Improving Organisational Process Input Factors And Company Performance

By: **Sam K. Formby, B. Dawn Medlin, Charlie C. Chen,** Yongyi Shou, and Danuvasin Charoen

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Improving organisational process input factors and company performance

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Keywords: enterprise environmental factors; organisational process assets; OPAs; project control and contingency planning; PCCP; project organisational support; POS.

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1 Introduction

Project success is often susceptible to the influence of enterprise environment factors (EEFs) and organisational process assets (OPAs). EEFs can have both an internal and an external influence on a project's success. The presence of key EEFs, such as strategic support and operational support (Güngör and Gözlü, 2016), can effectively increase the chance of project success. For instance, advanced technology, new regulations, and market conditions are external EEFs that can affect a project's scope, budget, duration, and quality constraints. Internal EEFs, such as organisational structure, organisational culture, and resource availability, can also affect a project's triple constraints.

OPAs can further add influence to a project's success. For instance, streamlined procedures for budget and change request approvals can increase the chance of a product's success. The availability and easy accessibility to lessons learned or knowledge repository (e.g., stakeholder register and risk register) can improve the efficiency of project planning and execution. One study showed that a high degree of match between project process diversity and the level of process compliance can further enhance overall project performance (Ramasubbu et al., 2015). EEF and OPA factors can not only independently but also jointly affect project performance. However, very few studies have attempted to simultaneously examine the effect of both EEF and OPA factors on project success, thereby leading to company performance (CP).

Another crucial factor for project success and CP is project control because all projects entail considerable ambiguity and uncertainty (Kirsch, 1996). As a project makes progress, the degree of uncertainty accelerates, along with the changes in contextual factors, such as project goals, priorities, team composition, and stakeholder involvement. Failure to regulate the behaviours of project stakeholders via effective control activities (e.g., contingency planning, changing the mix of resources and motivation mechanisms) could result in project failures (Wiener et al., 2016).

Project success has been traditionally measured according to the quadruple constraints of time, costs, scope, and quality. Information transparency empowered by the advance of information technology has given customers strong bargaining power in the determination of project success. As a result, an increasing number of project successes are currently measured according to customer satisfaction and the health of the client relationships (Williams et al., 2015).

The objectives of this paper are to assess the potential effect of project organisational support (POS) as a crucial EEF and company project processes (CCP) as an OPA on the effectiveness of project control and contingency planning (PCCP), as well as project baseline and planning management (PBPM). PBPM is probably the first and foremost task in project planning management. Without being able to set a baseline, no project

managers can manage and track project progress in relation to project scope, budget, and duration. In contrast, proper use of a baseline can help manage project requirements uncertainty and resolve scope-creeping issues (Ramasubbu et al., 2015). Therefore, PBPM performance is an important mediating factor to be examined with regard to its effect on the relationships among POS, PCCP, and CP. Another crucial factor for project success, and CP, is the customers' satisfaction with projects in addition to meeting triple constraints.

The following sections are organised as follows. A thorough review of the literature on the relationships among POS, CPP, PCCP, PBM, CP, and PCS is carried out. A research model will be proposed based on the literature review. Research methodology and data analysis will be conducted in order to examine the proposed relationships. The findings are reported based on the statistical analysis results. The paper concludes with a discussion of limitations, future research directions, theoretical implications, and practical implications.

2 Conceptual formation

2.1 The effect of POS on PCCP

New technology and dynamic business environments are constantly bringing about risks and uncertainty in terms of project success. In order to minimise the potential impact of known and unknown risks, an effective project manager often has a 'Plan B' or a contingency plan. When the original project plan cannot be materialised due to a significant future event or situation, the 'Plan B' can be quickly implemented as an alternative action. However, the success of a contingency plan relies on active organisational support because it requires immediate mobilisation of resources (e.g., budget, talented employees). One major challenge faced by organisations is the efficient use of facility capabilities because most of them lack ways or tools to monitor daily operations and to respond to unanticipated situations.

The increased uncertainty of customer demand has challenged many project managers in managing the variability of customer demand. The availability of organisational support tools (e.g., reshaping customer demand) can help control demand variability, thereby achieving better control of project success factors (e.g., cost reduction, project duration, product quality, and customer satisfaction) (Eynan and Fouque, 2005). The inability to manage the changes in a project's requirements often leads to a delay in the introduction of a new product and/or poor product quality (Slamanig and Winkler, 2012). Moreover, the resource mobilisation process may create conflicts among team members and across functional departments. Without proper organisational support, project contingency planning cannot achieve its success. An effectively project manager can also proactively manage change requests throughout the project in order to realise the success of any contingency plans. It is important for an organisation to institutionalise the change request process. Doing so also requires active organisational support of projects in place. Thus, we propose:

H1 POS has a positive influence on PCCP.

