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Design Science Evaluation of an IT Multi-Sourcing Framework

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Abstract

A multi-sourcing strategy utilizes several IT vendors over the long term. Vendor selection decisions are complex, requiring the organization (client) to pick, scale, rank and measure the relevant decision-making criteria to select the best vendor(s). The traditional RFP/RFQ (Request for Proposal and Request for Quotation) selection approach delays getting vendors to participate in the bid development and selection processes, until after the desired system has been fully specified by the client. This approach fails to capitalize on key domain knowledge held by the vendors, which can greatly improve the quality and scope of the specified system being sourced and its implementation methodology. This research studies the innovations implemented by a major US jewelry retailer in their IT multi-sourcing approach. GlobePort has adopted a novel vendor selection framework to cut down the decision-making time, as well as increase the knowledge transferred from multiple vendors during the sourcing process. This practitioner's framework allows vendors and business units to work together and collaborate from early stages of bid development, which leads to the introduction of more new system ideas, greater vendor competition and more efficiency in the vendor selection process. The goal of this research is to discover an evaluation model using design science methodologies and apply this model to determine the benefits or failings of this multi-sourcing framework. The results show that the new framework has advantages over the traditional RFP/RFQ process and allows better bid development, selection and sourcing outcomes.

Keywords: Multi Sourcing, IT Outsourcing, Design Science Research, MCDM, Fuzzy Logic, Outcomes.

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1. INTRODUCTION

Organizations are increasingly focusing on their core business functions and outsourcing the delivery and operation of IT applications/platforms/systems. As companies leverage hosted cloud-based infrastructure and SaaS applications, worldwide IT spending is growing 13% year over year and will reach over $6.31 Trillion in 2026, of which infrastructure implementation and managed services and IaaS, is forecast to see the largest overall spending, surpassing $1.87 trillion (Gartner, 2026). In a multi-sourcing strategy, several IT vendors are used for sourcing systems over the long term. It allows the client to choose "best of breed" vendors, benefit from vendor competition, achieve greater agility and adaptability to dynamic business environments. The benefits of successful multi-sourcing are seen in more innovation, flexibility, service quality, lower cost, lesser risk, and faster delivery speed (Su and Levina, 2011; Currie, 1998). However, the multi-sourcing approach entails greater selection effort, increased need for information sharing, coordination complexity among client and vendors, difficult system integrations, and the potential for greater misalignments with the client's strategic goals (Angst, et.al, 2017; Bapna, et.al, 2010; Bapna et.al, 2023). Evaluating bids from multiple vendors and making selection decisions is challenging due to diverse vendor perspectives, uncertainty in architectural compatibility from multiple delivery points, and a large set of objectives (Bapna, et.al, 2023). Moreover, the typical selection process to identify the best vendor(s) to deliver and support an organization's needed IT system(s) can be highly subjective and unstructured. The complicated contract design and performance management in multi-sourcing also relies heavily on identifying relevant selection criteria. It calls for the use of superior tools, frameworks, methods, and techniques such as Multi-Criteria Decision Making (MCDM) (Weistroffer and Narula, 1989), or Balanced Scorecards (BSC) (Kaplan and Norton, 1996) to assist in the selection and the ongoing renewal of multiple vendors' contracts (Ahmadi, 2010).

Multi-vendor evaluation frameworks and best practices eliminate troublesome hidden agendas and inherent biases that decision makers often have and allow all the stakeholders to participate in a time-efficient and objective manner (Angst, et.al., 2017). A variety of decision support criteria, practices, theories and tools have been used in practice and are described in the IS research stream (Weber, et.al., 1991). The selection data can vary from highly precise quantitative data and certainty about decision outcomes (deterministic information) to subjective qualitative interpretations and uncertain outcomes represented by probabilities and fuzzy numbers. Several problems with decision models have been reported in the literature such as the chosen factors/measures being inter-dependent and conflicting and the measurement data being approximate and containing errors. Moreover, the scale and prioritization (i.e. the allocated weights in the MCDM model) of these factors are also subjective and determined case by case. The differing goals of each sourced IT system and the diverse selection criteria of the business stakeholders negate the use of predefined, fixed criteria weights in the decision-making model (Pries-Heje and Baskerville, 2008). A comprehensive empirical model to evaluate and manage IT multi-sourcing still does not exist in the published IS outsourcing research stream (Liang, et.al., 2016).

1.1 Research Goals

An efficient framework for vendor selection in IT multi-sourcing presents an opportunity for IS innovation. The goal of this qualitative research is to study a real-world practitioner's (GlobePort) operational framework and processes for IT multi-sourcing using design science research (DSR) methodology to discover an empirical evaluation model. The paper also applies the discovered evaluation model to demonstrate the benefits or failings of the innovative IT multi-sourcing selection framework.

1. Develop an empirical evaluation model using design science research to identify inputs and outcomes of the model to evaluate an IT multi-sourcing framework currently in practice and validate that the practitioner's framework enhances multi-sourcing vendor selection outcomes.

