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DETERMINANTS OF IS OUTSOURCING DECISION: DEVELOPMENT OF AN INTEGRATED MODEL AND TEST

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Abstract

There has been considerable research interest on the determinants of outsourcing of Information Systems. However, most of the past studies are quite fragmented and no comprehensive study and model exists. Based on four theoretical models (resource-based theory, resource dependence theory, transaction cost theory, and agency cost theory), we propose an integrated model of IS outsourcing determinants. The model contains nine constructs. The relationships between the constructs are validated using survey data from companies in Hong Kong. Based on the results, we derived a reduced model of IS outsourcing determinants. Our results show that market uncertainty of IS resources and outsourcing agency factors affect significantly the outsourcing costs. Furthermore, we find that market structure and IS outsourcing costs (agency costs and transaction costs) affect IS outsourcing decisions.

Introduction

IT Outsourcing has become an important topic in the overall management of companies. Loh and Venkatraman (1992) defined IT outsourcing as the significant contribution by external vendors in the physical and/or human resources associated with the entire or specific components of the IT infrastructure in the user organization. According to McLellan (1994), IT outsourcing was to be understood simply as the contracting out of a part or all of an organization's information activities. Corbin (1994) explained that outsourcers had taken over the IT operations, either under agency's roof or off-site. Many articles have been published to explain determinants of IT outsourcing decision with different focus. Some of these are:

- Outsourcing allowed a company to focus on its core business. Even the state of Indiana realized that its core competency was in running an efficient government and not necessarily in the provision of high quality information technology service (Silver 1995). "Just because IT activity is business-critical or even strategic, it does not mean that all its elements have to be kept in-house" (Lacity 1995).
- Cost cutting by outsourcing while keeping quality of service. The National Bank of Canada outsourced its IT and saved \$25 million (Canada News Wire 1995).
- Availability of expertise and qualified technical personnel forced to outsource IT. Massachusetts Blue Cross and Blue Shield outsourced its IT function as it did not have the capacity to fix the problem from within (Nolan 1995).
- Business Process Re-engineering triggered the IT outsourcing. Outsourcing IT could be the first step towards business process re-engineering (Nagaraj 1995).

As can be seen from the above sample, most of the previous research on “outsourcing determinants” was developed in a fragmented fashion. Previous research does not contain a systematic framework in order to construct a logical IT outsourcing decision system. However, Cheon, Grover and Teng (1995) provided some theoretical perspectives of IT outsourcing decision. They took into consideration the resource dimensions of a company, the gap in its IT capabilities, the agency costs and the transaction costs. Based on the theories presented by them, we build an integrated framework of research for IS outsourcing.

In our research, we develop an integrated model of determinants of IS outsourcing, which is based on the four theories: resource-based theory, resource-dependence theory, transaction cost theory, and agency cost theory. We conduct an exploratory evidence of the model by surveying the industries and their IT outsourcing decisions in Hong Kong. We, then, provide conclusions based on our results. Our work is different from that of Cheon et.al. (1995), since the previous authors considered each of the theory independently and discussed the use of the theories in explaining IS outsourcing. On the other hand, we extend the work of Cheon et.al. (1995) by considering individual elements in each of the four theories and integrating into one model; we also tested our model empirically using survey data.

Previous Research

Previous research focused on the advantages and disadvantages of IT outsourcing. For example, Applegate (1996) investigated the strategic impact of existing IT systems in context with the strategic impact of applications development portfolio. Hurley and Schaumann (1997) studied the effect of IT outsourcing on productivity (Hurley, Schaumann, 1997). Laughter and Ang (1996) evaluated the IT outsourcing in human resources aspect.

Considerable amount of research was done in the past on the determinants of IT outsourcing. Loh and Venkatraman (1992) developed a model of the determinants of IT outsourcing by integrating both business and IT perspectives. They hypothesized that firm's business & IT cost structures would be positively related to the degree of IT outsourcing because a firm with a relatively high cost should normally consider available options to reduce its costs. They also stated firm's business & IT performance would negatively impact the degree of IT outsourcing. Hu et.al. (1997) studied whether the IT outsourcing was motivated by internal or by external influences under four diffusion models. Yang and Huang (2000) used five factors (management, strategy, economics, technology, and quality) and proposed a decision model using analytical hierarchy processing. Using an UK banking case, Baldwin et.al. (2001) found that rather than traditional factors, political, human, and organizational issues effected the outsourcing decision. Despite considerable research on determinants, there have been only a few studies that are based on previous theoretical frameworks. Our research, in part, fills this gap in previous research.

