INCREASING SATISFACTION AND PERFORMANCE IN SCM: EVALUATION OF BUYER/SUPPLIER MODELS

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ABSTRACT:

In 2008, a CIB Task Group (Egbu et. al., 2008) performed a study identifying innovative supplier selection methods that utilized performance metrics to increase performance and accountability. The study found that only one process (PIPS/PIRMS) had sufficient documentation showing that it could improve performance and accountability of the suppliers. PIPS/PIRMS stands for Performance Information Procurement System / Performance Information Risk Management System. Research was performed to identify what factors were unique to the PIPS/PIRMS buyer/supplier relationship model and do those factors improve project performance. In the research we used literature review to find factors, surveys to check the recognition of the variables and cases to test for the results in practice. The results of the research reveals that by changing the classic buyer dominated way of selecting suppliers (in the construction industry) based on eg. transaction cost economics can be enriched with a more relationship based theory, adding process thinking (like Lean and supply chain management theories) into the field. This paper contributes to the new avenue for buyer – supplier relationships, based on performance and accountability.

Keywords: Best Value Procurement, accountability, supplier relations, performance

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Track: Supply Chain Management and Purchasing

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INTRODUCTION

The construction industry has had a problem with delivering projects efficiently and with customer satisfaction (Latham 1994; Egan 1998; Chikuni & Hendrik 2012; Oyedele et al. 2012; Georgy et al. 2005; Bernstein 2003; UK Report 2011). Both professionals and academics have been unable to identify a sustainable solution to the dilemma. Many solutions have been proposed, few have been able to produce successful results (Sullivan et al. 2012; Olatunji et al. 2012; Gajjar et al. 2012; Lepatner 2007; Kenny 2009; Sambasivan & Soon 2006; Chen et al. 2010; Munting & Cruywagen 2008; Kazaz & Birgonul 2005; Binici et al. 2010; Palliyaguru et al. 2008; Ekolua & Ballima 2006).

The current direction of the performance in the construction industry will cause increasing problems in society (De Ridder, 2011). This trend is also shown in other industries, such as the information communication technology industry (Kerzner 2011; Vital Smarts et al. 2006).

In 2006, the International Council for Building (CIB) sanctioned a Task Group (TG61), which is now CIB Working Commission W117, with the purpose of investigating construction performance information and how it can be leveraged to improve the construction industry on a global scale. In 2008, TG61 (Egbu et al. 2008) performed a worldwide study identifying innovative construction methods that utilized performance metrics to increase project performance. The study reviewed more than 4,500 papers and identified 16 papers that had documented measurements showing an increase in performance due to the selection method utilized. The study found only three methods that proved to improve customer satisfaction, accountability and the value on projects.

One of the three construction methods found was a buyer/supplier relationship model called Performance Information Procurement System/Performance Information Risk Management System (PIPS/PIRMS). The study found that out of the 16 papers with documented performance measurements, 75% (12) of the articles were projects performed on PIPS/PIRMS. The other two methods were the Performance Assessment Scoring System (PASS) (Tam et al. 2000) and the City of Fort Worth Equipment Services Department (ESD - FT) (Stewart 2005). After further investigation, it was found that although the PASS had measured performance information, the system could not show any improvement in performance of their projects. The ESD -FT had measurements to show improvement in their projects, however, this system did not have documented information for how the process worked. It also was a process that was internal to the organization and did not involve projects with suppliers or other organizations.

PIPS/PIRMS was the only (selection and realisation) process that had sufficient documentation showing that it could improve customer satisfaction, accountability and value on projects in the construction industry that involved suppliers.

The Performance Information Procurement System / Performance Information Risk Management Process (PIPS/PIRMS), was developed by Dr. Dean Takeo Kashiwagi, from Arizona State University. The system was first conceived in 1991 as part of Kashiwagi's dissertation (1991). PIPS/PIRMS was originally, strictly a selection process. The first test of the process was performed in 1994 (Kashiwagi & Savicky 2002), used to select roofing systems and contractors for private organizations (including: Intel, IBM, and McDonald Douglas). Currently the PIPS/PIRMS system is used not only to procure services in all industries, it has also been developed into a business and risk management model (Kashiwagi, 2012). Over the last 19 years the PIPS/PIRMS has accomplished the following (PBSRG,2013): 1,600+ research tests; $5.7B of services delivered; 9 states (17.6% of U.S.

states); 6 countries participated in tests (Finland, Netherlands, Botswana, Canada, Malaysia, and the U.S.); 350 conference and journal papers; 98% customer satisfaction of test results; minimized owner transactions by up to 90%; and increased vendor profit by as much as 100%. The effort also received over 11 industry awards in 10 years, including: IFMA Fellow, George Cronin Silver Award for Procurement, Fulbright Scholar Award, and H. Bruce Russell Corenet Global Innovator's Award.

