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An empirical investigation of the drivers of software outsourcing decisions in Japanese organizations

Ashley A. Bush [a,*], Amrit Tiwana [b,1], Hiroshi Tsuji [c,2]

[a] Florida State University, College of Business, Tallahassee, FL 32306-1110, USA
[b] Iowa State University, College of Business, Ames, IA 50011-1350, USA
[c] Osaka Prefecture University, Graduate School of Engineering, Osaka 5998531, Japan

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Abstract

Although Japan represents the single largest Asian market and 10% of the global software outsourcing market, little is understood about how Japanese companies make software project outsourcing decisions. Tried-and-tested outsourcing models consistently fail to predict the outsourcing decisions of Japanese companies, leaving global software development companies with little usable guidance in the Japanese outsourcing market. Analyses of 396 software project outsourcing decisions made by 33 IT managers in Toshiba, Hitachi, Fujitsu, IBM-Japan, and Mitsubishi provides novel insights into the drivers of Japanese software outsourcing decisions. The objective of this paper is to develop an analytic tool to predict the likelihood of a software project being outsourced by Japanese IT managers.

Keywords: Outsourcing; Project management; Global software development; Japan

1. Introduction

Japanese companies have historically approached globalization opportunities surprisingly differently from their Western counterparts yet ended up in a better position in the long run. The auto industry is one of the most visible examples of such differences, where Japanese automakers like Honda and Toyota dominate in their markets even with highly globalized, local production. The Japanese consumer electronics industry has followed a similar path, rising from being an icon of unreliability to being an icon of quality that is perceived as being better enough to command price premiums. Sony, Toshiba, Hitachi, and Panasonic are representative examples. Japanese companies – notwithstanding their early failures in the software industry – are approaching global distribution of software development through outsourcing with puzzlingly different heuristics that are reminiscent of the early days of the Japanese auto and electronics industries. If history is even an unreliable signpost to the future, there might be valuable insights for non-Japanese companies in how Japanese companies approach global software outsourcing.

More pragmatic motivations also undergrid the need for American and other non-Japanese IT professionals to better understanding how Japanese companies make software outsourcing decisions. For one, Japan represents the single largest Asian IT market, with over 10% of the worldwide market for IT outsourcing [11,20]. However, American and other foreign companies attempting to tap into this burgeoning market find it a tough nut to crack; they find it puzzling – and frustrating – to understand the dynamics and norms of the Japanese IT outsourcing market. A large part of this challenge stems from the peculiarities of how Japanese IT managers

* Corresponding author. Tel.: +1 850 644 2779.
E-mail addresses: abush@fsu.edu (A.A. Bush), tiwana@iastate.edu (A. Tiwana), tsuji@cs.osakafu-u.ac.jp (H. Tsuji).
URLs: http://garnet.acns.fsu.edu/~abush (A.A. Bush), http://www.bus.iastate.edu/tiwana (A. Tiwana).
1 Tel.: +1 515 294 8198.
2 Tel.: +81 72 254 9353.

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decide to outsource software development. While differences in general management practices between Japanese and American companies are well recognized [24], how Japanese IT managers decide to outsource specific IT projects is little understood and is often perplexing to an outsider. For example, a globally-leading Japanese consumer electronics company that we interviewed routinely picks foreign vendors that are neither the lowest cost bidders nor the ones with the dominant market reputations. Consider another example of an American manager bidding for an embedded software project who might encounter a Japanese client that neither awards an outsourcing contract to their company nor to a competing, lower-cost Indian competitor; instead choosing to go with a little-known vendor in Vietnam. To an outsider seeking a foothold in the blooming Japanese outsourcing market, such decisions might appear baffling.

To better understand how Japanese managers make IT outsourcing decisions, we sought to examine how Japanese managers arrive at outsourcing decisions for individual software development projects. The following three research questions guided this research. First, what are the criteria that drive the IT project outsourcing decisions of Japanese managers? Second, what is the relative emphasis Japanese managers place on each of these criteria in the software project outsourcing decision-making process? Third, how can the likelihood of a project being outsourced be predicted from a parsimonious set of project characteristics? In other words, our objective was to use the answers to these research questions to develop a parsimonious analytic tool to predict the likelihood of software project outsourcing in Japanese companies.

To address these research questions, we analyzed 396 IT project outsourcing decisions by 33 IT managers in Toshiba, Hitachi, Fujitsu, IBM Japan, and Mitsubishi as part of a larger study on Japanese IT outsourcing. The results provide novel insights into the criteria that drive Japanese managers' IT project outsourcing decisions and the *relative* emphasis that they place on such criteria in their decision-making process. The main contribution of this paper is a pragmatic framework that IT vendors wanting to compete in the growing Japanese market can use to assess the likelihood that a given project will actually be outsourced by a Japanese client (Fig. 5).

The results provide insights into the criteria that most strongly influence the decision to outsource. Contrary to popular belief, Japanese IT managers weigh relative cost advantage from outsourcing a project most heavily, but only after they have decided that a given project ought to be outsourced to gain access to technical skills outside of their company's own expertise base. Following this, they simultaneously evaluate the degree to which a vendor can be trusted yet emphasize their ability to monitor vendor staff. Requirements – their ability to predefine them in sufficient detail and their volatility – are other criteria that also have a strong bearing on Japanese companies' project outsourcing decisions.

The rest of the paper proceeds as follows. In the next section, we briefly describe the factors that have been identified in prior research that influence the outsourcing decision at the project level. The subsequent section describes the research model, including the proposed formal model and field-based data collection to empirically test the model. The next section discusses the major results and develops an analytic tool to predict software project outsourcing decisions. The final section discusses the conclusions.