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2. Demonstrate that the selection framework efficiently engages multiple vendors simultaneously, integrating vendor knowledge to generate competitive bids.
3. Demonstrate that the selection framework eliminates typical input challenges, such as hidden agendas and biases of stakeholders.

2. BACKGROUND

IT vendor selection requires the business to pick, scale and rank the relevant criteria to build a decision-making framework/process and then apply the process rigorously to vendor data to choose the best vendor(s) (Cochran, et.al., 2006). The traditional sourcing approach using RFP (Request for Proposal) and RFQ (Request for Quotation) demands that the system be fully specified before the vendor engagement is started. However, systems vendors typically possess knowledge accumulated through economies of specialization by their repeated delivery of similar systems to multiple clients. The traditional RFP/RFQ approach fails to exploit this key knowledge held by the vendors by delaying getting the vendors involved in the bidding/selection process until after the client's needs assessment is fully completed (Chang and Gurbaxini, 2012). The RFP/RFQ approach also fails to exploit the vendor knowledge spillover effects as vendors are late to join the process, though their knowledge can be a key source of productivity improvement for client firms to help them optimize the scope and methodology of their IT project, if utilized during the needs assessment and selection criteria specification phase (Koo, et.al., 2016; Caselli and Coleman, 2001).

A large set of selection criteria exists in the IS research literature for IT vendor selection decisions (Thanaraksakul and Phruksaphanrat, 2009). In addition to the quantitative factors like bid price, functionality and delivery time, there are many important qualitative characteristics, such as vendor reputation and responsiveness, domain understanding, technical and methodological capabilities, delivery capability, and communication transparency are also important (Konning, et.al., 2019). Mixing a diverse set of factors that have different measurement scales and datatypes into a single decision-making model makes selection decisions challenging. When some criteria are dependent on each other, the evaluation power of the model becomes questionable.

2.1 MCDM using Fuzzy Decision Model

As both quantitative and qualitative criteria are present in the typical IT outsourcing vendor selection model (Thanaraksakul and Phruksaphanrat, 2009), the ideal decision making models use a hierarchical structure with multiple first-order constructs based on vendor characteristics such as: (i) technical capability, (ii) experience and reputation, (iii) cost and economic value, (iv) service and support offerings (v) infrastructure and cybersecurity, and (vi) communication frequency and quality (Lacity, Khan, Yan and Willcocks, 2010). The vendor selection model must handle a variety set of criteria, which differ in type and scale for each sourced IT system. There is no effective way to comprehensively assess and rank different vendors using conventional MCDM approaches using fixed weights for the multi-tiered criteria. This decision-making scenario lends well to the use of fuzzy logic. The MCDM model in this case study generates a single composite score and rank using Fuzzy Composite Programming (FCP) (Bardossy and Duckstein and Bogardi, 1993). This approach is an appropriate decision-making model that works well with mixed data (quantitative and qualitative), which may be conflicting, dependent and uncertain. The details of the FCP approach used in GlobePort's MCDM for IT multi-sourcing selection is outlined in Appendix A.

2.2 DSR Methodology

Design Science research (DSR) methodology emphasizes the evaluation of innovative artifacts created for practitioner solutions to IS management challenges (Hevner et.al., 2004). Such artifacts could be software systems, interfaces, processes, or technologies that constitute components of a practitioner solution (Stige, et.al., 2023). As new system artifacts are used, design science research evaluates these artifacts for their use and benefits and generates possible explanations that help in understanding changes in the behavior of people, processes, systems and organizations (Vaishnavi & Kuechler, 2004).

The application of design science research in evaluating a practitioner's selection framework for IT multi-sourcing is done in four phases (Table 1): (i) Awareness of the challenges around multi-sourcing selection decisions, (ii) Suggestions and Requirements from published IS theories that provide the

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foundation for the needed new selection framework, (iii) Documented evidence of a successful realization of a new framework and artifacts supporting the above suggestions, and (iv) Finding value in the usage of the developed framework/artifact.

DSR Phase	System and Organizational Aspects of DSR Phase
Awareness	Lists the challenges of multi-sourcing selection process
Suggestions	Builds theoretical base for a selection framework
Documentation	Description of the framework and practical artifact
Demonstration & Validation	Observe usage of artifact, measure, & estimate value

Table 1. Design Science Research Phases

In the Awareness phase, the challenges of the multi-sourcing decision making domain is thoroughly researched and documented. In the suggestions phase, a theoretical base is established for a decision framework and artifacts to address the listed challenges and objectives are identified for the needed new artifact(s). The evaluation of the practitioner's artifacts includes comparing the objectives of the solution to actual observed results from the demonstrations (Hevner et.al., 2004). In the Documentation phase, the delivered artifacts are checked for adherence to the theoretical base and addressing noted objectives and challenges. The artifact evaluation is achieved via users' usage demonstrations (Demonstration) and the value exhibited (Validation) through data collection. Demonstrations show that the developed artifacts are being successfully applied by the users towards the business needs. The end outcome of DSR evaluation shows that the system of components fits the organizational infrastructure, and are being used by the various stakeholders, who realize business value by using these components (Hevner et.al., 2004).