Due to the performance record of the PIPS/PIRMS model and it being identified by the CIB as the only system with documentation showing that it consistently improves project performance, it was concluded that further research into the PIPS/PIRMS model could identify a unique solution to change the current trend of non-performance.

So the phenomenon in construction industry was clear. There appeared to be a method that relates buyers and suppliers better, due to the focus on expertise of the supplier and his measurements from passed performance. We did not find any research on this phenomenon and therefor wanted to research this gap. The study aims to find the factors that explain the success (in terms of satisfaction and performance) of PIPS/PIRMS as compared to other buyer-supplier systems. We will describe the methodology used in the next section, followed by the results of each of the three parts of the research. We then draw a conclusion and discuss the results and make some suggestions for future research. In appendices we provide relevant information on the research.

RESEARCH QUESTION AND METHOD

The purpose of this research is to find out if and why PIPS/PIRMS is producing different results from most common buyer/supplier relationship models. Therefore, the research question (RQ) is: What unique factors distinguish PIPS/PIRMS from other buyer/supplier relationship models and do they deliver more customer satisfaction and performance?
In other words, is there anything unique about the PIPS/PIRMS buyer/supplier relationship model that is not found in other buyer/supplier relationship models today?

The methodology used for finding an answer to this question was adapted from Dul and Hak's structure for theory building and theory testing (Dul and Hak, 2008). The major research methods used are:

1. Literature Research
2. Exploratory Survey Research
3. Case Study Research

The research steps are as follows:

1. Perform literature research to identify factors of buyer/supplier models and theories.
2. Identify different and overlapping factors with the PIPS/PIRMS model and the other buyer/supplier models through analysis of literature research.
3. Validate that the factors identified are unique through an exploratory survey.
4. Identify if the unique PIPS/PIRMS factors can be implemented in any type of project through case study research.
5. Identify whether the PIPS/PIRMS factors increased accountability and performance through analysis of case study results.

LITERATURE RESEARCH

Figure 2 depicts how the literature search for unique PIPS/PIRMS factors was performed. First, literature for traditional buyer/supplier systems were found in two areas, literature on U.S. Buyer systems (top of Figure 2) and academic publications on buyer/supplier systems (far left of Figure 2, top). Then a literature search for PIPS/PIRMS was performed searching academic publications that have been published (far left of Figure 2, bottom). The major theories that have been researched are illustrated in appendix 1.

