables in the structural models are 0.44, and 0.54 respectively. This means contract dimension contributes 44% of the variance in relationship dimension, and contract and relationship dimensions together explain over half of the variance in IT outsourcing success.

<table>
<thead>
<tr>
<th>Paths</th>
<th>T-statistics</th>
<th>Significant?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship dimension → IT outsourcing success (H1)</td>
<td>5.65</td>
<td>Yes (0.01 level)</td>
</tr>
<tr>
<td>Contract dimension → IT outsourcing success (H2)</td>
<td>1.35</td>
<td>No</td>
</tr>
<tr>
<td>Contract dimension → Relationship dimension (H3)</td>
<td>10.49</td>
<td>Yes (0.01 level)</td>
</tr>
</tbody>
</table>

Table 2 Path coefficients of second-order constructs

Figure 2 Results of PLS analysis

Notes: Solid lines mean path coefficients are significant; dotted lines mean not significant.

R=Reflective; F=Formative

** p<0.01  *p<0.1
RESULTS DISCUSSION

First, three out of four factors in the relationship dimension are found significant. Trust and communication quality contribute most to the formation of this dimension, commitment is significant but the influence power is not as strong as trust and communication quality. These results are consistent with the literature that trust, communication/communication quality, and commitment are important relational elements in inter-organizational exchange. In contrast, knowledge sharing is not significant in relationship dimension. One possible explanation is that, in most Chinese companies, the sharing of knowledge is difficult, either internally or externally. The sharing of information and knowledge is especially hard between service provider and outsourcing client, since both parties take each other as “outsider” (Shin, Ishman and Sanders, 2007), and “outsider” deserves lower level of trust (Ramasamy, Goh and Yeung, 2006). In this context, knowledge sharing is superficial, where the core knowledge such as project management experience and business domain knowledge are seldom involved.

Second, contract dimension includes two sub-dimensions and they are equally important. This means both a well-designed contract and an efficient contract management capability are essential in contracting IT outsourcing relationships.

Third, EFA confirmed a three-factor pattern of IT outsourcing success, however, the confirmatory analysis showed that the strategic and economic benefits are not important in forming IT outsourcing success. Instead, overall satisfaction and IT related benefits from IT outsourcing contribute more to IT outsourcing success. This means when evaluating IT outsourcing success, Mainland companies prefer to use technical criterion or overall satisfaction as the benchmarks. One possible reason could be the purpose of IT outsourcing is to acquire necessary IT capabilities and human resources, instead of saving costs, gaining economy of scales or refocusing on core business (Qi and Chau, 2010). This finding is also consistent with similar studies in the literature (e.g., Lacity and Hirschheim, 1995; Smith, Mitra and Narasimhan, 1998) which suggested that strategic and economic benefits are not necessarily the determinant factors for companies to make IT outsourcing decision. Regarding to overall satisfaction, this finding reconfirms that overall satisfaction, a newly-developed dimension of IT outsourcing success, plays an essential role in explaining IT outsourcing success.

Last, for the structural model testing, H1 is supported. This result agrees with the extant literature, and confirms that relationship is the key to IT outsourcing success. H2 is not supported, probably because Mainland China is not mature on the legal perspectives of IT outsourcing. On one hand, IT executives have not paid enough attention to or are still on the way exploring the legal aspect of IT outsourcing. On the other hand, the legal system of Mainland China is not complete enough to ensure the execution of outsourcing contracts. Therefore, the position of contract (text and management) is not as important as that of relationship or “guanxi” in determining the success of IT outsourcing. This result is consistent with some of the prior studies, which suggested that comparing with “guanxi”, “the outsourcing contract configuration may be a less significant indicator of success in China” (Young and Tate, 2007, p.6542) and “the fulfillment of outsourcing requirements relies on guanxi rather than a formal outsourcing contract” (Kam, Chen and Wilding, 2011, p.441). Last, H3 is supported, which suggests that contract is the foundation and base of relationship. The 44% variance of relationship dimension explained by contract dimension confirmed this point. Moreover, the direct and indirect effects of relationship and contract dimensions explained 54% of the variance in IT outsourcing success. This shows a good model fit and a strong prediction power of the current model (Gefen, Straub, and Boudreau, 2000).

CONTRIBUTIONS AND LIMITATIONS

The main theoretical contribution of this research lies in the development and use of a “relationship-contract” framework to investigate IT outsourcing governance - it is among the first to put both relationship and contract dimensions in one integrated framework, and to explore the effects of them on IT outsourcing success. The second contribution lies in discussing the components of the three constructs. For relationship dimension, trust, commitment, and communication quality are suggested to be influential; and contract complexity and contract management are important factors in contract dimension. IT outsourcing success is mainly evaluated by the overall satisfaction and the IT related benefits gained through outsourcing activities. This result is inconsistent with the literature; however, it may reflect the specific situation of Mainland China. The third contribution comes from the use of theories - multiple theories from various domains are used to explain the complex phenomenon.

For practice, this research indicates that both contract and relationship are important factors, though contract dimension contributes indirectly to IT outsourcing success. The finding directs IT outsourcing practice by suggesting that (1) contract complexity and contract management are important, since they are the foundations of relationships; and (2) however, to guarantee the contract right is not adequate; at the post-contract stage, it is the effective management of relationship that

Qi et al.  Relationship and contract issues of IT outsourcing
contributes to the ultimate IT outsourcing success. These suggestions clarify the roles of relationship and contract and call for executives to take a holistic view when facing IT outsourcing problems.

The first limitation of the study relates to the research methodology. A cross-sectional research design was used to study a phenomenon that evolves over time. This method could not depict the evolutionary process of IT outsourcing as a longitudinal study could do, for instance whether the current IT outsourcing success will have a reinforcing influence on contract or relationship dimensions in the future. Second, the data analysis results reveal that relationship dimension is a significant mediator between contract dimension and IT outsourcing success, however, the mediating effect analysis was not conducted. Third, in Mainland China different industries and companies have varied levels of acceptance of IT outsourcing. Collecting data without distinguishing the nature of the company leads to a lower level of explanatory power in face of idiosyncratic situations. Fourth, this study was conducted in an immature/emerging market of IT outsourcing, caution needs to be paid when interpreting the results to the context of other regions. Last, since the evidence was collected from the clients’ perspective, there is a lack of understandings of the view from the service provider’s perspective.

CONCLUSIONS

The survey study is among the first to bring theories from Economics, Marketing and Management fields to the IT outsourcing context and investigate the effect of the two seemingly opposite governance mechanisms on IT outsourcing success. It is also among few studies to discuss the dimensionalities of relationship, contract, and IT outsourcing success and to explore the relationships among them. The data analysis showed that contract is an important foundation of relationship, and relationship is a key toward IT outsourcing success. Last, a special focus on China has raised some interesting discussions for researchers and practitioners who are paying special attention to China – an emerging market for onshore and offshore IT outsourcing.
REFERENCES