2. Drivers of outsourcing decisions

Research into IT outsourcing has identified a number of factors that influence the success of the outsourced project. Studies have identified trust [22,28], volatility of requirements [26,35] as well as the ability to specify requirements [26,27], cost considerations [12], among others [38] as impacting the success of outsourced projects. The majority of the research on outsourcing decisions has been done in the US context [1,10,13,32], with very limited field studies in other countries.

The variety of considerations that can drive IT outsourcing decisions can be broadly classified into cost, knowledge and skills, and outsourcing feasibility considerations. Key factors in this set include the following. The first factor is the relative cost advantage gained by outsourcing compared to the cost of internally developing the same application. The second factor is vendor trustworthiness, which describes the level of trust that the client has regarding the honesty and reliability of a vendor. Often, such trust is derived from prior experience of the client with that vendor or from the reputation of the vendor in the outsourcing marketplace [9]. The third factor is software complexity, which is usually captured by the number of function points in the software application. The more complex a software application, the greater is the difficulty of describing and specifying it in detail to a vendor. On the other hand, greater complexity can also make it more difficult for the client to readily use its internal programming and development staff or attempt to secure the services of a specialized vendor with deeper expertise in developing complex applications. The fourth factor is the strategic importance of a project to the client's business. Projects with greater strategic importance are those that are critical to the future or current operations of a client's business or enable the implementation of core business processes in the client organization. The fifth factor is the ease with which the project outcomes can be objectively measured and evaluated. In outsourcing, it is important to be able to specify in advance the evaluation criteria by which the client will judge the vendor's completed software artifacts. Such criteria can include project milestones, prototypes, and time tables. They can also include development costs and the acceptable density of defects. Such criteria can be more readily specified for some projects but with greater difficulty or accuracy for other projects. The more readily the client can fully and accurately identify the appropriate evaluation criteria in advance, the easier it is for the client to include them explicitly in the outsourcing contract and to subsequently use them to reward or penalize a vendor. Therefore, higher project outcome measurability will increase the attractiveness of outsourcing a development project, all else being equal [14,15]. The sixth factor is the ease of monitoring vendor progress throughout the software development lifecycle. Monitoring of a vendor by a client can be done either using staff co-location (where a client representative is stationed in the vendor premises or vice versa) or using Web-based project tracking and code monitoring software [9]. The more easily the client can monitor vendor activities associated with a project, the more assurance it can have that the project's development activities are on track with the client's intended project objectives. The seventh factor is client's own technical skills in the domain of the prospective project. The eighth factor is the precision with which project requirements can be spelled out upfront. Specification of project requirements is usually done at the beginning of the project using a formal set of project specifications and requirements, the ease of which can vary across different projects. The final factor is requirements volatility, or the degree to which project requirements are likely to change. Although project requirements volatility was believed to be an important source of project risk [3], recent research has reported that managers do not weigh it as highly as asserted earlier. For example, a study of American software project managers placed it among the lowest in the sources that they believed to be the key sources of software functionality risk [36]. The authors of that study suggested that software project managers take requirements volatility as a given and plan accordingly. For example, they might adopt agile methodologies or requirements management tools to ensure that changes in requirements are carefully traced and managed. Therefore, although requirements volatility poses a risk, clients might be technically and procedurally well prepared to cope with that risk. While we do not claim this list to be exhaustive, we believe that they represent good baseline criteria and are appropriate to address our research questions.

3. Research method

3.1. Data collection

The data were collected as part of a larger multiyear, multi-phase research program of IT outsourcing in Japanese companies as described in detail in [33]. The research study was sponsored by Japan's Strategic Software Research consortium, which is an industry group of six major Japanese technology companies. Fig. 1 provides an overview of the data collection process, including the research that informed the model tested in this study. The data collection for this study was preceded by in-depth, explorative interviews with Japanese managers associated with 15 different outsourced projects. These interviews were open ended where each participating IT manager selected a recently outsourced project and described the criteria that they used to guide the outsourcing decision. The interviews involved IT managers from Toshiba, IBM Japan, Fujitsu, Hitachi, and Mitsubishi. Each interview lasted between 75 min to almost 3 h and all except four were conducted in Japanese. We then conducted a multi-case comparison [8,23,39] to identify the common factors that then guided the conjoint field experiment that was subsequently conducted to address the research questions in this study. Additional, somewhat paradoxical insights derived from the qualitative study that is not the focus of this paper appear elsewhere [33,34]. The conjoint experiment was the primary focus of the data collection effort to address the research questions in this paper, unlike related work in the broader research program (e.g., [33]) that focused on comparing and contrasting competing theories of the firm and for vertical disintegration. For that, we examined 396 project outsourcing decisions of 33 Japanese IT project managers in five leading Japanese companies – IBM-Japan, Mitsubishi, Fujitsu, Hitachi, and Toshiba. The data collection for the conjoint experiment for this paper was conducted onsite and in person entirely in and around Tokyo, Japan at the premises of these companies.

3.2. Respondent descriptive statistics and demographics

The scope of the business sectors of the participating companies and managers ranged from consumer electronics, automotives, financial services, manufacturing, construction, and chemicals. On average, the managers in our study were highly experienced with approximately 19 years of IT experience. They also had extensive experience in outsourcing decisions, with the average participant having been previously involved in outsourcing decision making for about 12 IT projects. The participants had worked for their respective companies for approximately 19 years on average. The study participants were therefore seasoned Japanese IT managers with extensive experience in the domain of this research.

