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# Sourcing Decision-Making: Elicitating Consultancy Knowledge Using Policy Capturing

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# SOURCING DECISION-MAKING: ELICITATING CONSULTANCY KNOWLEDGE USING POLICY CAPTURING

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## Abstract

*Many organizations are currently deciding whether to insource or outsource their IS function or parts thereof, but are unsure as to what kind of organizational structure to arrange for sourcing and where to locate the sourced activities. To assist in this matter, several IT consultancy firms are providing sourcing consultancy to their clients, resulting in a large body of practical knowledge that is stored in the experience of consultants. Systematic scientific knowledge is largely based upon qualitative case studies. This paper presents the results of a Policy Capturing study that attempts to quantify the sourcing advice practice. 29 management consultants with experience in sourcing advice were presented with examples of situations in which a sourcing advice was to be given. Using Factor Analysis and Multilevel Regression the researchers obtained insight into how variables such as costs, flexibility, time-to-market and quality influence decisions with regard to both sourcing location as well as sourcing relationship. The Research method that was used proved to be useful in the explicitation of knowledge of consultants but needs further refinement.*

*Keywords: Outsourcing, Insourcing, Policy capturing, Consultancy/Advisory knowledge.*

# 1 INTRODUCTION

For years, outsourcing has been a popular strategy for IT-organisations to achieve performance improvement and/or cost reduction. Although studies show beneficial effects of outsourcing - see for example Lacity and Hirschheim (1993) - there are also numerous negative experiences with this strategy. For instance, Benko (1992), Due (1992) , Earl (1996) and, more recently, King and Malhotra (2000) have pointed that outsourcing is definitely not a silver bullet. It is one of the many alternatives an organisation has with respect to a strategic choice called IT *sourcing*: the transfer of part of or entire IS functions and/or employees and/or computer facilities of an organisation (the client) to a (internal or external) supplier, for which the supplier is responsible (adapted from Yang and Huang, 2000). Sourcing comprises the entire spectrum of transferring resources and co-operation schemes, such as for instance outsourcing, co-sourcing and insourcing.

This article addresses outsourcing of software application development in the context of a consulting firm. Application development comprises the analysis, design, construction, testing and implementation of software applications. Clients of this firm are increasingly struggling with the question, where to locate their application development activities and which co-operation model to employ with the sourcing provider. In other words:

> *"What is the optimal sourcing option for IT application development in a given situation?"*.

Although best practices exist in the consulting domain, a thorough empiric study regarding this question is lacking. In some areas of the sourcing domain, results are available in literature.

In order to answer the above research question a Policy Capturing study was performed. In Policy Capturing studies respondents are confronted with a short description of a situation (a vignette). Respondents are asked to make a judgment or evaluation with regard to the described situation. In this research we developed descriptions of organizations that seek advice with regard to the sourcing options they have. The respondents were asked what kind of sourcing option they would find viable, given the specific situation.

The article is structured as follows.  In section 2, we provide an overview of the sourcing decision making model. Section 3 describes the policy capturing method. Section 4 presents the results of policy capturing applied to sourcing decision making. In section 5 we discuss the results and the research method. Section 6 presents conclusions and further research.

# 2 SOURCING DECISION-MAKING

## 2.1 Basic terminology

One of the reasons why sourcing, and outsourcing in particular, often does not live up to its expectations is, that the terminology is fuzzy and the process resulting in a sourcing decision is not transparent. This paves the way to communication problems, which lead to misinterpretations, wrong expectations, ambiguity and, in the end, high costs and frustration. There is clearly a need for well-defined terms and a sound process that would help clients and suppliers in improving the quality of sourcing decisions.

Literature shows there are a lot of definitions of *outsourcing* (see, for instance, Loh and Venkatraman, 1992; Lacity and Hirschheim, 1994; Yang and Huang, 2000). In this research the following definition of outsourcing is used (adapted Yang and Huang, 2000; De Looff, 1996): *Outsourcing is the transfer of a part of or entire IS functions and/or employees and/or computer facilities (IT) of an organization (the client) to an external supplier, for which the supplier is responsible.* The verb "transfer" used in this definition implies two things. First, (part of) an IS function is passed on from a client to a supplier.

Second, the supplier actually executes the IS function. Thus, "transfer" implies the process of transferring, as well as the subsequent execution. If the client (or an internal supplier) conducts the IS functions and is also responsible, this is called insourcing.