3. METHODOLOGY AND DATA COLLECTION

This study uses qualitative research with interpretative methods based on semi-structured interviews.. Empirical data is collected in semi-structured interviews (Table 2) with four key stakeholders: (i) GlobePort's users from their business units, (ii) GlobePort's IT department staff, (iii) Senior leadership represented by the CIO and (iv) external IT outsourcing vendors. Concurrently, the relevant published literature was searched and analyzed to find theoretical support for the issues. A grounded theory model of measuring success of the stated IT multi-sourcing framework is a product of this research study. The study develops grounded theory by applying design science research methods in concert with theoretical research. The objective of grounded theory is to generate constructs and discover relationships among the constructs using qualitative data (Eisenhardt, 1989; Strauss and Corbin, 1990). The emergent empirical evaluation model for IT multi-sourcing developed with concepts and propositions from the theoretical foundations and the collected interview data, is in Figure 3 in section 5.

Role	Interview - Number & Min.	Interview Questions
IT Department Staff	3 – 60 minutes each	Describe your roles and responsibilities in the IT department. What challenges are you facing in IT systems sourcing? Describe the new sourcing framework and its benefits/issues.
CIO	1 – 30 minutes	What is the IT strategy? How is IT organized to support users? What innovations were instituted? Any impacts seen?
Business Unit Users	2 – 30 minutes each	Describe your roles and responsibilities in the business unit. How does your unit get new and/or updated IT systems? What changed in IT procurement? Benefits and issues faced?
Outsourcing Vendors – Proj. Manager	2 – 30 minutes	How do you interact with GlobePort's IT department and business users? Benefits and issues faced? How did your interactions change with the new framework?

Table 2. Interviews Conducted for GlobePort's Multi-Sourcing Framework

3.1 Case Study – GlobePort

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GlobePort is one of the largest privately held jewelry retail chains in the USA, with 20 stores and over 1000 employees in 13 states and over $200 million annual revenue. The company has been in the same family for three generations and specializes in the sale of fine jewelry and precious stones. GlobePort's IT (Information Technology) team consists of approximately 20 employees scattered across five departments within the organization. Due to the small size, the IT team relies on their vendors to manage all the technology for the company including computers, communications, phones, mobile devices, software development, and systems architecture. Typical IT budgets for small and medium sized companies do not allow significant spending for training staff on the latest technologies. GlobePort's IT rely on their systems vendors, who have invested in research and development (R&D) activities, to help it source better systems than what could be created internally by their limited IT team. Their vendors are able to more effectively deliver these systems due to their investments in software development methodologies and acquired domain expertise from prior project experience (Levina and Ross 2003; Ramasubbu et al. 2008). The vendor's solutions embedded improved business processes and routines generating business value for GlobePort beyond just improved systems (Keller and Chinta 1990).

3.2 GlobePort's IT Multi-Sourcing Selection Framework

GlobePort's innovative multi-sourcing framework (Figure 1) enables the IT department, the business units (inside the client) and the competing vendors to work in parallel. The innovation allowed the IT department to engage external vendors early in the workflow while the business units continued to define the system scope and details of each selection criteria and the weights for each criterion. This helped to cut down the interval time, as well as increase the knowledge transferred from multiple vendors to/from the client's team, resulting in better specification of the system and the selection criteria (Figure 1). This new multi-sourcing framework engaged multiple vendors blindly (names hidden) to objectify the selection process, thereby preventing opportunistic behavior (Agency Theory).