Theoretical Models for IT Outsourcing Decisions

Cheon et.al. (1995) provided a contingency model for IT outsourcing by synthesizing four theoretical models (resources-based theory, resource-dependence theory, and transaction cost theory and agency theory). Their research framework is the most comprehensive, which presents the theoretical perspectives in both strategic and economic aspects.

Resource-Based Theory

The resource-based perspective for outsourcing provides a framework for examining the relationship of organization to its IT resources and capability (i.e. financial condition, people, machinery, and facilities). Firm's resources and capabilities may vary depending on its resource attributes (i.e. values, rareness, imperfect imitability and non-substitutability). Based on resource-based theory, IT outsourcing is a strategic decision to be used to fill the gap between desired allocation and actual capabilities.

Resource-Dependency Theory

The resource-dependence theory focuses on the external task environment that affects organizations through the process of making available resources. There are three dimensions of organizational task environments, namely, concentration, munificence, and interconnectedness. They refer to power and authority, scarcity of critical resources, and number and pattern of linkage among organizations in environments, respectively.

Furthermore, Pfeffer and Salancik (1978) argued that three factors were critical in determining the external dependence between organizations: the importance of the resources, the discretion over the resources, and alternatives to the resource allocation and use. The resource-dependence perspective for outsourcing provides framework for examining those dimensions of task environments that may determine the firm's dimensions of resources. Then it may further determine an organization's decision to outsource. Firm's strategy may also affect the decision to outsource because an organization may need to obtain critical resources from external environment in order to implement its strategy successfully. The resource dependence model proceeds from the proposition that organizations are not able to internally generate all the resources / functions required to maintain themselves and therefore organizations must enter into transactions and relations with elements in the environment that can supply the required resources and services (Aldrich and Pfeffer, 1976). Uncertainty refers to the variability and complexity in acquiring resources from other organization (Pfeffer, 1978). The dependence is usually based on the external elements' control of some resources, which the organization needs (Kotter, 1979).

Transaction-Cost Theory

The transaction cost approach offers a method of evaluating the relative advantages of the different internal and external organization forms for handling transactions. Transaction costs increase as a result of asset specificity, uncertainty, and infrequency. Asset specificity implies firm's uniqueness on hardware / software attributes and internal skill set. Uncertainty arises because of unpredictable market condition or technological uncertainty. Infrequency implies lack of frequent contract to outsourcing agencies.

Agency-Cost Theory

Agency cost theory provides an evaluation method to identify the agency costs by summing up of monitoring costs by the principal, the bonding costs by the agent, and the residual loss of the principal. Theoretically, agency costs increase in IT outsourcing with high uncertainty, high-risk aversion, low programmability, low outcome measurability, and greater length of the agency relationship.

Development of an Outsourcing Model

Based on the theoretical perspectives described in section 3, we develop an integrated model that allows the assessment of the relative effects of the internal resources conditions, external market structure, and the related cost concerns. Following is the procedure we used in deriving the integration model of IS outsourcing.

Resource Based Theory (Firm's Internal Resources)

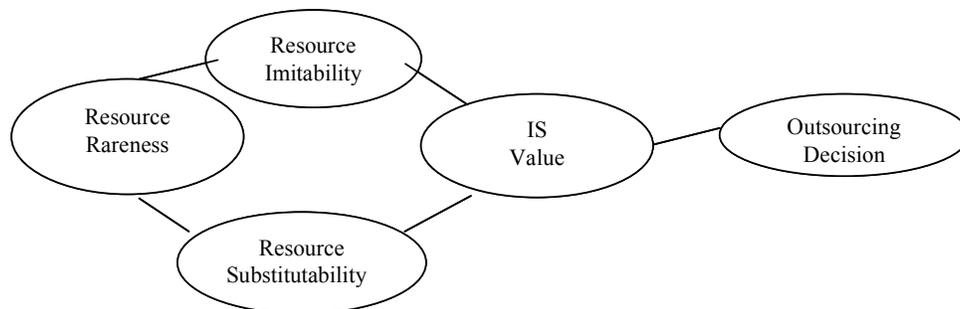


Figure 1. Resource Based Variables

The firm's internal resources are referred to its IS resources (hardware, software, human resources). According to the resource-based approach, a firm's competitive position depends on its ability to gain and defend advantageous positions concerning resources. In order to provide sustained competitive advantage, firm has to identify its own rareness and to find out the specific value which must be unique among a firm's current & potential competition. And it must be difficult to be imitated or substituted.