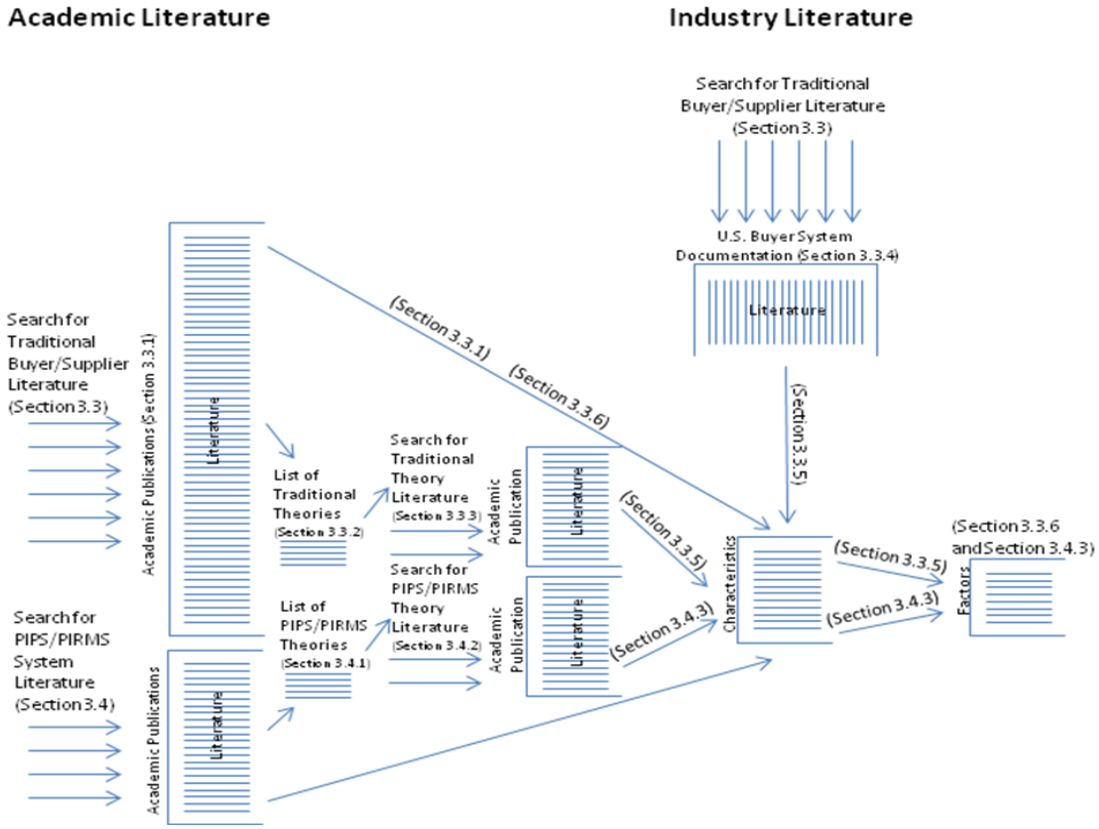

Figure 2: Literature Research Methodology

Another literature search was then performed looking for academic publications on each theory identified (mid section of Figure 2).

All academic publications and U.S. Buyer system documentation identified specific traits and actions of the system being documented or discussed. Those specific traits and actions were documented in the exact wording written in the publication and documentation it was found in, and are identified as "characteristics" of the systems (end section of Figure 2).

When all the literature was reviewed and all characteristics were identified, the researcher then took all the characteristics and divided them into categories called factors. A factor will be identified as a category that the researcher created (far right or last step in Figure 3). The factors were then divided as shown in Figure 3. The factors that were unique to PIPS/PIRMS were then separated from the rest of the factors.

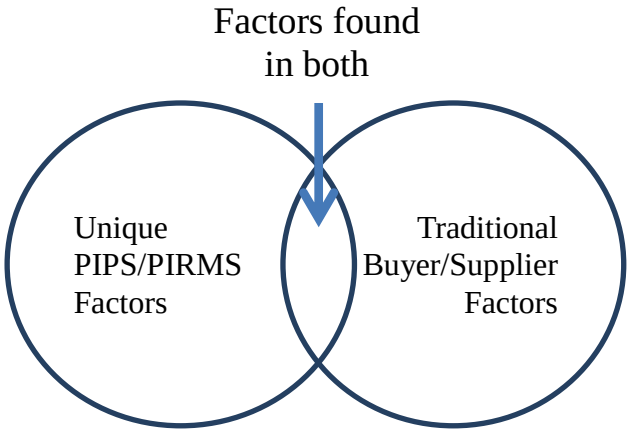

Figure 3: PIPS/PIRMS Factors

In the literature research 6 academic research databases were used (EI Compendex, Emerald Journals, ABI/Inform, ProQuest, ASCE library, and ScienceDirect) and the systems of 10 U.S. organizations were also used. These databases were used based on the journals and publications they consisted of (journals, reports, conference papers and articles), while the organizations were chosen based on their size and the type of work they performed (Kashiwagi, 2013). The research results of these areas converging in the next results:

- Buyer/Supplier systems documented by 103 academic publications. Every academic publication was identified as a different buyer/supplier system, due to the different interpretation of buyer/supplier systems by each author.
- 21 Supporting buyer/supplier theories found in the documented buyer/supplier systems (see appendix I).
- 10 U.S. Buyers' buyer/supplier systems.