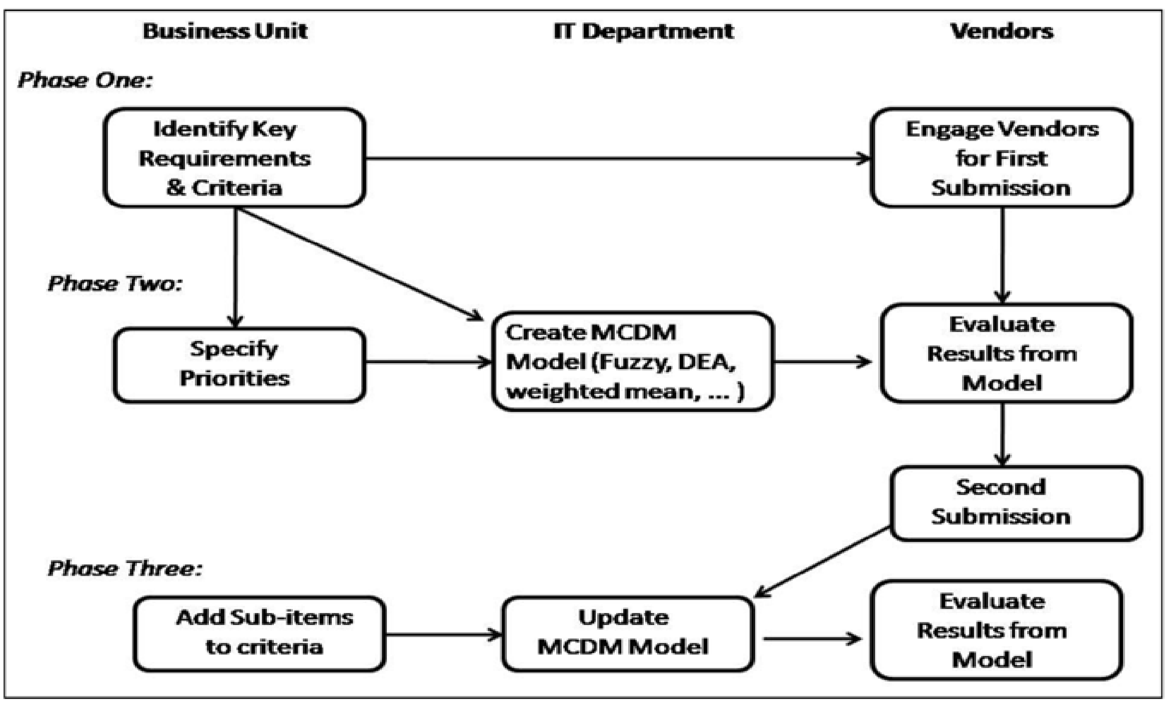

Figure 1. New Vendor Selection Framework

The business units scored the second pass proposals in the same manner as the first pass and distributed the vendor scores to each bid participant. The MCDM scoring model uses a hierarchical structure with groups of criteria, that vary by the IT system being sourced (Table 3). Each criterion is normalized into a 0 to 1 range, and the weights are established based on the degree of importance that the business units/IT department feel each criterion has in the group. The balancing factors of each of criterion

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reflects the importance assigned to that criterion. A single composite score and rank is generated using FCP (Appendix A). Once the scores were tallied, GlobePort could eliminate some of the vendors involved if they desired and such communication was sent to the vendor with their final score. It was recommended that if the number of vendors involved in the process exceeds three then the group is reduced to three after the second pass. This further reduced the timeline for the entire process. The remaining three vendors were then taken through their second pass scorecards and offered an opportunity to make final changes in a third pass.

Category	**Set of Group Criteria (*varies by Systems being Sourced*)**
Technical Capability	Technical Expertise; Architecture Capability; Integration Capability; Infrastructure; Scalability
Reputation/Experience	Industry experience; Comparable projects; References; Reputation; Financial Stability
Cost and Bid Value	Competitive price; TCO; Expected Savings; ROI; Adaptability
Communications	Communication Frequency; Knowledge Sharing; Governance; Trust and Norms
IT Infrastructure	Architecture Capability; Integration Capability; Infrastructure Fit; Scalability; Cybersecurity Compliance
Service Quality	Service Performance; Availability and Problem Resolution; SLA Performance;
Methodology	Innovation; Strategic Alignment; Roadmap; Transformation Capability; Development & Implementation Process Capability

Table 3. Operationalization of the MCDM with Fuzzy Composite Programming

The third pass was the final pass through the framework, so vendors were encouraged to give their best efforts, as the final decision would follow the third pass scoring. GlobePort would request that the final (third) pass be a formal proposal so that all services and pricing were in writing and ready for signatures for the selected vendor. This prevented further negotiation beyond the final review. Once all final offerings were in, GlobePort could score and rank all the vendors, still under consideration, with a final view of all services, functions, and process. In a purely objective approach, the vendor with the best score is selected and awarded services (Figure 1).

4. DESIGN SCIENCE RESEARCH OF IT MULTI-SOURCING FRAMEWORK

4.1 DSR Awareness Phase

In organizations with small IT departments, the desired system's scope evaluation, functional specification and sourcing become more driven by the business users, who often do not understand the technical infrastructure constraints. The minimal IT department makes vendor selection into a subjective, time-constrained and contentious process dominated by the company's business culture built over many years of ingrained practice. Just reaching internal consensus on specifying system needs, the selection criteria and setting priorities often take many weeks of assessment and negotiation between the business users and the IT department. Only after these steps are completed, GlobePort's vendors are requested to submit their proposals in response to the RFP over several additional weeks. GlobePort found this traditional approach of using RFP and RFQ steps to be highly sequential and time consuming, creating major delays in the IT sourcing process. There was no way to simultaneously establish a list of selection criteria, reach agreement between the IT department and business units on the prioritization of those criteria items and objectively evaluate each vendor's capabilities rapidly and efficiently using the RFP and RFQ process. Quoting GlobePort's IT Department staff,

> "*These delays further create frustration for business users and dissatisfaction with the IT sourcing process.*"

The CIO also noted that IT staff is unable to represent infrastructure needs in the current process,

> *"The IT sourcing process is highly subjective with an adherence to practices that maintained the status quo or "let's just go with who we have" mindset driven primarily by the business side."*