Since imitability and substitutability are reflecting same characteristics, the two elements will be combined in to one element – matchability – in order to simplify the construct (Fig. 2).

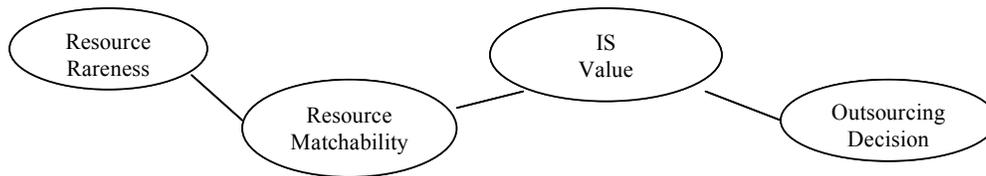


Figure 2. Simplified Resource Based Variables

The rareness of IS resource effects the possibility to imitate or substitute an IS resource respective to match the requirement of the specific IS resource. Such difficulties will increase of course the value of the resource and will provide the focal company with a competitive advantage, which a company wants to save. The tendency to outsource such critical resources will decline.

Resource Dependence Theory (External Resources)

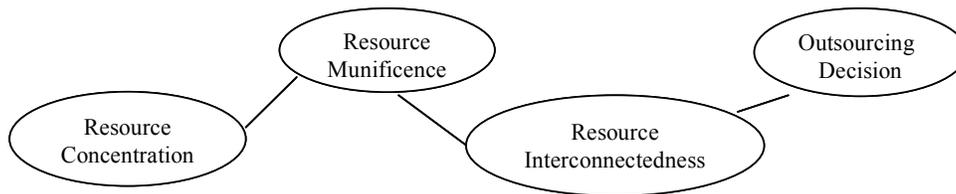


Figure 3. Resource Dependence Variables

In the resource-dependence theory (Fig. 3), concentration refers to power and authority in the environment, munificence refers to availability or scarcity of critical resources (rareness), and interconnectedness refers to the number of pattern and linkages among organizations. Rareness or munificence of resources can generate exchange relationships with other organization (mutual benefit coalition), which leads to the interconnectedness. This interconnectedness can effect the outsourcing in different ways. In case two companies are sharing rare skilled IS staff; this coalition will decline the outsourcing of a firms IS. In case a firm is asking its supplier to take over the complete warehouse accounting, this will positively effect the firm’s outsourcing. Concentration in the environment will lead to interconnectedness respective alliance to strengthen a firm’s capability. The corresponding theoretical framework is given in Figure 4.