From these sources 919 characteristics were identified. Characteristics were identified by going through each buyer/supplier system and capturing exact wording describing the different actions and components of each buyer/supplier system.

For PIPS/PIRMS characteristics, 58 publications were found, used to develop the characteristics for the PIPS/PIRMS buyer/supplier system. From these publications 54 buyer/supplier characteristics were found.

The total amount of characteristics identified were 973 (not published in this paper). Although the characteristics were worded differently, many of the characteristics were similar to each other. In order to make the characteristics easier to compile and analyze, the characteristics were categorized into so called factors. After reviewing all the characteristic, 44 factors were identified.

The analysis found the following:
1. 36 factors were found in the traditional buyer/supplier relationship models (see appendix 2)
2. 13 factors were found in the PIPS/PIRMS relationship model and 8 of those factors were unique to the PIPS/PIRMS model.
3. 5 factors were found in both traditional and PIPS/PIRMS relationship model.

The conclusion of the literature search is that the following eight factors are unique for PIPS/PIRMS:

1. No-Influence, No Control, No Management philosophy - requires the buyer to minimize direction and release control over the supplier, since the supplier is the expert. This system also focuses on making the supplier accountable.
2. Seamless Contract - Contract mitigates risk for the project/deliveries, instead of being a legal/regulatory/control document between buyer and supplier.
3. Supplier Contract Creation - The supplier creates the contract and the scope of project.
4. Pre-planning - Places more importance on pre-planning before the contract is signed then after the contract is signed. The contract representing the start or implementation of the service, since usually the contract binds all parties to an identified project plan and set of activities.
5. Problem Contracting - Does not require the buyer to identify scope of project. Allowing the buyer to only relay their intent and expectations.
6. Communication Minimization - System minimizes buyer/supplier communication
7. Expert Supplier Model - Supplier has no technical risk and focuses on mitigating risk the supplier does not control
8. Dominant Information - Communication to be in simple, clear, and in non-technical terms.

In the next section the validation of the eight PIPS/PIRMS factors from literature is described.

THEORETICAL DIFFERENCE OF PIPS/PIRMS AND COMMON BUYER/SUPPLIER SYSTEMS

The literature research revealed that there are two major opposing theoretical ideas in which all buyer/supplier systems are based from. One view identifies that buyers should direct, seek to control, and manage their suppliers. The other is that direction, control, and management are not efficient practices, and buyers should give control to the supplier and let them determine what needs to be done. All common buyer/supplier systems have a form and degree of management, direction, and control. The largest factor influencing buyer/supplier models to be based off of management, direction, and control, is due to the problem of information asymmetry and the inherent nature of human beings to seek their own self-interest. Buyers' and academics feel that without management, direction, and control, they would not be able to have enough information or leverage to procure and deliver the required services. One major effect of the idea that management, direction, control is required for a buyer/supplier system is that the expertise of the supplier is not as important, since the supplier will be listening to the buyer's instructions. Therefore, price becomes more important in the selection of suppliers. This can be seen in multiple current buyer/supplier models, as price is the major deciding factor in the selection of suppliers.

The literature research discovered that the PIPS/PIRMS was the only model that identified that any practice that contained actions requiring management, direction, or control, was inefficient and would produce lower performance. The eight unique PIPS/PIRMS factors were factors that removed any form of management, direction, and control in the selection and realization phases of a project or service.

EXPLORATORY SURVEY RESEARCH

The validation amongst practitioners for the eight PIPS/PIRMS factors was done through two exploratory surveys conducted in 2011 and 2012. Both of the surveys (2011 and 2012) were conducted at the Annual Best Value Conference held in Tempe, Arizona. This conference attracted over 200 practitioners each year. Since this conference attracts PIPS/PIRMS interested people (either users or interested in), these 200 practitioners could form an opinion on both PIPS/PIRMS and on traditional buyer/supplier systems. The annual conference attracts people from the United States as well as other countries, such as the Netherlands and Canada. This also broadened the research's primary U.S. focus until now.
Both surveys (2011 and 2012) were divided into two sections:

- PIPS/PIRMS Factors - Statements relating to the PIPS/PIRMS factors and their impact on project performance were given. Instead of using the PIPS/PIRMS factors, the researcher decided to use some of the actual characteristic wording of each factor to improve the understandability of the survey to the practitioners. The questionnaire describe each of the 8 PIPS/PIRMS and then stated that the factor was unique and had impact on project performance (incl. accountability). The practitioner then had to identify if they agreed, did not know, or disagreed. This was done with a 1-10 rating system: 1-4=disagree, 5= not enough information to know (don't know), and 6-10=agree.
- Common/PIPS/PIRMS Comparison - Questions identifying the difference between the two systems in terms of cost, time, and quality. Seven questions were asked and the practitioner would have to give two (1-10) ratings for each question, one to the PIPS/PIRMS model and one to the Common Models.