4.2 DSR Suggestions Phase

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Reviewing Information Systems (IS) literature suggests that Transaction cost theory and Agency theory are identified as governing the dynamics of the IT vendor selection process. During the process, there is a need to fully specify the system being sought and reduce the uncertainty in the delivery of the system after the transaction has been executed (Figure 2). Transaction costs consist of costs incurred in searching for the best supplier/partner/customer along with the cost of establishing a mutually agreeable contract, and the costs of monitoring and enforcing the implementation of the contract (Bahli, Bouchaib, & Rivard, 2003; Ngwenyama, et.al., 1999). A well-designed multi-sourcing framework and vendor selection process adds value to the vendor management functions by minimizing transaction costs through the increase in flexibility and competition. Moreover, the framework could also improve the understanding of the boundaries and expectations from each player in the sourcing process (the business unit, the IT department and the external vendors). By breaking the system definition into multiple phases in GlobePort's IT multi-sourcing framework, the client vendor interactions become less complex and more dependable – thereby reducing selection intervals and costs (Transaction Cost Theory).

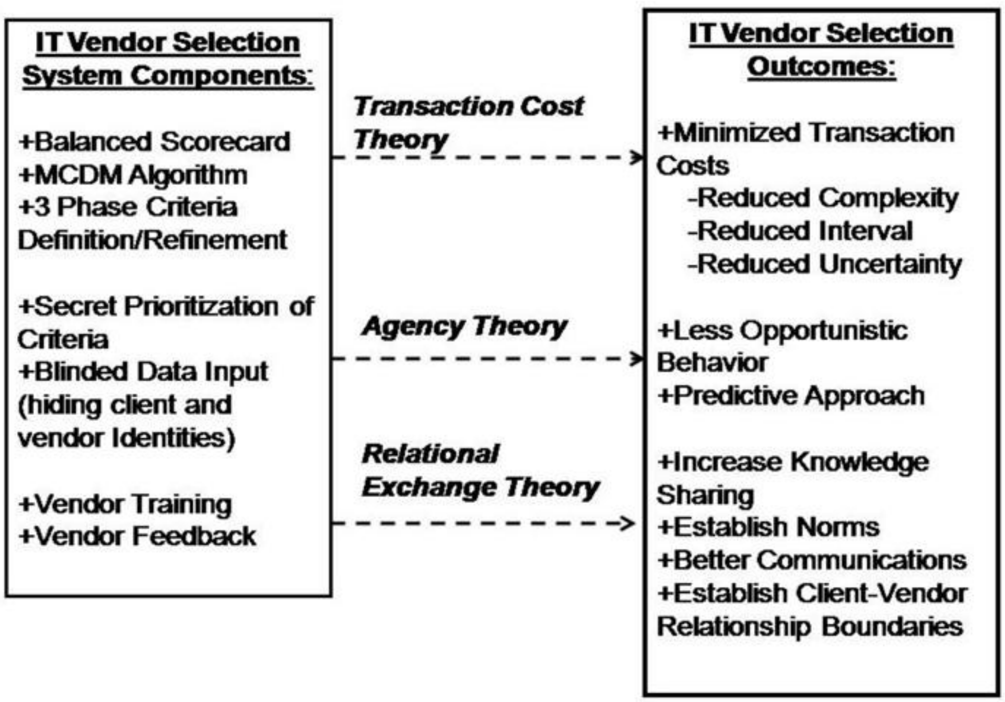

Figure 2. Theoretical Basis for Multi Sourcing Artifacts

Opportunistic behavior can hinder collaborative activity, putting the effectiveness of outsourcing multi-sourcing arrangements in danger (Lioliou, et.al., 2019). Agency theory is applicable when one party (eg. the client company) delegates work to another (the vendor or IT department), who performs that work. Agency theory is concerned with resolving two problems that can occur: (a) when the desires or goals of the principal and agent conflict and (b) when it is difficult or expensive for the principal to verify what the agent is actually doing. By "blinding" the identities of the players, GlobePort's new vendor selection framework places emphasis on the prediction of future expectations from the vendor and away from past experiences with that vendor (Figure 2). This reduces opportunistic behavior among the participants in the selection process. Moreover, the new process becomes more objective and iterative with feedback and supports increased communication, which brings added transparency to expose "*what is actually going on*".

Relational exchange theory establishes relational norms between the actors in the vendor selection transaction (Figure 2). Providing the vendor with training and example interactions (norms) with on-going feedback in a selection system gives all the parties (GlobePort and the multiple participating vendors) additional insight as to the product and service expectations well before the contracting phase

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is entered and contracts are signed. This allows greater knowledge exchange, increasing communications and establishing operating norms (Relational Exchange Theory). The pooling of knowledge from multiple vendors forms a critical element of the new system as it defines the bilateral expectations between the client and the vendors and builds understanding of the boundaries and solidarity of the purpose of sourcing (Kern and Blois, 2002).