The term "sourcing" encompasses the entire spectrum of insourcing on the one hand and outsourcing on the other hand. Thus, sourcing is a container concept for all possible in- and outsourcing alternatives. More formally: *sourcing is the transfer of part of or entire IS functions and/or employees and/or computer facilities (IT) of an organization (the client) to a (internal or external) supplier, for which the supplier is responsible.*

## 2.2    Decision Making Model

Our decision making model is based on De Looff (1996) and contains the following components: sourcing location, sourcing relationship and sourcing option. These components are elaborated below. Sourcing can take place on several locations, for which the term 'global sourcing' is used. Murray, Kotabe & Wildt (1995) define global sourcing as: "global sourcing involves setting up production operations in different countries to serve various markets, or buying and assembling components, parts or finished products world-wide". According to Mol (2001) a more general definition of global sourcing is needed: "finding and managing sources for production of final products on a world-wide basis". A number of possible options can be distinguished, such as sourcing at the location of the client (in the same building), from somewhere in the country where the client is situated, from neighboring countries, or from other continents. The sourcing locations also need to be clarified:

- In *onsite sourcing* the activity is provided at the client location. Home country, at client location.
- In *onshore sourcing* the sourced activity is provided from the same country, but from another location than the premises of the client. Home country, not at client location
- In *nearshore sourcing* the sourced activity is provided from an adjoining country or region.

In offshore sourcing the sourced activity is provided from another continent/region of the world. Neighboring region or country:

- *Offshore western* is used in this research to indicate sourcing to a country with western culture. Another (not neighboring) country with western culture
- *Offshore non-western* is used to indicate sourcing to a country with a non-western culture. Another (not neighboring) country with non-western culture.

Another dimension of sourcing is the way of "interaction between two or more separate but mutually dependent players". In other terms, the *Sourcing relationship* is the legal relationship between client and supplier. This interaction can be both brief and long-lasting. *Short-term contracting* (traditional sourcing) usually occurs with one supplier which has won the trust of the client by successful cooperation in the past (Currie & Willcocks, 1997). Long-term relationships with a supplier (strategic sourcing) are currently more popular than short-term relationships. Current literature distinguishes many sourcing relationships. The following are considered within this research:

- *Insourcing* is sourcing using an internal supplier Client and supplier are part of the same legal entity. Insourcing: Client owns supplier, fully or partially
- *Single outsourcing* means sourcing using one external supplier (there are more suppliers available but the client chooses to outsource to one), Client and supplier are separate legal entities, but part of the same parent company"
- A *joint venture* between client and supplier results in a new organization which is officially unrelated to the companies that started it, though they keep a certain amount of control. Client has a joint venture with other client organizations or supplier
- *Multiple outsourcing* means sourcing to more than one external supplier. Independent supplier

Combining  sourcing relationship and sourcing location, results in a matrix of 20 cells, shown in Table 1. These *Sourcing options* are *c*ombinations of sourcing relationships and sourcing locations.

| Sourcing relationship | Sourcing location | | | Offshore Western | Offshore non-western |
|---|---|---|---|---|---|
| | Onsite | Onshore | Nearshore | | |
| Insourcing | … | … | … | … | … |
| Single Outsourcing | … | … | … | … | … |
| Multiple Outsourcing | … | … | … | … | … |
| Joint Venture | … | … | … | … | … |

*Table 1.        Sourcing options based on sourcing locations and sourcing relationships*

According to De Looff (1996) the decision to maintain the current situation or improve the situation (by outsourcing) depends on six goals of outsourcing that should always be considered in conjunction:

- *Costs*: The total costs of preparing and performing an activity
- *Time-to-market*: The time between the moment the requirements for an activity have been specified and the moment the result of the activity has been accepted
- *Quality*: The degree to which the specified requirements are met by the supplier
- *Flexibility*: The degree to which IS activities that are needed can be started, changed and stopped at any time
- *Control*: The degree to which costs, lead time and quality can be predicted, measured and if necessary enforced
- *Continuity*: The probability that a certain product or service will be delivered as long as the client organization has a need for it