Both surveys (years) asked the same statements. In the 2012 survey, statements were changed slightly. This was an attempt to simplify the statements, trying to ensure each question and statement was one dimensional, so the answers were based on one factor.
The surveys were given at the registration of the 2011 and 2012 Annual Best Value Conferences. This was done to ensure that the practitioners' opinions were not skewed by the one week training of the conference. Upon registering at the front desk the practitioner was handed the survey and asked to complete it before being able to register. The administration would give brief instructions to the practitioner and would be available to the practitioners if they had any questions concerning the survey. There was no time limit for the survey. The practitioner could spend as much time thinking about each question as they thought necessary. After all the surveys were collected, the data was loaded into an Excel spreadsheet. The data was then reviewed to identify survey validity.

Table 1 shows the comparison of the two conferences survey participants and some basic details per year. There were 28% more surveys disqualified in 2011 than in 2012. The reason the number disqualified in 2011 is so much larger than in 2012 is due to the complexity of the survey in 2011. The amount disqualified in 2011 is one of the main reasons the survey was changed in 2012.

Table 1: Summary Table for 2011 and 2012

Characteristic	2011	2012
Total # of Surveys:	241	171
# Disqualified:	93	17
% Disqualified:	38%	10%
# of Suppliers:	96	93

# of Buyers:	46	61
Average years experience w/ PIPS/PIRMS:	2.2	1.5
# of U.S. States represented:	28	22
# of Countries represented	4	4
# of Organizations represented	116	84

The basic statistics (i.e. mean, standard deviations, etc.) for the surveys were performed in Excel. T-tests and other charts were performed by using SPSS software and Excel. The statistics looked at the results of each survey separately. It then compared the difference between the 2011 and 2012 results. Finally, it looked at the results of both surveys together. The analysis identified the following (Kashiwagi, 2013):

- The results of both the 2011 and 2012 survey identified that the practitioners felt that the PIPS/PIRMS factors were unique and that the PIPS/PIRMS relationship model performed better than the traditional buyer/supplier relationship models.
- There was no statistical difference between the results of the 2011 and 2012 surveys.

In appendix 3 the basic results per factor and per year are shown. The validation of the 8 PIPS/PIRMS factors bring to light a different paradigm for buyer/supplier systems, then what has been documented in academic literature and practiced by industry practitioners. The practitioners agreeing that the factors improve customer satisfaction and value of projects, identifies the new paradigm of PIPS/PIRMS.
In the next section the case study research is described, in order to analyze the impact and whether the results also hold for other industries.

CASE STUDY RESEARCH

To identify the impact of the eight new factors a case study research was performed. The test projects were performed in partnership with the following buying organizations in the United States (Michael et al. 2008; Kashiwagi et al. 2007; Kashiwagi 2012; Little et al. 2012; Riley & Kashiwagi 2012; PBSRG 2012; Kashiwagi et al. 2010):

- Schering Plough (Private Business)
- State of Oklahoma (Public Organization)
- Arizona State University (Public Organization)
- State of Idaho (Public Organization)
- University of Idaho (Public Organization)

These buyers were the first to implement the factors in projects, using PIPS/PIRMS. These buyers implemented the factors on 31 projects (cases) in 30 different industries including dining services, document management, information communication technology, juvenile services, health Insurance, furniture and bookstores.