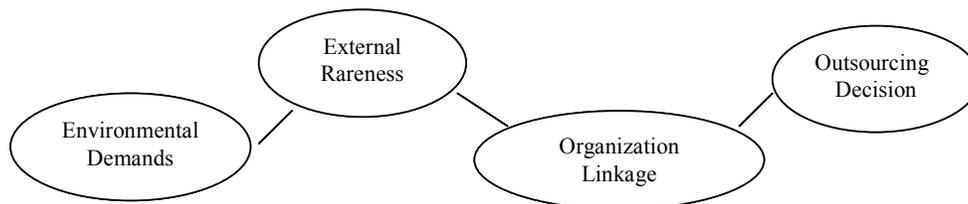


Figure 4. Simplified Resource Dependence Variables

Transaction Cost Theory

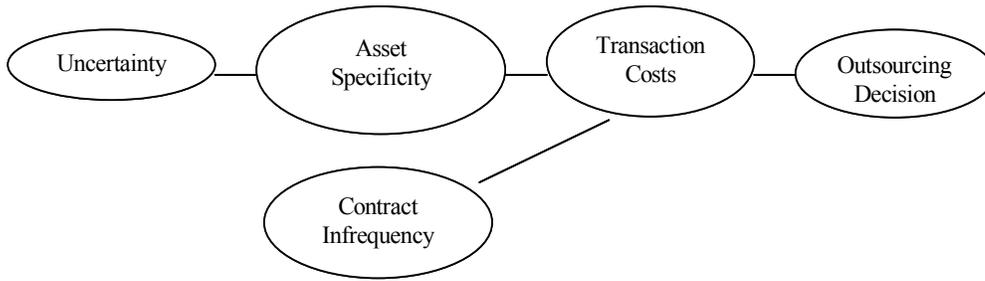


Figure 5. Transaction Cost Variables

In Figure 5, uncertainty refers to external uncertainty caused by the environment (such as technology), asset specificity refers to a firm’s uniqueness of hardware, software and human resources, and infrequency refers to infrequent contracting to the provider. External uncertainty will push a firm to broaden its asset specificity in order to become more independent, which effects the tendency to outsource. A non-stabile asset specificity, which can not fulfill the IS requirements, will lead to an infrequent contracting with agencies.

For simplicity, the "Asset specificity" is changed to "Internal rareness" and "Infrequency" is replaced by "Contracting frequency" (Fig. 6).

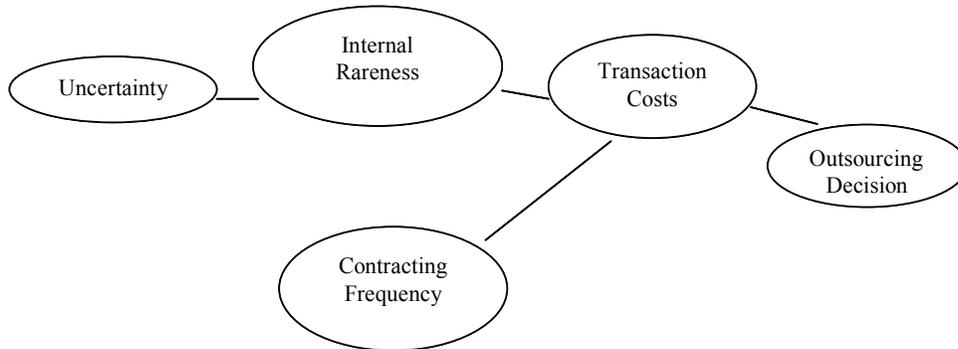


Figure 6. Simplified Transaction Cost Variables

Agency Cost Theory

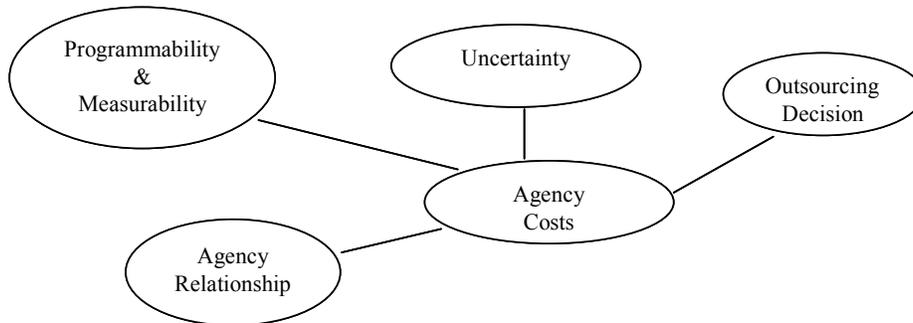


Figure 7. Agency Cost Variables

In Agency Cost Theory,

- **Uncertainty:** refers to external uncertainty caused by the environment (such as technology).
- **Programmability:** degree to which appropriate behavior by the outsourcing provider can be specified in advance.
- **Measurability:** extent to which outcomes can be easily measured.
- **Relationship:** length of the agency relationship.
- **Agency costs:** refers to the costs of the outsourcing between receiver/ provider.

The total agency costs are a function of external uncertainty, difficulties to measure outsourcing outcomes, and the length of relationship between providers/ receivers. The outsourcing decision is affected by the extent of agency costs.

The Integrated Outsourcing Decision Model

After considering all related previous research models, the final integrated research model is constructed using the theoretical models described in section 4. In order to integrate the four theories, similar variables are summarized and consolidated depending on the nature of the variables. The final overall model is given in Figure 8. Following gives details of the model and its nine constructs.