3.3. The conjoint field experiment methodology

The study was conducted using the conjoint research methodology [19], which has previously been used to study software project decision-making [16]. Our motivations for the choice of the conjoint research design were threefold [19,37]. First, this approach allows the control of a laboratory experiment with the external validity of a survey. Second, the conjoint experimental design is immune to threats of social desirability bias and hindsight bias as we elaborate later in this section. Third, this research design allows researchers to infer the mental model of the respondents without forcing them to articulate it. Since the mental models used by managers are largely based on their tacit knowledge, it is difficult if not impossible for them to recognize

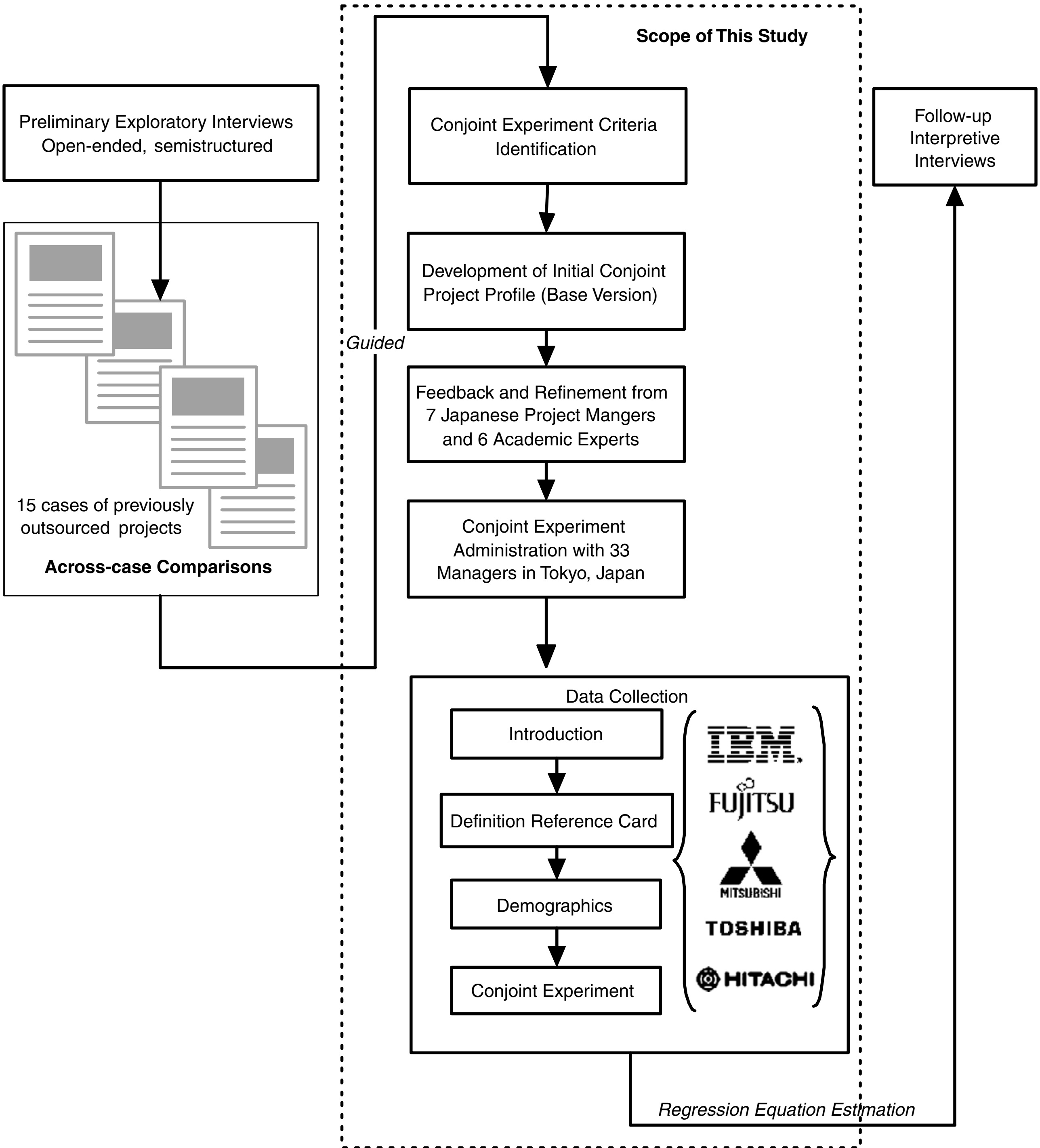


Fig. 1. An overview of the research methodology.

and communicate those mental models [21]. Table 1 summarizes these and other key threats to experimental validity and provides an overview of how they were addressed in this study [see 2].