The PIPS/PIRMS factors were tracked on every case project. Each case study was approached with three main objectives in mind:

- To document whether the eight unique PIPS/PIRMS factors were integrated in the buyer/supplier system being used.
- Identify whether the customer satisfaction of the project increased
- Identify whether the value of the project increased

To achieve each of the major objectives, before a case study was performed a benchmark was created on the previous systems customer satisfaction, value, and the buyer/supplier factors used. This was obtained through the organizations documentation of the service.
The case study was then performed with inserting the eight PIPS/PIRMS factors into the previous buyer/supplier system. The only factors that were changed from the previous buyer/supplier system where those that conflicted with the eight PIPS/PIRMS factors. The factors that directly conflicted with the eight PIPS/PIRMS factors is as follows: Communication, Collaboration and Partnering, Shared Accountability, Trust, Contract Terms, Living Scope, Scope of Services, Risk Sharing, and Mitigation of Technical Risks, these 9 factors were never used on any of the case study projects. All of the other factors identified in common buyer/supplier systems were used in conjunction with the PIPS/PIRMS factors.
Customer satisfaction on each case study was performed by either having the buyers rate the traditional buyer/supplier system they used and then having them rate PIPS/PIRMS or through measurement of the client customer satisfaction of the previous service and then the service after PIPS/PIRMS factors were used. The ratings were performed on a scale of 1-10, 1 being the most dissatisfied and 10 being the most satisfied with the system and the results.
Increased value in each case study was identified by taking the cost of the project using the traditional buyer/supplier system and then taking the decreased cost of the project when the unique PIPS/PIRMS factors were integrated into the buyer/supplier system. Increased value was also measured through documenting additional services that a supplier offered at no cost to the buyer. The services were then converted to a financial value.
The following tables (2 and 3) show the overall impact of the PIPS/PIRMS factors, by buying organization, by comparing three out of the four impact criteria to the Traditional buyer/supplier system.

Table 2: Overall PIPS/PIRMS Results by Buyer (Part 1)

	Schering Plough		State of Oklahoma		Arizona State University	
Criteria	*Traditional*	*PIRMS Factors*	*Traditional*	*PIRMS Factors*	*Traditional*	*PIRMS Factors*
# of outsourced Services	12		9		8	
Cost of services	$6,965,806	$3,527,903	$100,821,726	$71,834,040	$130,692,810	$85,200,000
Added Value	-	-	-	-	-	$69,762,248.60
Average Customer Satisfaction (CS)	5.47	7.78	3.00	9.44	3.56	9.10

Table 3: Overall PIPS/PIRMS Results by Buyer (Part 2)

	Idaho State		University of Idaho	
Criteria	*Traditional*	*PIRMS Factors*	*Traditional*	*PIRMS Factors*
# of outsourced Services	1		1	
Cost of services	$36,000,000	$28,440,000	$0	$0
Added Value	-	-	-	$3,000,000.00
Average Customer Satisfaction (CS)	4.12	8.75	1.00	5.00

The impact that the PIPS/PIRMS factors had on the 31 cases when compared to the traditional buyer/supplier systems is:

- Cost of services decreased on average by 31%.
- Suppliers were able to offer the buyer 38.5% more value, totaling up to $72.76M.
- Average customer satisfaction of services provided increased by 4.59 points on a 1-10 scale (134% greater than the traditional customer satisfaction rating).

The case studies performed also discovered that:

- The identified unique PIPS/PIRMS factors from the literature search can be implemented in other industries buyer/supplier systems.

- The identified unique PIPS/PIRMS factors do increase the customer satisfaction and the value of projects.

CONCLUSION

The research started with the Research Question: "What unique factors distinguish PIPS/PIRMS from other buyer/supplier relationship models and do they deliver more customer satisfaction and performance?"

The results of the research show the following eight factors:

- No-influence, no-control, no management philosophy
- Seamless contract
- Supplier contract creation
- Require a plan
- Problem Contracting
- Communication Minimization
- Expert Supplier Model
- Dominant Information

These factors can be used to select suppliers that are accountable for their performance and contribute to the performance of the buyer and customer satisfaction.
From the surveys we learned that practitioners recognize the difference of the factors.
The case studies have shown that customer satisfaction goes up in project where the factors of PIPS/PIRMS were used. These cases also showed that the performance has gone up.
The research has identified that PIPS/PIRMS is different than common buyer/supplier systems. It also identified that the unique factors that PIPS/PIRMS do improve customer satisfaction and performance on services.