In the empirical part of the project, the effect of costs, time-to-market, quality and flexibility on the choice of a sourcing option is investigated. Control and continuity are not included in this research, since these variables depend on the choice of supplier. The effect of these variables on sourcing decision-making could be investigated in a different context: different outsourcing suppliers could be evaluated on service levels, clients interviewed, et cetera. Control and continuity should be taken into account later in the sourcing decision process, when the optimal design of the sourcing arrangement is clear and suppliers need to be selected. The goal of this research is to elucidate the effect of variables on the choice of sourcing relationship and location.
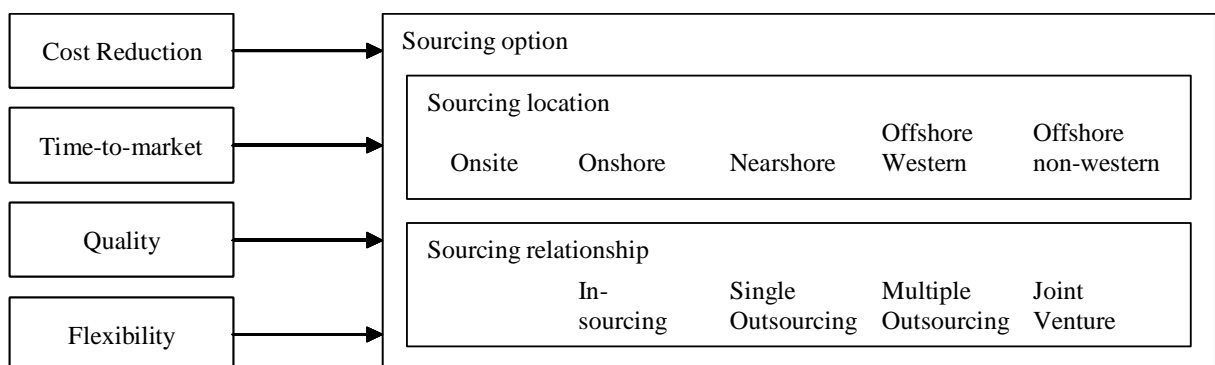
Summarizing, our research model is depicted in Figure 1.



*Figure 1.        Conceptual model*

# 3    RESEARCH METHOD

## 3.1    Research approach

There are many ways to investigate the effect of the four independent variables on a sourcing decision. For instance, it is possible to perform case studies of more of less successful sourcing deals. Another opportunity would be to conduct in depth interviews with consultants and/or clients of a consultancy organization to extract their sourcing decision-making process. However, these qualitative research approaches have several disadvantages. Although they provide in depth insight into a specific situation, they also tend to be of an anecdotic nature, making the results hard to compare across studies. As a consequence it is hard to accumulate knowledge in this research area. With this article, the researchers hope to quantify the effect of several factors on sourcing decisions. Another reason for not choosing a qualitative approach is that these research methods strongly focus on the past experience of respondents, rather then obtain insight into how respondents would react to possible or future situations. In the fast changing sourcing landscape, this is a major disadvantage. Sample survey is not considered a viable research method in this case because there are simply to few people that have in depth knowledge with regard to the subject. Moreover, individuals often overestimate the relative importance of minor variables in direct ratings (Martocchio, Webster & Baker, 1993) and generalization is not the goal of this research.

Because of the limitations of the research methods that were described above we chose to use policy capturing as a research method. Policy Capturing is applied more and more in the field of IS. Policy Capturing is a valuable research method when in comes to studying human judgements, or more specifically, decision making. There are several studies that use policy capturing to study choices such as computer training and software selection (Martocchio et al., 1993), media choice (Van de Wijngaert, 1999; Bouwman and Van de Wijngaert, 2003) and the use of mobile, fixed or face-to-face channels in e-commerce (Bouwman and Van de Wijngaert, 2003). As our study can also be interpreted as a feasibility study with regard to sourcing decision-making, policy capturing can be applied. Although policy capturing is used more and more in the field of IS, its basic principles we be further explicated the following section.

## 3.2    Policy capturing

Policy capturing (also called factorial survey, vignette study or conjoint measurement) is a method for measuring the relative importance of decision variables to a decision maker's choice among alternatives (Martocchio et al, 1993). Rossi & Nock (1982) describe policy capturing as the combination of certain features of existing research designs into a powerful tool for evaluation processes. In essence, it combines the advantages of multivariate (more than one variable) experimental designs with sample survey procedures. Its ability to capture the complexity of real life and the conditions of real human choices while at the same time assessing the effect of several variables on these choices is exactly what is needed in this research.