The conjoint methodology was originally developed in the context of marketing research. The conjoint experimental design blends the precision of a laboratory experiment with the external validity of a field study. The technique relies on a series of experimental profiles that are evaluated by practitioners in a real world setting. Each experimental profile has varying combinations of level for different profile attributes, here the nine project characteristics in the study that were derived from the qualitative interviews with the 15 project managers as described earlier. Each conjoint project profile therefore corresponds to an experimental manipulation in a traditional laboratory experiment. Following this series of evaluations, the cognitive models of the respondents are empirically inferred through a statistical analysis technique such as multiple regression. This procedure allows estimation of the weights that the

Table 1
Threats to validity and steps taken to address them in this study

Validity threat	Description of threat	Steps taken to address the threat
External validity	The ability of experimental results to generalize to the "real-world" population is poor	Use of experienced, real world experimental subjects i.e., Japanese IT managers for the evaluation of the project profiles. On average, the managers in our study were highly experienced with approximately 19 years of IT experience. They also had extensive experience in outsourcing decisions, with the average participant having been previously involved in outsourcing decision making for about 12 IT projects. The participants had worked for their respective companies for approximately 19 years on average
Internal validity	The ability of the experimental design to properly and reliably assess the relationship between two variables	• Use of multiple regression with at most a 5% margin of change for statistical significance. All hypotheses below this threshold were rejected • Pooling of multiple project evaluations from each respondent
Face validity	The risk that an instrument does not measure what is intended	• Extensive pretesting with 7 Japanese IT managers and 6 academic domain experts, followed by refinement to ensure non-ambiguity and consistency of interpretation by the intended subjects i.e., Japanese IT managers • Translation with a double blind retranslation of the survey instrument into Japanese
Content validity	The risk that the measure does not adequately describe the conjoint profile characteristic that is intended	• Grounding of the project attribute descriptions in an earlier set of semi structured interviews with Japanese IT managers involved in projects that had previously been outsourced • Extensive pretesting with 7 Japanese IT managers and 6 academic domain experts • Translation with a double blind retranslation of the survey instrument into Japanese by native Japanese speakers
Social desirability bias	Respondents might provide a more socially desirable, positive set of responses to appear in a positive light in front of their colleagues	Use of hypothetical project scenarios rather than historical ones in the company; this is less likely to invoke a face saving dynamic that is common in the Japanese culture
Recall or hindsight bias	Respondents might have difficulty in accurately recalling the details of past projects and might be prone to selective recall	Use of hypothetical project scenarios rather than past projects; this lowers the need for remembering project-specific details

respondents ascribe to each factor without forcing them to explicitly articulate their importance.

The implementation of this technique involves sequentially presenting the respondents a set of project profiles (the conjoint profiles) with different combinations of attributes; the respondent evaluates the likelihood that they would outsource each project. Since the study involved nine project attributes, each with a high or low value, the total possible combinations of project profiles is 512 (2^9). In a real world setting, attempting to have each respondent evaluate this number of profiles would be infeasible due to time constraints and respondent fatigue. Similarly, increasing the number of levels beyond two exponentially increases the number of possible project profiles, which also reduces the feasibility of data collection with real world project managers. Thus, the use of two levels for the project attributes in the conjoint profiles is a necessary tradeoff to be able to conduct the study in a real world setting. Therefore, we followed the widely used fractional factorial design with two level attributes [5,30,37]. This is comparable to a fractional factorial design in the design of experiments. The objective is to identify the minimum number of project profiles that generate the largest amount of information. We used the fractional factorial conjoint algorithm implemented in SPSS 11.0 to generate such a set of conjoint profiles. The algorithm generated 12 such profiles, which is the number of different project profiles that had to be evaluated by each respondent.

The study was introduced to each manager in the following manner. We first described the purpose of the study and assured the managers that their responses would be completely confidential and anonymous. We asked the managers to first provide some demographic information (IT experience, prior involvement in outsourcing decisions, and their tenure with the company). We then provided them a reference card that described each project characteristic and provided a pretested definition for each of them. We then asked them to examine each project profile one by one and then evaluate each one by answering the two questions that measured the dependent variable. One assessed the level of perceived attractiveness of outsourcing the project described in the profile and the other asked them about the likelihood that they would recommend outsourcing it. These two questions were averaged to compute the likelihood to outsource for the project described in each of the 12 project profiles.

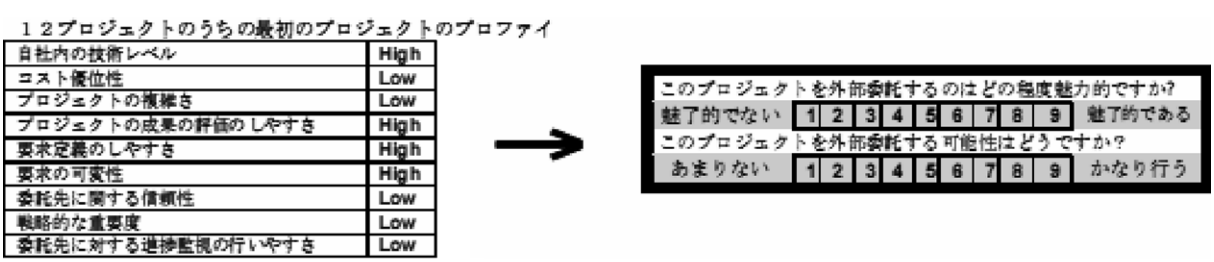
We presented the 12 project profiles, one by one, to each of the study's participants. The project profiles varied in the extent to which each project attribute was present (i.e., high or low) in each project profile. Each respondent must evaluate an identical set of 12 different project profiles. Fig. 2 provides an example of such a project profile in Japanese along with an English translation. (Additional details pertaining to the entire research program are available in [33]). The study participants evaluated each project profile based on the information in the profile, and using their own considerable experience and expertise in Japanese software development projects. We used a nine-point semantic differential scale for their outsourcing likelihood assessments for each project profile.

The attributes in this study are the nine key factors or drivers identified previously. Fig. 3 gives a summary of these attributes along with the definitions provided to the respondents. The responses for each profile from each expert respondent are then analyzed to reverse engineer the mental model that was implicitly used by them to arrive at their evaluations. The profiles are generated using a statistical conjoint algorithm that optimizes the extent of information that can be gained with the fewest profiles.