DISCUSSION

The research is the first in the field, trying to compare PIPS/PIRMS with existing buyer-supplier relationship models. Obviously, some choices with respect to methodology had to be made, otherwise we could not proceed in this non researched field.
We would like to make some comments on our methodology:

- We have put limitations on the number of databases searched, number of search terms, sources for PIPS/PIRMS as we wanted to make progress. One of the lines for further research is to explore the effects of the limitations.
- The survey were held during two years of Best Value Conferences. This might have led to 'convert the converted' effects in the results of the surveys. Further research has to further objectivate the results
- In the cases we compared the old and new situations within organisations. We did not check for other innovative selection methods, and tested whether they had improvement effects on customer satisfaction or performance. We will add this to the list of further research.

The contribution to the academic field is that we found a theory that helps to improve buyer – supplier relationships from a customer satisfaction and performance perspective. The relationship is now built around the supplier's capabilities instead of buyer's requirements and low prices.

Our academic contribution is that the buyer dominated way of selecting suppliers (in the construction industry) based on e.g. transaction cost economics (Williamson, 1983), can be enriched with a more relationship based theory, adding process thinking (like Lean and Supply chain management theories) into the field. This paper contributes to the new avenue for buyer – supplier relationships, based on eight new factors and contributing to customer satisfaction and performance. The theories on PIPS/PIRMS have yet to be discovered, going further than where the classic Transaction Cost Economics has brought us.

Obviously this work in progress paper shows that we have discovered a first idea of what can happen if we use PIPS/PIRMS. Further research has to create more and broader evidence of the theoretical framework, also in other industries.

Finally, some other suggestions for further research could be made:

- Involve more countries to compare different cultures in buyer – supplier relationship
- Extend the research into the project realization phase

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APPENDIX 1: MAJOR THEORIES RESEARCHED

1. Lean Construction
2. Transaction Cost Economics
3. Principle Agent Theory
4. Partnering
5. Supply chain management
6. Value stream analysis
7. Reliable Commitment Model
8. Conflict Management
9. Dispute Avoidance and Resolution Techniques
10. Balanced Score Card
11. Joint Risk Management
12. Total Quality Management
13. New Institutional Economics
14. Capability Maturity Model
15. Just In Time (JIT)
16. Nominal Group technique
17. Risk Management Practices
18. Construction Management at Risk
19. Public Private Partnership
20. Project Management Body of Knowledge (PMBOK)
21. Relational Contracting
22. Information Measurement Theory
23. Kashiwagi Solution Model
24. Construction Industry Structure (CIS)
25. Alignment Leadership Model (ALM)

APPENDIX 2: THE 36 TRADITIONAL FACTORS

1. Planning - Emphasizing thorough planning after contract award.
2. Communication - Promotes buyer and supplier to share more information and increase communication (i.e. Meetings, Reports, Access to internal technical information, etc.) Collaboration and Partnering - Increases volume of activities, information flow, and idea sharing between buyer and supplier before and after the contract is signed.
3. Collaboration and partnering - The system increases the amount of activities, information flow, and idea sharing between the buyer and the supplier before the contract is signed and throughout the entire project.
4. Shared Accountability - Allows both buyer and supplier to make decisions on project. The buyer agrees to take partial responsibility for project outcome.
5. Trust - Requires buyer and supplier to assume the other party will hold to agreement and is capable to perform their requirements.
6. Multi-Disciplinary Team - Buyer creates a team of experts from varied disciplines to interact with the supplier. This team begins communication with supplier as soon as selected.
7. Early Supplier Involvement - Brings in supplier upon beginning creation of the project. This allows supplier to be involved in creation of scoping and purpose of the project.
8. Senior/Top Management Support - Focuses on gaining support of either or both the suppliers and buyers upper level management to support the project and has them involved throughout the project to help with coordination and participation.
9. Contract Terms - Identifies project success with shaping of the contract. It also presents strategies for creating contracts and identification of contract terms that improve the project.
10. Long-term Contracts/Relationships - Increases efficiency of project through advantages in lengthening time of contractual obligations of supplier or through continually using the same suppliers.
11. Defining Roles - Focuses on identifying authoritative boundaries of both buyer and supplier personnel. It also puts emphasis on ensuring everyone knows their roles and responsibilities.
12. Living Scope - Allows scope of work to be molded as project is being implemented. Also entails creating a contract that can easily be modified.
13. Scope of service - Buyer and supplier focus on detailing the scope for a project before the contract is signed to improve performance.
14. Incentives and Penalties - Buyer and supplier have terms in contract that gives either party a monetary award or penalty for performing certain actions.
15. Use Information to Make Decisions - Buyer or supplier collect information on project throughout duration and use information to make decisions for the project.
16. Measurement tools - Buyer or supplier has a tool or process that measures their performance of the project.
17. Insurance and bonds - Requires supplier have insurance or bonds to ensure project is completed to buyer's satisfaction.
18. Document Structure - Buyer creates system which requires supplier to complete documents and forms ensuring project meets expectations.