In policy capturing, respondents are presented with a description of a situation (i.e. the vignette). In this research, we have made the assumption that it is easier for a respondent to relate to a real-life situation if a context (such as line of business) is provided. Thus, respondents can actually give the advice they would have given had it been a real consulting question. As argued in section 2, four independent variables characterize the vignette: *cost reduction*, *quality*, *flexibility* and *time-to-market*. All variables have two values: either important or unimportant. An example of a vignette in is given below:

> *"SteelCom is a production company of steel and steel products, with establishments all over the world. SteelCom uses very high-quality applications to support the steel production, since a single error in IT can lead to enormous production and/or sale*

*problems. SteelCom requests a recommendation which sourcing relationship and location should be chosen with regard to the development of new applications. SteelCom cannot wait long for new applications to be developed, since this has enormous impact for the production of its products. What also must be taken into account is that SteelCom releases several new products each year, which must be supported by the applications. The internal or external supplier should therefore be very flexible, continuously able to adapt itself to the changing requirements. SteelCom has much capital in reserve, as a result of which costs/price is not important."*

In this case quality, time-to-market and flexibility are rated as important. Cost reduction is rated as not important. In policy capturing studies it is essential to make sure that the values of all four variables are correctly formulated and easily interpretable (but not so easy that we might as well state the variables with their values). In this research, all vignettes were first checked on clarity and interpretability of variables and values by two consultants of the company at which the study was performed. Then, two other consultants of that same company were asked to rate the values of the variables in every vignette on a five-point scale. This scale ranged from "totally unimportant" to "totally important". Using their scores, a few adjustments were made to the vignettes. For instance, "costs do not matter much" was changed into "costs do not matter at all" to achieve better polarization. Also, some phrasings were adjusted so vignettes would not resemble each other too much. Otherwise, the respondents might be inclined to directly compare vignettes, while the idea is that a respondent considers every vignette as a question in itself. With four variables and two values per variable, 16 vignettes can be constructed. Two unrealistic combinations of values were excluded from the research. In the remaining 14 objects independent variables were systematically varied.

After reading a vignette, respondents were asked to make a judgment with regard to the dependent variable: sourcing option. In this research, respondents are asked to score the expected successfulness of a sourcing option, defined as a combination of sourcing relationship and sourcing location, with regard to application development (as defined in Table 1). Respondents could rate the successfulness of s sourcing option on a five point scale ranging from 'no chance of success' to 'excellent chance of success'. The data was gathered by using a pen-and-paper questionnaire. The researcher made appointments with each of the consultants and had them fill out the questionnaire. This way emerging questions could be answered right away and additional comments were noted.

The research population consisted of 29 consultants a Dutch consultancy firm. These respondents were selected for their experience with sourcing. Most of the consultants are employed in the Financial Services sector and Technology Advisory Services. All consultants in the research population were ranked *managing consultant* or higher, which is an indication of their experience. Furthermore, these consultants have hands-on experience with technology solutions viewed from a business perspective. Of the resulting 29 respondents, only one is female.

After completing the 14 vignettes, respondents were asked if the information in the vignettes was sufficient to rate the successfulness of the sourcing options. The large part of the respondents (45%) thought that the information in the vignettes was limited but enough to give a reasonable advice, while two respondents thought that the information (more than) sufficient and gave advice easily. Seven respondents felt the information was limited and another seven respondents felt it was almost impossible to give reasonable advice with the given information. No respondent thought giving advice entirely impossible.

### 3.3 Data analysis

In the previous section we described how we did not draw a representative sample of real life sourcing situations but we artificially created our factorial object universe. Although this object space does not provide a *representative* sample of sourcing situations, it does provide the complete *range* of possible sourcing situations. This is inherent to the Policy Capturing method. The consequence is that generalizing the results is not only not possible, but also inadequate. Therefore, in the results section,

there will be no descriptive overview of the number of times sourcing option x was mentioned as opposed to sourcing option y. Rather, our analysis focuses on understanding relationships among the variables. The goal of our data analysis to understand what the effect is of variables like costs and flexibility on sourcing decisions.

Because we asked respondents to grade 20 combinations of sourcing relationships and sourcing locations, we ended up with a large amount of dependent variables. In order to reduce this complexity we started out with performing hierarchical clustering as well factor analysis in order to reduce the data. Because the factors we found were easy to interpret we maintained them for further analysis. This analysis focussed on the question whether the differences within and between the factors can be explained by differences between the independent variables: *cost reduction*, *quality*, *flexibility* and *time-to-market*. We are aware of the fact that this data is measured at two levels (that of the respondent and that of the vignette). Therefore we used Multilevel Linear Regression to analyse the effect of the variables on each of the factors (Bryk and Raudenbush, 1992).