Consider a simple example of this approach. Let's say a laptop manufacturer believes that six attributes – processor speed, battery life, weight, screen size, brand recognition, and warranty length – influence whether customers will pay $2800 for a laptop. A conjoint study lets the laptop manufacturer test whether each of these characteristics actually influence purchase decisions and their relative importance in the customers' minds. The conjoint experiment involves showing potential customers different versions of laptop prototypes with different levels of each attribute and asking how likely they are to purchase each version. Once a sufficient number of responses are collected, the manufacturer can use a statistical estimation technique to estimate each attribute's *relative* contribution to the likelihood of purchase.

We asked each project manager to evaluate twelve hypothetical profiles of projects that might be considered for outsourcing. The primary motivation for using hypothetical scenarios was to prevent social desirability bias. In our preliminary exploratory interviews, we became aware of the importance of face saving in the Japanese culture. It was therefore important that the research design for the actual empirical data collection be immune to the threat of social desirability bias [2,31]. Social desirability bias refers to the bias wherein the respondents might provide a more socially desirable, positive set of responses to appear in a positive light in front of their colleagues. By using hypothetical scenarios instead of actual projects for the empirical part of the data collection process, we were therefore able to mitigate such social desirability bias. A second advantage of using hypothetical scenarios is to mitigate the threat of recall or hindsight bias [7], which refers to the difficulty faced by respondents in accurately remembering the details of a particular project that might have been completed several years ago. Therefore, the use of hypothetical project scenarios allowed us to reduce the threats of social desirability and recall bias and at the same time, extensive pilot testing of the scenarios allowed us to maintain high external validity and realism in the research design.

Each profile described a project with a different, unique combination of the nine attributes. Table 1 gives a sample of one project profile in our study. The other eleven project profiles contained the same set of attributes and only differed in the combination of high and low values assigned to these attributes. The IT managers who participated in the study individually evaluated the likelihood of outsourcing the project described by each of the twelve project profiles. The actual survey was conducted entirely in Japanese. The survey was initially developed in English, translated into Japanese, and subsequently reverse translated back to English by a second native Japanese speaker to ensure that it was precise and non-ambiguous. English versions of this experiment were also successfully used in other countries as part of this paper's parent research program. Additional details are available in [33].



Relative cost advantage	Low
Trust in vendor	Low
Project complexity	Low
Strategic importance of project	Low
Project outcome measurability	High
Vendor behavior observability	Low
Internal technical expertise	High
Requirements specifiability	High
Requirements volatility	High

Fig. 2. A sample conjoint experimental profile as presented to the respondents and an English translation [33].

プロジェクトの特性に関して、次のように定義します。

プロジェクトの特性	定義
自社内の技術レベル	外部委託するプロジェクトの分野に関しての自社のスタッフの技術および知識（多い場合High）
コスト優位性	自社内で開発せず外部委託することにより期待できるコスト節減（節減できる場合High）
プロジェクトの複雑さ	規模あるいは新規性に依存したプロジェクトの複雑さ（複雑な場合High）
プロジェクトの成果の評価のしやすさ	プロジェクトのマイルストーン、スケジュール、コストや品質など事前に定義した尺度によってプロジェクトの成果を評価できる範囲（評価しやすい場合High）
要求定義のしやすさ	プロジェクトの着手時点において正式なプロジェクト仕様書によってどれだけ正確かつ完全にプロジェクトの要求を記述できるかのしやすさ（しやすい場合、High）
要求の可変性	プロジェクトのビジネス要求が開発中に変わると予測される範囲（多い場合、High）
委託先に関する信頼性	以前の委託経験や委託先の評判に基づいて、委託先が忠実にプロジェクトを履行するだろうという信頼度（信頼できる場合、High）
戦略的な重要度	御社の事業に関してこのプロジェクトの重要度（戦略的な場合High）
委託先に対する進捗監視の行いやすさ	オンサイトのスタッフやプロジェクトの進捗管理ソフトによって委託先の進捗管理のしやすさ（しやすい場合High）

Attribute	Definition
Relative cost advantage	Expected cost savings from outsourcing the project vis-à-vis of doing it internally.
Trust in vendor	The extent to which the client trusts that a vendor will honestly fulfill project obligations (e.g., based on the client organization's prior experience with the vendor or on the vendor's reputation).
Project complexity	Complexity of the project.
Strategic importance of project	Importance of the project to the client organization's business.
Project outcome measurability	Extent to which project outcomes can be precisely evaluated using predefined criteria such as project milestones, schedule, costs, and acceptable defect levels.
Vendor behavior observability	Ease with which vendor behavior can be monitored during the development process using on-site staff co-location and project tracking software.
Internal technical expertise	Technical skills and knowledge of the client's technical staff in the outsourced project's domain.
Requirements specifiability	Ease with which project requirements can be accurately and completely conveyed to a vendor at the beginning of the project through a formal project specifications document.
Requirements volatility	Extent to which the business requirements of the project are expected to change during development.

Fig. 3. Project attributes as presented to the respondents in Japanese and their English translation.