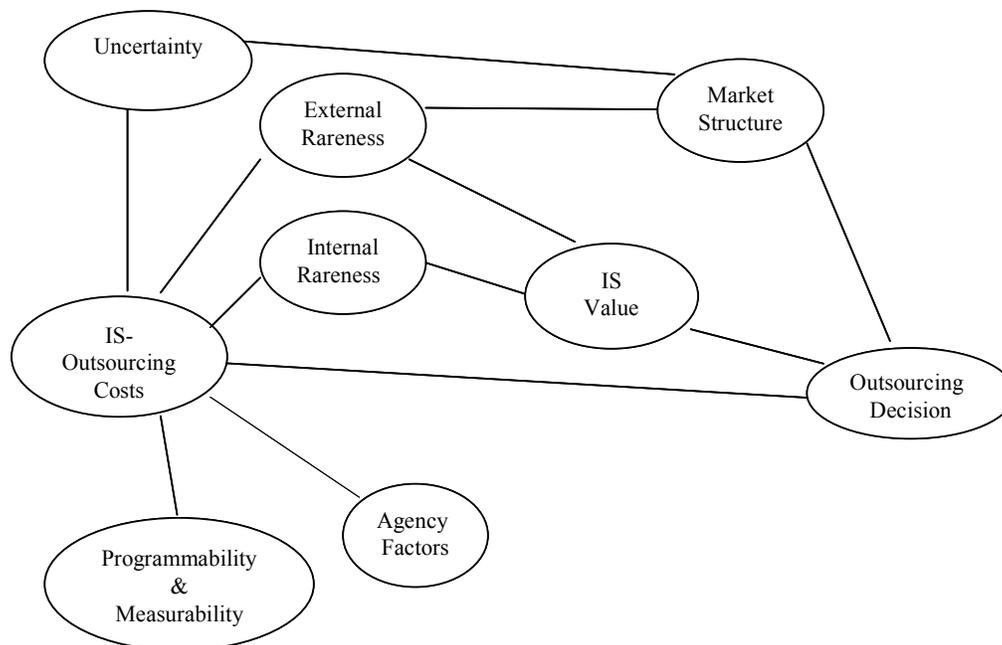


Figure 8. An Integrated Outsourcing Model

Uncertainty: is caused by the situation that organizations are unable to internally generate either all the resources or functions required to maintain its IS requirements. Uncertainty reflects the variability and the complexity in acquiring resources from other organization. Situations of high uncertainty is caused mainly by unpredictable IS market, rapid IS technological changes, quality of output, and competitors actions.

External Rareness: The environment is assumed to contain scarce and valued resources essential to organizational survival (Pfeffer, 1978). Pfeffer and Salancik (1978) assert that organizational survival depends on acquisition of scarce and valued resources from the environment in a stable and low cost manner. In an IS context, such rare external resources include skilled IS labor, IS software, IS hardware and IS services. In order to maximize the competitiveness by the IS value, external acquisition of complementary resources and capabilities may be necessary (Grant, 1991).

Internal Rareness: The IS internal resources are skilled IS labor, IS software, IS hardware and set of IS services. In order to a firm's resource to provide sustained competitive advantage, the resource must be unique and rare among a firm's current and potential competitors in order to provide a superior IS value. Skilled IS staff can not only efficiently and effectively handle present information systems in order to achieve cost advantages, but also creates and develops new highly sophisticated IS. Rare internal resources only can provide such competitive advantages.

Programmability and Measurability: Eisenhardt (1989) states that programmability is the degree to which appropriate behavior by the outsourcing provider can be specified in advance. The IS quality and the IS costs of an outsourcing contract heavily depend on how precise the scope of service can be 'programmed' and how exactly the outcome can be measured. The costs of such an outcome-based contract are more controllable, if the service content and outcome can be specified and if the outcome can be objectively measured. Programmability and measurability are sole characteristics of outsourcing service.

Agency Factors: Agency factors cover all factors appearing within the principal-agent relationships. Eisenhardt (1989) claims, that the length of the agency relationship will determinate the agency costs. On one hand a long-term relationship between the principal and the agent can reduce a lot of uncertainty and consequently reduce the outsourcing costs. On the other hand long-term relationship can also imply an increase of opportunity costs, which would reflect the cost caused by not using a more competitive service of another providers. However, agency factors, like relationships with other principals, experiences, skilled staff and reputation may provide the principal with a save feeling.