## 4 RESULTS

### 4.1 Clustering sourcing options

In order to reduce the complexity of the data analysis we performed factor analysis on the scores of the twenty sourcing options as described in Table 1. Factors were extracted using Principal Components. Afterwards Varimax rotation was performed in order to facilitate interpretation of the factors. Factor scores for the five factors with an Eigenvalue > 1 are presented in Table 2. The total explained variance of the five factors is 66%. The factor loadings > 0,5 are marked in bold.

| | Factors | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Sourcing option | *Explained variance* | 15% | 15% | 14% | 13% | 9% |
| Insourcing Nearshore | | 0,24 | 0,07 | 0,04 | **0,84** | 0,05 |
| Insourcing Offshore Western | | 0,11 | 0,14 | -0,03 | **0,80** | 0,16 |
| Insourcing Offshore Non-Western | | -0,09 | 0,06 | -0,01 | **0,83** | 0,11 |
| Insourcing Onshore | | **0,57** | 0,07 | 0,03 | 0,57 | -0,13 |
| Insourcing Onsite | | **0,70** | -0,03 | -0,22 | 0,25 | -0,12 |
| Single Outsourcing Onsite | | **0,74** | 0,09 | 0,03 | 0,24 | -0,04 |
| Single Outsourcing Onshore | | **0,71** | -0,03 | 0,00 | -0,02 | 0,36 |
| Single Outsourcing Nearshore | | 0,03 | -0,02 | 0,14 | 0,22 | **0,75** |
| Single Outsourcing Offshore Western | | -0,04 | 0,10 | 0,03 | -0,01 | **0,82** |
| Single Outsourcing Offshore Non-Western | | -0,56 | -0,03 | -0,08 | 0,17 | **0,45** |
| Joint Venture Onsite | | 0,35 | **0,76** | 0,02 | -0,05 | -0,08 |
| Joint Venture Onshore | | 0,31 | **0,79** | 0,01 | -0,04 | 0,01 |
| Joint Venture Nearshore | | -0,03 | **0,80** | 0,02 | 0,12 | 0,08 |
| Joint Venture Offshore Western | | -0,15 | **0,81** | 0,04 | 0,11 | 0,08 |
| Joint Venture Offshore Non-Western | | -0,34 | **0,68** | -0,06 | 0,22 | -0,04 |
| Multiple Outsourcing Onsite | | 0,35 | 0,09 | **0,66** | 0,13 | -0,21 |
| Multiple Outsourcing Onshore | | 0,22 | -0,02 | **0,82** | -0,05 | 0,01 |
| Multiple Outsourcing Nearshore | | -0,18 | -0,04 | **0,83** | 0,04 | 0,10 |
| Multiple Outsourcing Offshore Western | | -0,18 | 0,04 | **0,72** | -0,13 | 0,19 |
| Multiple Outsourcing Offshore Non-Western | | -0,46 | 0,00 | **0,57** | 0,08 | 0,04 |

*Table 2.        Factor loadings for the rotated five-factor solution.*

In Table 3 a more comprehensive view of the five factors is provided. This table shows how the twenty sourcing options are related to the five factors that were found. Hierarchical clustering was also performed and yielded similar results. The factor scores were saved and used for further analysis.

| Sourcing relationship | Sourcing location | | | Offshore Western | Offshore non-western |
|---|---|---|---|---|---|
| | Onsite | Onshore | Nearshore | | |
| Insourcing | Factor 1 One party in home country | | Factor 4 Insourcing, not at client location | | |
| Single Outsourcing | | | Factor 5 Single Outsourcing elsewhere | | |
| Multiple Outsourcing | Factor 3 Multiple Outsourcing | | | | |
| Joint Venture | Factor 2 Joint Ventures | | | | |

*Table 3.        Relation between twenty sourcing options and the five factor solution*

From the Tables 2 and 3 we can conclude that five factors provide a picture of the data that is easy to interpret:

- *Factor 1: One party in home country:* This factor is called 'one party' because of the number of parties involved in the sourcing relationship. In a joint venture are two parties (client and supplier), and multiple outsourcing can consist of two or more parties. But this factor contains only one-party-relationships, namely insourcing (client) and single outsourcing (one supplier). The cluster is also titled 'in home country' to illustrate the appropriate locations of the supplier: situated in the 'home country' of the client.
- *Factor 2: Joint ventures:* These sourcing relationships apparently do not differ much from each other according to the respondents. Within this group there are two subgroups: joint ventures in the country where the client is situated (onsite and onshore; from now on called *home country*) and joint ventures elsewhere.
- *Factor 3: Multiple outsourcing:* All multiple outsourcing relationships also form a cluster. As with joint ventures, there are two subgroups, one for the home country and one for elsewhere.
- *Factor 4: Insourcing not at client location:* This cluster consists of all insourcing relationships regardless of location, except for insourcing onsite (at the client's premises). Two subgroups are also identified, depending on location. One cluster contains the insourcing relationship which is constituted in the home country of the client, while the other cluster contains the other locations elsewhere in the world.
- *Factor 5: Single outsourcing elsewhere:* This last cluster consists of the remaining single outsourcing locations: all locations not in the country where the client is situated.