19. Training Program - Some type of training is provided to both buyer and supplier employees working on project to increase performance and efficiency.
20. Stakeholder Management - Identifies involvement of all buyer stakeholders helps increase project performance and efficiency.
21. Delegate Responsibility - Tries to push decision making down the management chain on both supplier and buyer's side to increase efficiency of project.
22. Knowledge Management System - Buyer or supplier keeps track of lessons learned throughout project and alerts workers of information to increase project performance.
23. Inspection - Has a party inspecting supplier's technical work.
24. Buyer Decision Making - Buyer is the party in control of project and makes most decisions.
25. Buyer Performance Evaluation - Buyer's representatives identify if supplier is performing or not.
26. Third Party Certification - Buyer requires supplier obtain some type of certification or pass any third party inspection.
27. Risk Sharing - Buyer and supplier take accountability to mitigate the risks that occur and take part of liability if risk does occur.
28. Project Constraints - Identifies project constraints at beginning of project to help project management.
29. Mitigation of Technical Risk - Focuses on improving project performance through managing risks that involve suppliers' expertise.
30. Computer Algorithm - Uses computer algorithm (AHP, Fuzzy Logic) to make decisions
31. Simulation Technology - Uses a simulation technology to increase project performance.
32. Internal Technology Connection - Looks to integrate internal communication technology systems of buyer and supplier to increase efficiency and information transfer.
33. Master Supplier - Allows buyer to hire one supplier for many types of services.
34. Experienced Project Manager / Facilitator / Supply Chain Integrator - Has buyer hire or maintain in-house experts that will be the representative(s) for buyer in managing the project.
35. Quality Surveyor - Hires a quality surveyor or quality assurance inspector to ensure that supplier is meeting standards and requirements of contract.
36. Information Communication Technology - Uses any type of information communication technology to aid in dialogue on the project.

Appendix 3: some results from the surveys

Table 3.1: PIPS/PIRMS Factors Uniqueness		
PIPS/PIRMS Factor	% of Practitioners that felt PIPS/PIRMS factor was unique (rated 6 or higher) (Avg. of 2011 and 2012 survey)	Average 1-10 rating of each factor
No-influence, no-control, no management philosophy	82%	8.61
Seamless contract	86%	8.82
Supplier contract creation	74%	8.07
Pre-planning	83%	8.70
Problem Contracting	56%	6.52
Communication Minimization	69%	7.6
Expert Supplier Model	81%	8.46
Dominant Information	84%	8.82

Table 3.2: PIPS/PIRMS Factors Lead to Increased Value		
PIPS/PIRMS Factor	% of Practitioners that felt PIPS/PIRMS factor creates success or value on projects (rated 6 or higher) (Avg. of 2011 and 2012 Survey)	Average 1-10 rating of each factor
No-influence, no-control, no management philosophy	67%	7.68
Seamless contract	70%	7.81
Supplier contract creation	60%	7.32
Pre-planning	72%	8.04
Problem Contracting	48%	6.47
Communication Minimization	61%	7.30
Expert Supplier Model	68%	7.83
Dominant Information	73%	8.06

Table 3.3: Difference in Satisfaction of PIPS/PIRMS Factors and Traditional Systems		
Survey Part II	Average rating of Practitioners for the PIPS/PIRMS factors (Avg. of 2011 and 2012 survey results)	Average rating of Practitioners for Traditional Systems (Avg. of 2011 and 2012 survey results)
Satisfied with the performance of the system	7.29	3.90