3.4. Model estimation and data analysis

The statistical analyses were conducted using the multiple regression model estimation technique. This technique allowed us to compute the statistical significance of each attribute (i.e., whether the influence of the attribute on the outsourcing decision was significantly stronger than pure chance) and its relative weight (i.e., the beta path coefficient in the regression equation). The regression model tested can be specified as follows in Eq. (1). The beta coefficients represent the regression weights to be estimated using the collected empirical data and the associated terms represent the values of each of the nine factors in the model.

$$\begin{aligned} &OutsourcingLikelihood \\ &\quad = \beta_0 + \beta_{RelCostAd} * RelCostAd + \beta_{VendrTrst} * VendrTrst \\ &\qquad + \beta_{Complexity} * Complexity + \beta_{StrImp} * StrImp \\ &\qquad + \beta_{Measur} * Measur + \beta_{Obs} * Obs + \beta_{TechExp} * TechExp \\ &\qquad + \beta_{ReqSpec} * ReqSpec + \beta_{Volatility} * Volatility + \varepsilon \ldots \end{aligned} \quad (1)$$

where

Outsourcing Likelihood = Intent to outsource

RelCostAd = Expected cost savings from outsourcing the project over doing it internally

VendrTrst = Trust in vendor

Complexity = Project complexity

StrImp = Strategic importance of project to the client

Measur = Project outcome measurability

Obs = Vendor behavior observablility by the client

TechExp = Technical expertise of the client organization in the domain of the project

ReqSpec = Requirements specifiability of the project

Volatility = Perceived requirements volatility of the project

ε = Error term

This model was then estimated using a statistical multiple regression estimation procedure using the data collected form the Japanese managers. Two related statistics from this procedure are pertinent to the model's estimation. The first one is the actual value of the beta coefficient and its sign. The second statistic is the value of the Z-statistic associated with each beta coefficient estimate. Only terms in the equation that have Z-statistics that are statistically significant contribute to the prediction of the dependent variable. Thus only the terms with statistically significant beta are to be retained and those without statistically significant relationships must be dropped from the model. For statistical significance, we used the conventional threshold of $p < 0.05$, which refers to a 5% or lower likelihood that the relationship might be purely by chance. All terms in the equation for which we statistically have better than a 95% confidence regarding a significant relationship with the dependent variable are retained in the model. Five of the nine terms in [1] met this criteria. This resulted in the retention of all predictors with the exception of project complexity (*Complexity*), strategic importance (*StrImp*), internal technical expertise in the client organization (*TechExp*), and project outcome measurability (*Measur*), which were dropped from the model.

Table 2 summarizes the results of this estimation procedure using data collected from the respondents in the study. All significant terms are retained in the model with the remaining four dropped due to lack of statistical significance in predicting the likelihood of outsourcing. The model explained 32.3% of the variance in the model, suggesting a good fit between the final model and the data.

Replacing the beta coefficients in Eq. (1) with the beta estimates from the foregoing regression procedure and removing the non-significant terms yields the reduced form Eq. (2) that reliably predicts the dependent variable.

$$\begin{aligned} &OutsourcingLikelihood \\ &\quad = \beta_0 + 0.45 * RelCostAd + 0.26 * VendrTrst + 0.15 * Obs \\ &\qquad + 0.15 * ReqSpec - 0.11 * Volatility + \varepsilon \ldots \end{aligned} \tag{2}$$

The beta values of the statistically significant drivers of outsourcing decisions, which indicate the relative importance of each factor, were 0.45 (relative cost advantage), 0.26 (vendor trustworthiness), 0.15 (vendor monitoring), 0.15 (requirements specifiability, and −0.11 (requirements volatility). Statistically, we have 95% or greater confidence that these results are not by chance. The other four factors in the model did not have a statistically significant influence on Japanese managers' outsourcing decisions. In the discussion of the findings in the next section, it is important to bear a limitation in mind. The companies examined in this study are larger companies, therefore it is difficult to generalize the findings to smaller companies.

Table 2
Regression estimates and statistical significance

Eq. (1) term	Estimated beta (β) magnitude	Observed sign	Z-statistic magnitude	Statistical significance
RelCostAd	0.45	+	10.9	Significant
VendrTrst	0.26	+	6.3	Significant
Complexity	0.01	−	0.26	Not significant
StrImp	0.03	−	0.7	Not significant
Measur	0.01	−	0.3	Not significant
Obs	0.15	+	3.5	Significant
TechExp	0.06	−	1.4	Not significant
ReqSpec	0.15	+	3.6	Significant
Volatility	0.11	−	2.6	Significant
β_0	−	+	11.6	Significant

4. Discussion and implications

Fig. 4 summarizes the five dominant criteria out of a larger pool of criteria that emerged as the dominant drivers of their project-level outsourcing decisions. The size of each driver in Fig. 4 indicates the *relative* importance that Japanese managers ascribe to it in their outsourcing decision-making. Please note that the values in the graph represent rescaled values that are used to subsequently construct the analytic tool and are identical in relative importance to Eq. (2) where the values are not rescaled for easier interpretation. We discuss these drivers in order of their observed relative importance and discuss what they mean for non-Japanese vendors competing in the Japanese outsourcing market.