It seems that respondents view the sourcing options as two distinct groups: either single outsourcing to other countries or other relationships and locations. In other words, it is easiest for respondents to discriminate between outsourcing to a single party in (e.g.) Eastern Europe, Canada or India, and other sourcing options. When considering the latter, it is easiest to discriminate according to sourcing relationship. Within each sourcing relationship (insourcing, multiple outsourcing or a joint venture), one can discriminate between locations: one group consists of onsite and onshore, while another group consists of nearshore, offshore western and offshore non-western.

## 4.2        Descriptive: effects of variables on factors

A first descriptive exploration of the effect of the four variables on the five factors is shown in Figure 2. The figure shows five radar plots, one for each factor. In each of the radar plots an axis is drawn for the variables that are hypothesized to influence the sourcing decision. Also, each radar plot shows two series. The black/circle series shows the average factor score for the condition in which a variable was important. The grey/square series shows the average factor scores for the condition in which a variable

not important. Independent sample T-tests were used to find out if the difference between the two conditions is significant. Significant differences are flagged accordingly. The lines that are drawn between the values have no intrinsic meaning. They are merely supplied to facilitate interpretation of the plots.
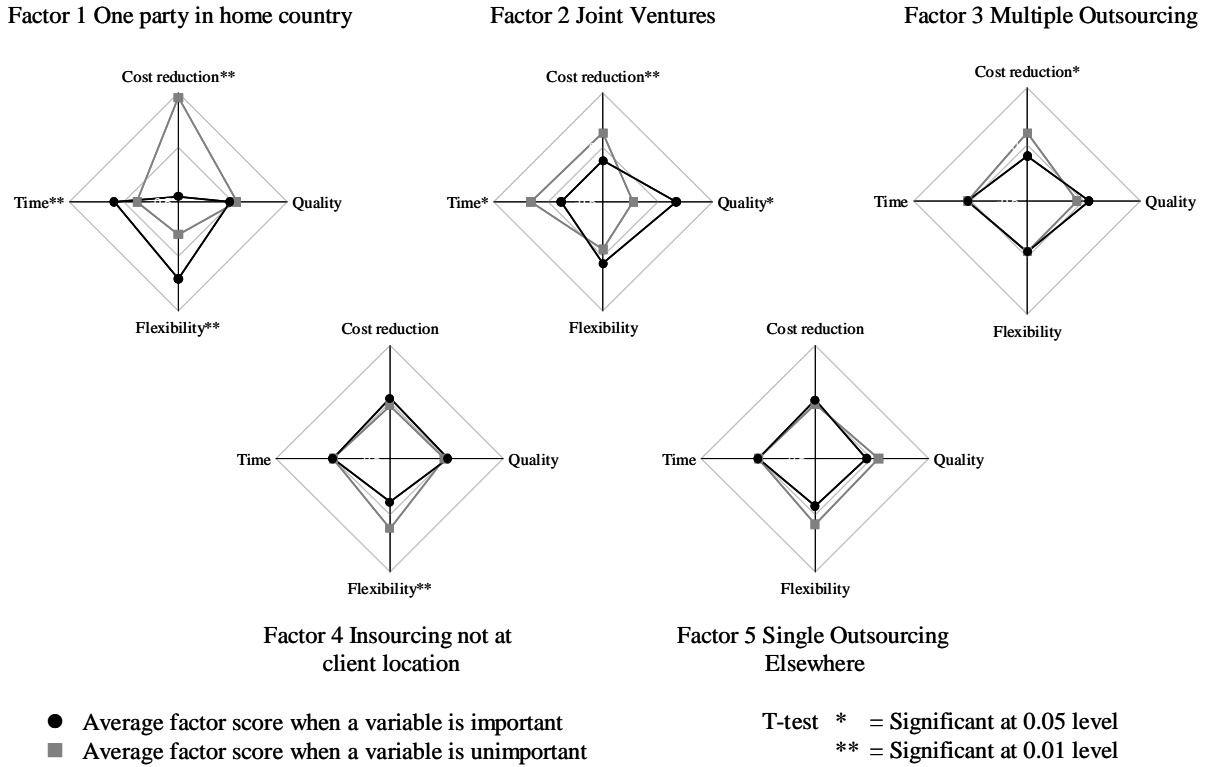