2.2 The effect of project management processes on PCCP

Project management (PM) processes are important OPAs. Business process reengineering has often been cited as an important process asset for delivering large-scale software projects (Olson et al., 2005). One study showed that seven out of ten key reasons for project success are closely related to PM processes. Those reasons include user involvement, clear business objectives, minimised scope, standardised software infrastructure, requirements, technology, formal methodology, and reliable estimates (Slamanig and Winkler, 2012). Continuous improvement of PM processes is critical to project success (Wysocki, 2004). Many PM processes, such as 'definition of activities', 'schedule development', 'organisational planning', 'staff acquisition', 'developing a project plan', and 'communications planning', are essential for a project's success (Zwikael and Globerson, 2006). More importantly, the establishment of rigorous PM processes can effectively reduce project risks (Shimizu et al., 2013).

An initiative for PM process improvement is targeted at some of these critical PM processes. By ensuring that each initiative is continuously improved and moved up to a higher maturity level, there are increased opportunities for project success (Bolles and Hubbard, 2007).

For instance, analysing stakeholder requirements is an important PM process because it helps a project manager understand who and what resources each stakeholder possesses (Heravi et al., 2015). An effective contingency plan requires that a project manager have the ability to control the interaction and resource flows in the network of stakeholders. Moreover, the ineffectiveness of communicating with various stakeholders any changes caused by internal and external factors can result in project failures (Smith, 2011). Ensuring that stakeholder requirements are closely analysed in the planning phase can have a positive effect on PCCP, thereby increasing the chance of a project's success. In addition, the process of developing a reliable risk analysis and contingency estimation can also help develop a more realistic project budget that can help buffer any actual project performance off project baseline (Hollmann, 2014).

Moreover, designing earned value management (EVM) systems is a popular PM process used to compare planned with actual performance and to track project progress. Contingency planning activities are to take corrective actions if current project performance deviates from the planned performance in schedule, budget, and scope. However, reaching a consensus among stakeholders concerning the tolerance limits of EVM values (e.g., 10% or 25% behind schedule or over budget) could be challenging because they vary greatly with project types (e.g., historical and novelty projects) (Colin and Vanhoucke, 2014). A systematic planning process needs to be in place in order to support a project manager in making conscious decisions about taking corrective actions. Consequently, project managers can better control project progress and redirect a project in the right course when it deviates from the project's baseline. Therefore, we propose:

H2 PM processes have a positive influence on PCCP.

2.3 The effect of POS on PBPM

A PM maturity model uses a staged approach to reflect the degree of the effectiveness of an organisation in implementing projects (Görög, 2016). The model also reflects to some degree the organisational support that a project can receive from its organisation. In order

to move up the stages of increasing maturity, an organisation needs to provide varying degrees of support in order to increase project success. At level 1, managers may be aware of projects in their area of responsibility, yet do not show support or encourage use of standardised PM processes. At level 2, managers begin to rely on PM processes instead of ad hoc processes. However, the project baseline is not established based on the accurate estimation of the project performance indicators. This poor baseline is because PM processes are not championed or institutionalised. At level 3, an organisation recognises the importance of institutionalising PM processes and begins to establish strong baselines for PM. For instance, the presence of the project management office (PMO) often indicates strong organisational PM competence (Khalema et al., 2015). At level 4, management mandates compliance with PM processes and control of pre-established baselines. At level 5, compliance becomes a common practice and is lived by all project managers in order to measure project performance against project baselines. As an organisation progresses the maturity level, a project within the organisation receives increased support and performs better than it did at previous maturity levels in terms of meeting PBPM. Therefore, we propose:

H3 POS has a positive influence on PBPM.

2.4 The effect of PCCP on PBPM

As a project's life cycle shortens, the degree of requirement volatility, technological novelty, and customer involvement increases substantially (Ramasubbu et al., 2015). In order to cope with this challenge, an increasing number of organisations are projectising their business in order to better integrate, plan, and control short-lived and unique endeavours (Williams et al., 2015). The success of projectised organisations depends on the establishment of PBPM. Project monitoring and control are an important driver management skill according to PMI methodology (Besteiro et al., 2015). PCCP are particularly important for projectised organisations since most short-lived projects tend to have tight triple constraints. Without too much room for scope creeping and a missing baseline, PCCP against a well-established project baseline are critical to the success of project planning management. For instance, a study has shown that software process diversity refers to the simultaneous use of multiple software development process frameworks to deliver a single project. In such a projectised organisation, this study found that having contingencies for requirement volatility, technological changes, and customer involvement is critical to a project's success. Conducting PCCP is a proactive risk management approach that is more effective than conducting them retroactively. For instance, conducting a risk assessment and developing contingency actions have a greater impact than establishing a disaster recovery plan on meeting the planned baseline, an important indicator of a project's success. Therefore, we propose:

H4 PCCP have a positive influence on PBPM.