4.1. Relative cost differentials

Unlike in most Western companies [12], Japanese IT outsourcing decisions are often initially motivated by the need to access technical expertise that Japanese companies do not internally possess [34]. However, once a promising outsourcing candidate project has been identified, the most dominant criteria that they use to choose a vendor is the relative cost advantage that a vendor offers, as our empirical results suggest. Relative cost advantage refers to the expected overall cost savings from outsourcing a software development project over the cost of internally developing it. When the technical domain of a project is outside the company's existing internal skill set, this cost includes that of acquiring or developing those technical skills. This implies that although Japanese companies are more likely

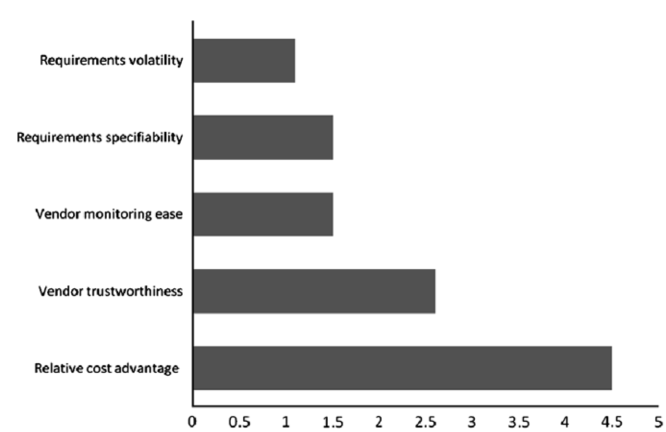


Fig. 4. Japanese IT managers simultaneously consider but differentially weigh multiple criteria in their outsourcing decisions (size indicates relative importance).

to outsource to vendors that they perceive as having stronger technical skills than their own, they often compare these vendors on the relative cost advantage rather than actual cost in choosing one. This finding has important implications for software development practice. For companies attempting to gain a foothold in the Japanese IT outsourcing market, the key is to target Japanese companies that are less likely to have the depth and breadth of in-house technical expertise in the project domain relative to their counterparts.

4.2. Vendor trustworthiness

We found that the second most important driver of Japanese managers' IT outsourcing decisions was the extent to which they perceived a prospective vendor as being trustworthy. Trustworthiness refers to the degree to which the Japanese client manager perceives that a given vendor will honestly fulfill their project obligations without attempting to take advantage of the client. This strong emphasis on trustworthiness vis-à-vis American managers stems from the need for complex and costly project governance mechanisms, which are more difficult for Japanese companies to implement due to the widespread use of Japanese and the ensuing language and cultural differences with the majority of foreign vendors. Moreover, Japanese companies rely more on informal relationships rather than legal contracts in contracting for IT projects [4]. Foreign IT companies seeking a foothold in the Japanese outsourcing market can engender trustworthiness either by offering prospective Japanese clients "test projects" or by conveying their reputation for integrity by extensive and early reliance on referrals from prior clients. If such client references are other Japanese companies – even competitors of the potential Japanese client – they are much more likely to engender trustworthiness that is instrumental in winning their outsourcing business.

4.3. Vendor observability

We found that the third most important driver of Japanese managers' IT outsourcing decisions was their ability to observe and monitor the work of their vendor's employees as a project progresses. Unlike most Western clients who rely on detailed legal contracts and then give the vendor considerable leeway in choosing how to deliver on those contracts, Japanese IT managers prefer a more hands-on role after the project has been outsourced. Japanese IT managers typically employ a number of informal mechanisms to monitor vendor progress in their attempts to lower outsourcing risks [18]. Some examples of monitoring approaches that we observed in Japanese companies are daily email updates, weekly video conferences, co-location of a "bridge" software engineer at the client site, or physical co-location of a client staff member at the vendor site. A noteworthy difference from Western clients that we observed in our research is that the Japanese prefer to co-locate actual developers and software engineers rather than client liaisons or managers in the vendor organization.

4.4. Requirements specifiability

The fourth but equally important driver of Japanese IT managers' project outsourcing decisions was requirements specifiability [26,27] – whether they felt that they could accurately and comprehensively pre-specify project requirements at the outset of the project they were considering outsourcing. While – not unlike their American peers [35] – they fully expect that project requirements may change over the course of the project, being able to create a comprehensive and complete formal requirements specification document at the beginning of the project reduces their perception of outsourcing risk. For vendors seeking to increase their share of Japanese clientele, this finding highlights that successfully landing contracts in corporate Japan might require greater effort upfront in helping a potential client fully articulate project requirements. Traditional requirements elicitation techniques, semi-structured interviews with a variety of different stakeholders in the Japanese client organization, direct involvement of software engineers (rather than just sales managers), and extensive upfront interactions in the pre-contracting stage are therefore more important in the Japanese market relative to most Western outsourcing markets.

4.5. Requirements volatility

With many projects, requirements specified at the outset are likely to shift and change over the developmental lifecycle of the project [25,29]. Although requirements volatility is a common problem that has been widely observed in practice [26,35], we found it to be particularly thorny in the Japanese companies that we studied.

The reason was that many of the leading Japanese companies that outsource extensively are in the consumer electronics business, where concurrent engineering is widely practiced. Concurrent engineering refers to an industrial product development technique where parts of a large system are developed in parallel as independent subprojects [6], e.g., electronics hardware for a digital camera, its optical lens system, its firmware software, and application software. If the application software is outsourced to an outside vendor, a small change in the hardware or firmware in a parallel subproject team in the client organization might also introduce a ripple effect of necessary changes in the application software. Therefore project requirements volatility poses a more serious risk in outsourcing IT projects. Japanese managers are accustomed to the need for such parallel changes. However, they are easier and less risky to manage effectively when all related subprojects are kept in-house. Therefore, Japanese managers are less likely to outsource IT projects where project requirements are expected to be volatile. Vendors seeking to increase their share in the Japanese market can take one of two approaches to deal with this challenge and increase the likelihood of earning project contracts from Japanese clients. First, they should avoid projects that are small components of larger consumer electronics product or embedded systems and instead focus on entire systems projects. Second, they should bid with higher time-and-materials components in prospective contracts than with larger fixed-price component contracts that usually fare better in Western markets.