Factor 1 One party in home country
Factor 2 Joint Ventures
Factor 3 Multiple Outsourcing
Factor 4 Insourcing not at client location
Factor 5 Single Outsourcing Elsewhere

● Average factor score when a variable is important
■ Average factor score when a variable is unimportant

T-test  * = Significant at 0.05 level
** = Significant at 0.01 level

*Figure 2. Average Factor Scores for the two conditions of the variables for each factor*

In order to interpret these results the reader should bear in mind that both extreme high and low average factor scores (either close or far from the centre of the radar plot) contribute to the interpretation of the radar plot. Factor scores that are close to zero (i.e. in the middle of the radar plot) do not influence the interpretation of the factor very much. A quick scan of Figure 1 shows that the factors 3, 4 and 5 hardly any of the variance is explained by the four variables. In contrast, both factor 1 and 2 show interesting patterns:

- *Factor 1 One party in home country* is viable as a sourcing option when flexibility and speed are important and cost reduction is not important.
- *Factor 2 Joint ventures* is expected to be a successful in case quality and flexibility are important and speed and costs are not important.
- *Factor 3 Multiple outsourcing* becomes relevant when cost reduction is not important.
- *Factor 4 Insourcing not at client location* is a viable sourcing option when fexibility is not important.
- *Factor 5 Single outsourcing elsewhere* is also viable when flexibility is not important. However the differences between the four variables is not significant.

## 4.3 Multilevel Linear Regression Models

As a final step in the data analysis we have performed multilevel regression analysis using HLM. We built five regression models in which the variance in the factors is explained by the four variables cost reduction, time-to-market, flexibility and quality. We used multilevel linear regression because the

data has two levels: that of the individual respondent and that of the vignettes. The dependent variables were entered uncentered. The results are provided in Table 4.

| | Factor 1 One party in home country | | Factor 2 Joint ventures | | Factor 3 Multiple outsourcing | | Factor 4 Insourcing not at client location | | Factor 5 Single outsourcing elsewhere | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coeff | p-val | Coeff | p-val | Coeff | p-val | Coeff | p-val | Coeff | p-val |
| Intercept | 0.19 | 0.13 | 0.00 | 0.98 | 0.05 | 0.74 | 0.08 | 0.62 | 0.14 | 0.35 |
| Cost red. | **-0.86** | 0.00 | **-0.24** | 0.01 | **-0.21** | 0.03 | 0.03 | 0.82 | 0.01 | 0.95 |
| Quality | -0.03 | 0.76 | **0.35** | 0.00 | 0.12 | 0.14 | 0.03 | 0.70 | -0.10 | 0.32 |
| Flexibility | **0.28** | 0.00 | 0.10 | 0.26 | -0.13 | 0.12 | **-0.23** | 0.00 | -0.16 | 0.06 |
| Time | **0.20** | 0.05 | **-0.22** | 0.03 | 0.09 | 0.36 | 0.00 | 0.97 | -0.01 | 0.90 |
| df | 28 | | 28 | | 28 | | 28 | | 28 | |
| Chi$^2$ | 134.86 | 0.00 | 163.90 | 0.00 | 154.37 | 0.00 | 209.76 | 0.00 | 160.10 | 0.00 |

*Table 4.*        *Fixed effects (with robust standard errors) from multilevel regression models for each of the five factors (predictors with a p-value < 0.05 are marked in bold).*

From this we can basically draw the same conclusions as in the previous section. We can see that across factors Cost Reduction is a good predictor of which sourcing option is most viable. Notice that in all three the cases Cost Reduction is significant, the coefficient is negative. This means that the Sourcing Option is viable when cost reduction is not important. Flexibility explains the preference for Factor 1 (if flexibility is important) and Factor 4 (if flexibility is not important). Time-to-market also predicts the preference for two variables. If speed is important respondents tend to favor Factor 1 (One party in home country). If speed is not important Factor 2 (Joint Ventures) is chosen. Joint Ventures are also chosen as a viable option in case Quality is important.