IS Outsourcing Costs: The IS costs are mainly determined by the transaction costs and the agency costs. Transaction costs increase because of asset specificity, uncertainty, and infrequency. Asset specificity implies firm's uniqueness on hardware-, software-attributes and skills requirements; uncertainty refers to an unpredictable market, technological changes, economic trends and quality of output; infrequency reflects an infrequent contracting to an outsourcing agent. Agency costs are influenced by outcome uncertainty due to technological change, competitors action, programmability and outcome measurability, and the length of the agency relationship.

IS Value: One criterion to provide an organization with competitive advantages is the value of its resources. IS value refers to resources such as IS staff, IS software, IS hardware and IS services. The value will be created by the information quality, IS support quality, staff quality and effectiveness. The rare and unique IS value can be either identified from internal or external resources. The present and future strategic value of a firm's IS capabilities will be considered as a determinant of IS outsourcing. If the IS value in a firm's current strategic use will promise a high 'return potential', an organization will maintain and strengthen this value rather than to outsource it. Consequently the IS value of a firm will increase.

Market Structure: The market structure refers to concentration and interconnectedness. Concentration describes the extent to which power in the environment is widely dispersed. For instance, a powerful outsourcing provider, with high concentration of a firm's competitors as client/ principal may decrease the firm's intention to outsource its IS function, in case no other agent can provide this service. Interconnectedness reflects the number and pattern of linkages among organization. For example, to obtain externally resources that cannot be generated internally organizations might enter into exchange relationships with other organizations in the environment. That is, organizations alter their structures and behaviors to acquire and maintain needed resources (Ulrich and Barney, 1984).

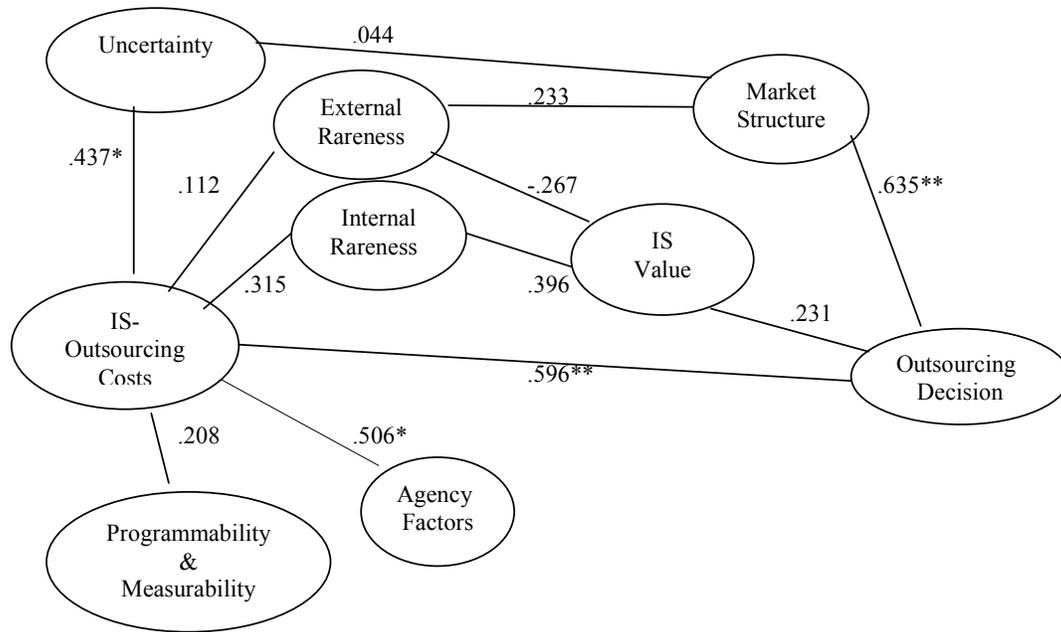
Uncertainty, caused by the situation that organizations are not able to internally generate either all the resources or functions required to maintain it's IS requirements, will lead to relationship with other organizations too.

Outsourcing Decision: According to McLellan (1994), IT outsourcing is to be understood simply as the contracting out of part or all of an organization's information activities. A firm will guide its outsourcing decision by considering if its IS facilities are part of its core competency or provides the firm with a competitive edge. The major factors determining the outsourcing decision are considered to be the market structure, the perceived IS value and the related IS costs respective outsourcing costs. The outsourcing decision can be considered as partly or fully outsourcing of IS staff, IS software or IS hardware or any combination of these resources. Renting of IS staff from service providers will be also considered as outsourcing like contracting out all IS activities. Corbin (1994) explains that outsourcers take over the IT operations, either under agency's roof or off-site. .