4.6. Other drivers

We also examined a variety of other project characteristics that are known to impact outsourcing decisions in Western companies [38]. However, none of these emerged in our analysis as drivers of Japanese managers' outsourcing decisions. Strategic importance of a given project, ability to define performance metrics at the outset of a project, project technical complexity (based on its size, scope, or technical requirements), and the Japanese company's internal technical knowledge in the project domain did not influence Japanese managers' decisions about whether they would outsource a given project. However, we found that Japanese managers who had previously been directly involved in outsourced projects were significantly more likely to outsource, all else being equal.

We also found that, in addition to project characteristics examined in this study, demographic characteristics of managers also influenced their intentions to outsource. In particular, we found that managers who had worked for their companies longer were more likely to be inclined towards outsourcing ($\beta = 0.79$, T-statistic $= 5.34$, $p < 0.001$). However, the greater the number of outsourcing decisions that managers had been previously involved in ($\beta = -0.22$, T-statistic $= -3.13$, $p < 0.05$), and the greater the extent to which they used CMM certifications to evaluate vendors ($\beta = -0.12$, T-statistic $= -2.21$, $p < 0.05$), the less likely they were inclined towards outsourcing.

4.7. Development of a Japanese software project outsourcing likelihood analyzer

How can a prospective foreign vendor or IT services provider eyeing the Japanese outsourcing market use these findings to identify promising projects that are more likely to be outsourced by a prospective Japanese client? Japanese managers' decision to outsource a software development project rarely hinges on a single criterion; instead it relies on a complexly-weighted simultaneous assessment of a set of criteria that are substantially different from those used by managers in most Western companies [for additional details, see 33].

Fig. 5 presents an assessment matrix based on our empirical results that can be used to develop a quick assessment about the outsourcing likelihood of a specific project. The outsourcing likelihood analyzer tool (Fig. 5) uses weights from our statistical analyses to estimate an overall project outsourcing likelihood score specific to Japanese companies. These weights are the standardized regression coefficients fitted to the predictive model using the data from these project assessments. These weights are rescaled to allow ease of interpretation of the total outsourcing likelihood score (i.e., 1 to 100 range) and the project criteria questions are simplified for ease of use of the tool in Fig. 5. It is important to note that although a two-level predictor set was used in the conjoint field experiment, the beta estimates are *standardized* beta estimates, which allow such rescaling. The tool effectively implements Eq. (2). Esti-

Instructions

❶ Rate each **Project Characteristic** for *this* project on a scale of 1 (low) to 10 (high) relative to similar types of projects that you have previously been involved in.

❷ Multiply each **Rating** and its **Weight** and sum.

❸ This **Total** indicates the likelihood that this project will be outsourced by a Japanese IT manager. The score ranges from approximately 1 (very low likelihood) to 100 (very high likelihood).

Outsourcing likelihood score	40 or lower	41-70	71 or higher
Likelihood of project being outsourcing	Low	Moderate	High

Project Characteristic	❶ Rating	x	Weight		❷
Relative cost advantage from outsourcing vis-à-vis internal development	2	x	4.5	=	9
Vendor trustworthiness	5	x	2.6	=	13
Ease with which client can monitor vendor development processes (e.g., using tracking software or by physically co-locating staff)	7	x	1.5	=	10.5
Ease with which project requirements can be comprehensively specified at the outset of the project	9	x	1.5	=	13.5
Expected project requirements volatility	3	x	-1.1	=	-3.3
❸ Outsourcing likelihood score ⇨					42.7

Fig. 5. Japanese project outsourcing likelihood analyzer.

mates from managers for each of the terms allow the computation of the right hand side of the equation, which is a measure for outsourcing likelihood for a given project. This score can provide a quick assessment of the prospect that a Japanese client will actually decide to outsource a specific IT project.

Managers using this tool should follow the steps outlined in Fig. 5. The first step is to rate each of the five project characteristics on a scale of 1 to 10, where 1 is low and 10 is high. The rating is multiplied by the rescaled weight of each factor derived from the regression estimates presented in Eq. (2) and summated. It is important to note that IT project managers and non-IT users can have different perceptions and beliefs about a given project [17]. Similarly, different IT managers might also have differing perceptions about the same project. Therefore, we recommend having multiple project stakeholders separately rate a project on the five characteristics in Fig. 5 and then using their averages for the value in column 1 of the tool. This will ensure that there is sufficient inter-stakeholder agreement on the ratings. The resulting outsourcing likelihood score can have a low, moderate, or high value, which indicates the likelihood that a Japanese company will outsource a project with those characteristics.

5. Conclusions

For foreign IT vendors trying to tap into the growing Japanese outsourcing market, an appreciation of the idiosyncrasies in how Japanese IT managers arrive at the outsourcing decision is key. Equally important is being able to distinguish promising candidate projects for outsourcing from those that are unlikely to be outsourced and focusing on those projects that are likely to be outsourced. Realizing early on the fallacy of assuming that what works well elsewhere will work well in the more-demanding Japanese market will circumvent much disappointment. This study, through an indepth statistical multiple regression analysis of 396 project level outsourcing assessments by 33 IT managers in five major Japanese companies, provides insights into the factors that influence those decisions. The results are used to develop a parsimonious tool to estimate how a few key characteristics of prospective projects can predict the likelihood that it will be outsourced. Although the results provide unique insights into the idiosyncrasies of Japanese IT managers' cognitive models, this study represents an initial step in advancing our understanding of a promising but understudied phenomenon in the specific context of Japanese companies.

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