4.3 DSR Development Phase

To move the organization away from "business as usual", the IT team implemented the new vendor selection framework using a multi-criteria decision making (MCDM) framework. An MCDM problem consists of five basic elements: alternatives, criteria, outcomes, preferences, and information. The MCDM was accompanied with reengineered vendor management processes to be able to efficiently establish operational boundaries and norms and integrate and exploit IT knowledge and service capabilities from multiple vendors. Supporting proposition P1, one of the business users mentioned:

> *"This process not only clarifies the selection process for us, and it also gives us more insight into vendor capabilities and their methods before the contract is prepared."*

Proposition P1. Increased Business Unit Engagement increases the Quality and Volume of Vendor Knowledge Sharing.

Supporting proposition P2, the CIO mentioned:

> "*Vendor selection is always an issue for our business, and more so today, as more we move to entirely hosted and virtual solutions. Initially the new sourcing process was leveraged by the senior IT director but others in the IT department and business users are beginning to leverage the process as part of their vendor selection activities to generate better bids".*

A quote from the IT Department Staff also supports the proposition P2:

> *"Good vendor selection process can impact the business for the entire term of the contract, which in some cases can be as many as five years."*

Proposition P2. Increased Vendor Knowledge Sharing improves Sourcing Bid Development Quality and Efficiency.

GlobePort's IT department had frequently used scorecards in the past as part of individual vendor performance management practice and therefore, leveraged the objectivity of MCDM algorithms as part of the new vendor selection process. A quote from the IT department staff notes:

> "*The early synthesis of vendor knowledge collected with their identities hidden along with the ongoing engagement of the business units significantly improved system scope development and reduced sourcing time interval."*

This practice-oriented innovation and its subsequent application of FCP improved the unstructured decision-making process of IT multi-sourcing (Pries-Heje and Baskerville, 2008). IT Department staff mentioned the growing interest and use of the framework among the business units, supporting proposition P3:

> "*Because this supports vendor selection, and all our businesses are looking to host their IT systems, there is a significant potential for this framework to be of interest across our business".*

Supporting proposition P3, one of the external vendors mentioned:

> *"This process not only clarifies the selection process for us, it also gives us more insight into client expectations before the contract is finished and signed."*

A quote from the CIO supports proposition P3:

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> *"By scoring expected and promised deliverables, the process became more predictive. Further, it provides objectivity in the process and gives the business the opportunity to view vendor proposals side-by-side".*

Proposition P3. Increased Business Unit Engagement improves Sourcing Bid Development Quality and Efficiency.

4.4 DSR Demonstration/Validation Phase

Table 3 lists six IT projects that have been sourced by GlobePort using the new multi-sourcing framework and redesigned process. The first system evaluated with the framework was the consolidation of the print vendor practice and the selection of a single vendor for management of all print services in all stores and the home office. The CIO was directly involved in the initial scorecard outline, and made the final decision based on the results of the scoring process. The new system enabled the IT department to objectivity move the business away from an entrenched vendor that had been with the company for three years. GlobePort's business users described the impact of the new framework as below, supporting proposition P4:

> "*This process not only clarifies the selection steps, it also gives the vendor some insight as to our expectations before the contract is created. In one case, it enabled the IT department to move the business away from a vendor that had been with the company for three years. It brought in new vendors with new ideas and solutions and compared those directly to the services being provided by the current vendor."*

> *"Finally, it allowed us to reduce the monthly print services costs by nearly 40% per month, a significant savings for the term of the contract."*

Proposition P4. The Multi-Sourcing Framework enhances IT Sourcing Selection Success.

IT System	Characteristics	Outcomes
Infrastructure & Platform Projects		
Hosted Solution (IaaS)	Mission Critical: Supports all Info Tech.	Enhanced pooling of vendor knowledge - reduced IT service costs by 40%
VoIP Vendor	Mission Critical Infrastructure	Enhanced Knowledge Sharing of latest Tech Standards
Print Vendor	Business critical service function	Significant operating cost reduction of $3500/mo; Improved Service
Application and IT Support Projects		
Sales Force Effectiveness Evaluation System	Business critical app – supports all storefronts	New Vendor selected with innovative support offerings
Business Intelligence Tool	Company-wide adoption of a single tool	Cloud based single BI model repository
Digital Signage	Marketing App	Reduced Selection Interval-IT and MKT

Table 3. Recorded Usage of New Framework

5. RESULTS AND ANALYSIS

This new selection framework has some distinct advantages over the standard RFP/RFQ practices in place in most companies. First, the potential business unit has an opportunity to leverage the expertise of all the vendors in the process. Negotiations around expected deliverables and services go beyond the experience the client brings to the table. Discussions with multiple vendors can give the users insight into what is standard practice within the industry of interest, and what might be considered "added value" practices. The new vendor selection framework supports the pooling of technical knowledge from multiple vendors into the selection process, which is allowing the business to effectively understand and leverage new industry standards into its IT infrastructure and applications **(P1).**