Initial Results

The data collection of this study is conducted by questionnaire survey. The survey was administered to the DBA (Doctor of Business Administration) students at a major university in Hong Kong. The class is composed of mainly senior managers working in different business sectors such as manufacturing, banking, and real estate. They represent group of organizations with high

learning will in both public and private sectors. This study may be considered to be of an exploratory nature, since the sample size is only 23 and the response rate is 100%. The correlation of the variables in the path model is analyzed by using SPSS software package to test the fit of the research model to the data collected. The analysis should provide direct measures of the degree of which theoretical constructs are related, the relationships among the variables affecting outsourcing decisions.



(**. Correlation is significant at the 0.05 level 2-tailed)
 (*. Correlation is significant at the 0.01 level 2-tailed)

Figure 9. Tested Outsourcing Model

Considering the significance among the variables, various constructs and paths can be eliminated from the original path model, giving rise to modified model (Figure 10). Tables 1 and 2 show the corresponding statistical results.

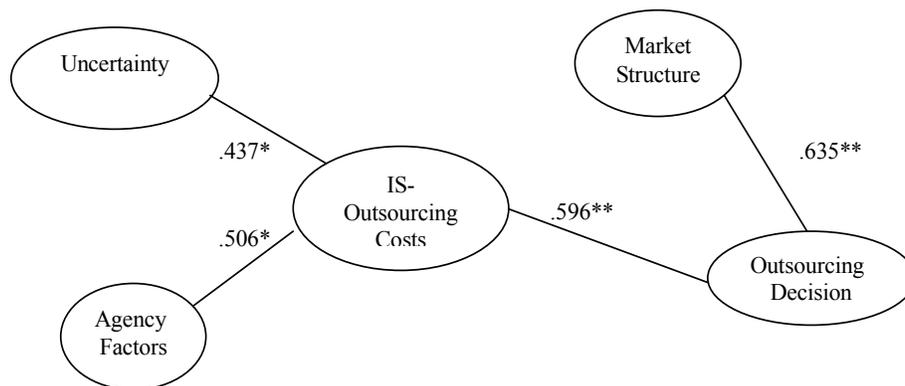


Figure 10. Validated (Significant) Outsourcing Model

Table 1. Regression of IS Outsourcing Costs (ISCO)

Variables Entered/Removed^b

| Model | Variables Entered | Variables Removed | Method |
|-------|---------------------------|-------------------|--------|
| 1 | AGFA, UNCERT ^a | . | Enter |

a. All requested variables entered.
b. Dependent Variable: ISCO

Model Summary

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1 | .680 ^a | .462 | .408 | .6489 |

a. Predictors: (Constant), AGFA, UNCERT

ANOVA^b

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|-------|------------|----------------|----|-------------|-------|------|
| 1 | Regression | 7.231 | 2 | 3.615 | 8.586 | .002 |
| | Residual | 8.421 | 20 | .421 | | |
| | Total | 15.652 | 22 | | | |

a. Predictors: (Constant), AGFA, UNCERT

Coefficients^a

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|-------|------------|-----------------------------|------------|---------------------------|--------|------|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | -3.070 | 1.639 | | -1.873 | .076 |
| | UNCERT | .919 | .332 | .454 | 2.768 | .012 |
| | AGFA | .760 | .239 | .521 | 3.175 | .005 |

a. Dependent Variable: ISCO

Discussion

Our results show that outsourcing decision is significantly influenced by market structure and IS outsourcing costs; IS outsourcing costs in turn are influenced by uncertainty and agency factors (Figure 10). Uncertainty reflects variability and difficulty of obtaining outside resources, due to technological changes, unpredictable IS markets, and competitors’ actions. Higher uncertainty thus induces higher costs of outsourcing. Agency factors include factors relating principal-agent relationship, such as, length of principal-agent relationship and principal’s expertise. While the length of relationship can affect the outsourcing costs one way or other, the expertise of principal is more likely to decrease outsourcing costs. This is because principal’s high expertise will lead to higher productivity and lower monitoring costs by the agent firm.