# 5    CONCLUSION

## 5.1    Main findings

Systematic knowledge in the area of sourcing is hard to find. This conclusion can be drawn based on the abundance of definitions, frameworks and qualitative research that can be found in this research area. The aim of this research was to elicit some of this knowledge by taking a more quantitative approach. Based on the literature research we have built a framework in which sourcing options depend on sourcing location and sourcing relationship. A sourcing decision is based upon differences between the importance of const reduction, flexibility, quality and time-to-market. Using Policy Capturing as a research method, we were able to put this model to the test and draw two main conclusions. One is aimed at the sourcing options and one on the variables influencing sourcing decisions:

- Factor analysis shows that there is a limited number of sourcing options that are more or less similar. Five clusters are identified, which were called *one party in home country*, *joint ventures*, *multiple outsourcing*, *insourcing not at client location* and *single outsourcing elsewhere* in this research. From these results we can conclude that the type of sourcing relation distinguished sourcing options more strongly from each other than sourcing location.

- Our second conclusion is related to how the independent variables *cost reduction*, *flexibility, quality* and *time-to-market* influence the sourcing option the is expected to be most successful. Figure 3 provides a comprehensive overview of the results of the Multilevel Linear Regression

analysis that was performed. From the data analysis we can deduct that the cost reduction has the strongest explaining power. The need for speed and flexibility also help to predict which sourcing option is most viable. The quality of the work that is sources has least explaining power. Joint Ventures are expected to be the most successful option when quality is very important. The other sourcing options did not show significant relations for Quality.
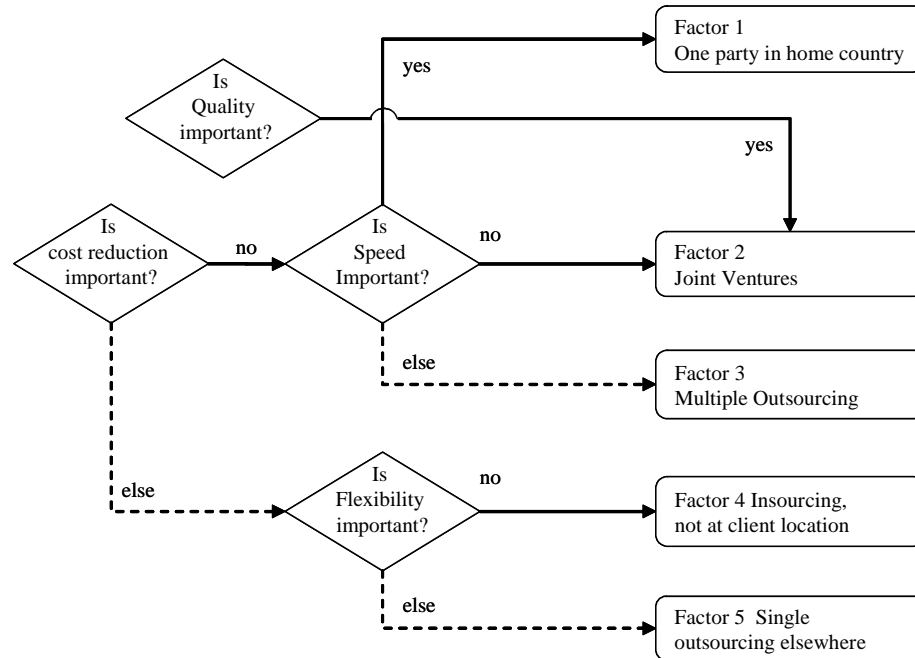


*Figure 3.*      *A comprehensive presentation of Multilevel Regression Analysis (solid lines represent significant relations, dotted lines are not significant)*

## 5.2     Limitations and further research

This study was a first exploration where policy capturing was employed to elicit complex knowledge in a IS consultancy setting. We therefore are aware of the limitations concerning both the research method on the one hand and the application of the research method in the domain of IS sourcing decision making on the other hand. First, decision making is a complex process on its own, and so the IS sourcing decision is usually embedded in a myriad of factors of various sorts. This lead to our selection of independent and dependent variables in the research design in order to be able to execute the research method. Further experimentation with more independent variables, such as the business domain and the language of the application development is required to refine the decision making knowledge.

Secondly, it is obvious that we need to repeat this policy capturing method with management consultants of other companies and of other countries. The applied research method is well described and it is not difficult to arrange similar elicitation efforts elsewhere. Care should be taken to keep the research design feasible. However, with these limitations in mind, we are convinced that policy capturing is a valuable research method to elicit complex IS decision making knowledge.

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