The framework promotes ongoing and healthy vendor competition, which helped bring new vendors with new ideas and solutions to the table. As the process progresses, the vendors are competing directly

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for the customer's contract, rather than driving the customer into their preferred services. For the vendor, there is advance knowledge of the customer's expectations of performance, and of what the customer finds the most critical aspects of the offered products and services. This allows the vendor to better tailor their offering and sets a solid basis for the beginning of their relationship if the vendor is selected for the contract, which helps reduce coordination costs and improve accountability **(P2).**

GlobePort was able to better leverage process, tools and knowledge from their vendors and bring in a lot of synergies, which reduced management costs and increased IT hosted sourcing success **(P3).** The framework reduced their monthly IT hosting services costs by nearly 40% per month, a significant savings for the term of the contract. The new vendor selection framework continues to support cost reduction efforts by the IT team, including the identification of updated equipment that can further reduce monthly maintenance and operation costs **(P4).**

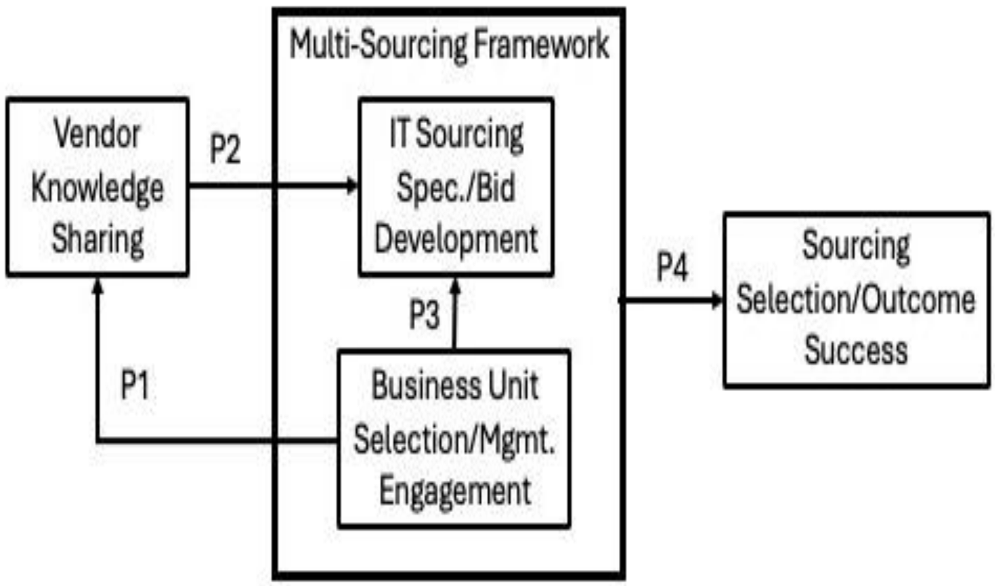

Figure 3. Grounded Theory Evaluation Model of IT Multi-sourcing

6. CONCLUSIONS

Vendor selection is a major IT function for most IT centric organizations. This is more so today as companies move to leverage hosted and virtual solutions. A poor vendor selection process can negatively impact the business for the entire term of the contract. In contrast to earlier and more traditional outsourcing approaches, current multi-sourcing ventures are seeking to capitalize on the co-operation as well as the competition among vendors to improve the sourcing process. The described practitioner framework allows IT to manage expectations from the business units and vendors and to integrate and exploit specific vendor knowledge and system implementation capabilities in a strategic fashion. The application of the DSR methodology led to the development of an evaluation model for multi-sourcing (Figure 3). This grounded theory model is supported by the interview data from the organizational stakeholders, analyzing the actual use and management of IT multi-sourcing by GlobePort.

6.1 Future Work

CIOs and business leaders in all industries are looking to host some or all aspects of their technology platform, hence there is a significant potential for this proposed framework and research study to be of interest across the business spectrum. The net effect of the DSR methods has led to the qualitative development of an evaluation model based on grounded theory (Figure 3), which can be the basis of a follow-on quantitative study. Follow-on quantitative research using this empirical evaluation model and measurements of latent variables, is motivated by the results of this study. This research study has created an impetus to get a deeper understanding of how clients can achieve a balance between the

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dimensions of cooperation and competition between their multiple vendors. This theme of research is particularly topical, considering that a major driver for the growth of multi-sourcing is the actual exploitation of simultaneous cooperation and competition among their external sourcing vendors.