Based on our results, IS outsourcing costs and market structure influences IS outsourcing decision. Outsourcing costs include transaction costs and agency costs. Cost reduction has been one of the reasons traditionally why outsourcing of IS activities are preferred. Transaction costs increase if there are special hardware and software needs of the organization that can be met by only a specific set of suppliers. Furthermore, concentration, a component of market structure, has direct influence on outsourcing decision. For example, a firm may not outsource its IS functions if an outsourcing vendor has a high concentration of competitor firms as its principals.

Table 2. Regression of Outsourcing Decision (OUTSOUDE)**Variables Entered/Removed^b**

| Model | Variables Entered | Variables Removed | Method |
|-------|----------------------------|-------------------|--------|
| 1 | ISCO, ^a MARK | . | Enter |

a. All requested variables entered.

b. Dependent Variable: OUTSOUDE

Model Summary

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1 | .707 ^a | .500 | .450 | .5466 |

a. Predictors: (Constant), ISCO, MARK

ANOVA^b

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|-------|------------|----------------|----|-------------|--------|------|
| 1 | Regression | 5.976 | 2 | 2.988 | 10.002 | .001 |
| | Residual | 5.975 | 20 | .299 | | |
| | Total | 11.951 | 22 | | | |

a. Predictors: (Constant), ISCO, MARK

b. Dependent Variable: OUTSOUDE

Coefficients^a

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|-------|------------|-----------------------------|------------|---------------------------|-------|------|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | .361 | .637 | | .567 | .577 |
| | MARK | .523 | .218 | .446 | 2.404 | .026 |
| | ISCO | .318 | .162 | .364 | 1.963 | .064 |

a. Dependent Variable: OUTSOUDE

In this research, the model is evaluated by using statistical correlation and linear regression. It is essential to measure the relationship, direction, and significance among the different variables shown in the path model. The Pearson correlation matrix provides the indication on the direction, the strength, and the significance of bivariate relationships among the variables in the study. Besides on the confirmed relationships in the path model (Figure 10), the Pearson Correlation Matrix can also indicate the significant relationships among variables; these are not necessarily pre-set in the path model. The following variables are identified as additional significant relationships: i) Internal Rareness to Agency Factors ($R^2 = 0.481$, $p < 0.01$), ii) IS Value to Agency Factors ($R^2 = 0.474$, $p < 0.01$), iii) Market Structure to Programmability & Measurability ($R^2 = 0.661$, $p < 0.05$), iv) Market Structure to IS Outsourcing Cost ($R^2 = 0.522$, $p < 0.01$), v) The Outsourcing decision to Agency Factors ($R^2 = 0.714$, $p < 0.05$), and vi) The Outsourcing decision to Programmability & Measurability ($R^2 = 0.628$, $p < 0.05$). These relationships can be explored in future research.

Conclusion

The findings show that the IT outsourcing decision is mainly influenced by the market structure and IS outsourcing costs. But IS Value is not a significant determinant in the IT outsourcing decision. It seems IT outsourcing is not only the solution for the activities of high IS value, but also of low IS value. Probably, some low valued IT works can also be outsourced so long as the

market can provide the service at a reasonable cost. Actually, other two possible determinants (based on Pearson correlations) are agency factor ($R^2 = 0.714$ at $p \leq .05$) and programmability & measurability ($R^2 = 0.628$ at $p \leq .05$) on IT outsourcing. This implies these two factors, while they are under the significant level at two standard deviations, are not only mediators to affect the IS costs and market structure respectively. But they are also independent variables to affect the IT outsourcing decision. Uncertainty is another key determinant to affect the IS outsourcing costs as well, by the way of affecting outsourcing costs.

Implications

This study provides some new insights on IT outsourcing determinants. From previous research, it has been argued that IS value is one of the key considerations on the IT outsourcing process. It has been stressed that internal rareness and external rareness are interpreted as the support to "Value". This research shows that the IT outsourcing may normally be done even for simple activities to serve the IT functions and the cost factor is probably the most important concern. In IT industry, it seems the agency factors and market structure are more meaningful than other variables.

Limitation

IT outsourcing is a new aspect and the theoretical framework was developed from previous research papers. Some determinants may be overlooked and hence they are not being taken into consideration when constructing the model. The possible determinants can be service quality, investment returns of outsourcing, etc. Therefore, the present model may not cover all determinants but it obviously moves another step forward by taking a more integrated approach in putting the variables into a decision making model.

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