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APPENDIX A

Fuzzy Composite Programming MCDM Model

Fuzzy Composite Programming (FCP) is a popular MCDM technique, which can handle mixed indicator data (quantitative and qualitative), and also work with conflicting, uncertain and hierarchical criteria. FCP methodology was developed by Bardossy, et.al., (1993). FCP lends naturally to a hierarchical structure of decision-making criteria (groups). The normalization of each criterion is done by using the best and worst basic indicator values that are described by the following equation:

$$\beta_{ij} = \frac{f_{ij} - f_{ij}^{-}}{f_{ij}^{+} - f_{ij}^{-}}$$ (When f_{ij}^{+} is best)

Or

$$\beta_{ij} = \frac{f_{ij}^{+} - f_{ij}}{f_{ij}^{+} - f_{ij}^{-}}$$ (When f_{ij}^{-} is best)

FCP is based on a Fuzzy Composite Index (FCI). The equation is:

$$L_j = \{\sum_{i=1}^{n_j} w_{ij} \beta_{ij}^{p_j}\}^{1/p_j}$$

Where, Lj is Fuzzy Composite Index for the B+1 level group j of B level indicators;
w_{ij} is weight of B level indicators in group j;
p_j is balancing factors among indicators for group j;
f_{ij}^{+} is the best value of i^{th} fuzzy indicators for group j;
f_{ij}^{-} is the worst value of i^{th} fuzzy indicators for group j;
f_{ij} is the value of i^{th} fuzzy indicators for group j.

The final fuzzy composite index for an outsourcing vendor's bid, which is used for ranking, is obtained by calculating the FCI from basic level to top level. The weight parameters for indicators at different levels (w_{ij}) are established based on the degree of importance that decision makers feel each indicator has relative to other indicators of the same hierarchical category. The balancing factors (p_j) reflect the importance of maximal deviations between indicators in the same category and determine the degree of substitution between indicators of the same category. Low balancing factors (equal to 1) are used for a high level of allowable substitution. High balancing factors (equal to 3) are used for minimal substitution.

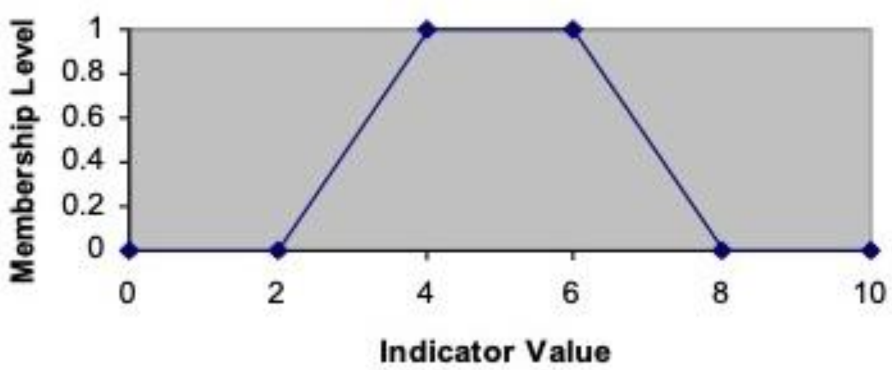

Figure 4: Trapezoidal Membership Function of a Fuzzy Indicator

The best value (f_{ij}^{+}) stands for the maximum possible value of the indicator, and the worst value (f_{ij}^{-}) stands for the minimum possible value of indicator.

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MLI reflects the most likely range for indicator value, and LLI reflects the largest possible range for indicator value. MLI consists of both low bound (LMLI) and high bound (HMLI). LLI consists of both low bound (LLLI) and high bound (HLLI). Both the Low bound and the high bound can be same, but normally, the following relationship exists among the above values in a fuzzy logic scenario:

LLLI ≤ LMLI ≤ HMLI ≤ HLLI

In Figure 4, the range from 4 to 6 is called Most Likely Interval, and the range from 2 to 8 is called Largest Likely Interval. LLLI = 2, LMLI = 4, HMLI = 6, HLLI = 8.

Ideal Point and Worst Point of FCP

The normalized Ideal Point of FCP is located where all indexes are 1, and the normalized Worst Point of FCP is located where all indexes are 0. The real scenarios scatter inside those boundaries. The closer the values are to the Ideal Point, the better the scenario is. Note that in this multi-vendor selection framework model, each external vendor bid is considered a scenario.

FCP Computation Steps

FCP computation is divided into the following steps (Bardossy, et.al., (1993):

Step 1. Utilize the formula below to compute the fuzzy composite index (FCI) for low bound and high bound for both Most Likely Interval (MLI) and Largest Likely Interval (LLI) for each scenario.

Step 2. Based on the computed fuzzy composite index of LMLI, HMLI, LLLI and HLLI at step and compute final fuzzy composite index for each scenario.

$$FCI_i = \frac{1}{2}\left(\frac{FCI(HLLI_i) - \min}{(\max - \min) + (FCI(HLLI_i) - FCI(HMLI_i))} - \frac{\max - FCI(LLLI_i)}{(\max - \min) + (FCI(LMLI_i) - FCI(LLLI_i))} + 1\right)$$

Where, i is scenario number; $\min = \min_j (FCI(LLLI_j))$, Which is minimum LLLI in all scenarios; $\max = \min_j (FCI(HLLI_j))$, which is maximum HLLI in all scenarios.

Step 3. Compare the final FCI for all scenarios and make the best decision using the ranking rule: the larger the final FCI value, the better the scenario.