2.5 The effect of a project's baseline and planning management on CP

A baseline is an important output of planning activities. A baseline needs to include a set of stored values about planned start and finish dates, planned efforts, planned cost, and planned revenue. Since the execution of a project is to hit a moving target, a SMART (specific, measurable, attainable, realistic, and timely) baseline can help track and assess

a project's performance in meeting triple constraints and improving future estimation accuracy. Being able to see the discrepancies existing between the planned and actual tasks at any given time, the project manager and team can make conscious decisions in taking corrective actions to turn a potential failed project into a successful one. As the environment becomes more volatile, managing projects against the SMART goals can support organisational change (Gertner et al., 2010). PBPM enable the effective monitoring and control of a project's health. Consequently, the project success rate can be increased to increase the company's performance. Thus, we propose:

H5 The project's baseline and planning management have a positive influence on CP.

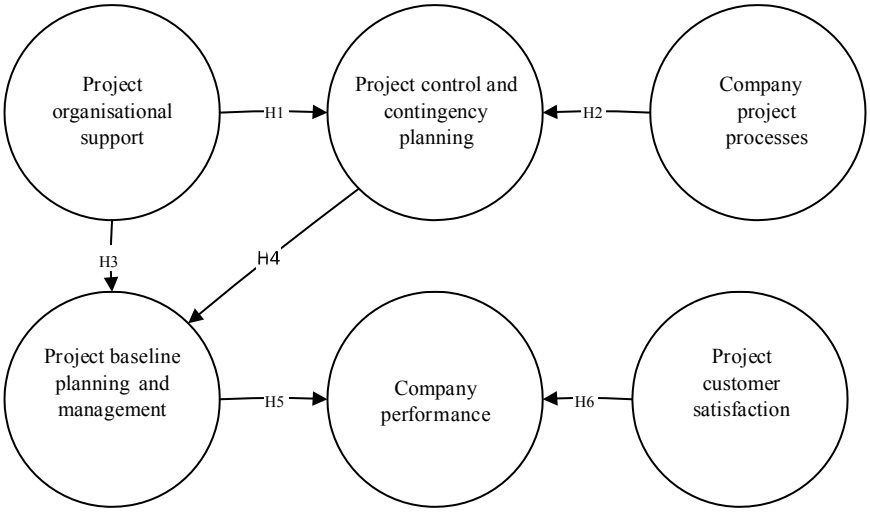
2.6 The effect of project customer satisfaction on CP

Customer satisfaction is an important surrogate for the financial and non-financial performance of a company (Bernhardt et al., 2000). In terms of non-financial performance, customer satisfaction has a positive effect on customer loyalty and the willingness to pay, which can indirectly improve the bottom line for a business (Haumann et al., 2014). In addition, customer satisfaction is also highly correlated with client relationship quality during project execution (Williams et al., 2015). Regarding financial performance, one study showed that customer satisfaction has a strong effect on a company's operational efficiency, measured by the indicator for asset turnover (ATO) (Haumann et al., 2014; Suchánek and Králová, 2015). Since there exists ample evidence concerning the positive effect of customer satisfaction on financial and non-financial performance indicators, we propose:

H6 Project customer satisfaction has a positive influence on CP.

The above discussion led to the development of the research model (Figure 1), showing the relationships among six constructs in relation to project baseline planning and management, as well as CP.

Figure 1 Research model



3 Research methodology

3.1 Demographics

A survey of these members can help validate our proposed research model against popular PM practices in the largest market. An online questionnaire comprising three parts was sent to these randomly-identified respondents. The first part clarified the research purpose and the context of this study. The second part asked the subjects to respond to all of the measurement items. The last part asked the subjects to provide demographic questions. The confidentiality and anonymity of all of the respondents were maintained without disclosing any personal information.

China has more than 50,000 PMP members and the second largest number of project management professionals (PMPs) in the world, followed by the USA. We randomly recruited 200 candidates from the registered PMPs of Project Management Institute (PMI) in China. Although 125 PMPs responded to our request to complete the survey, 32 responses contained missing data and only the remaining datasets were retained for analysis. A final sample of 93 responses was used for model testing,, with a 46.5% response rate. This response rate exceeded the average 10%–15% response rate for an industry survey. In addition, the demographical profile of these participants represented a range of project types, scope, duration, and size. Department managers (31.2%) represented the largest majority of our respondents, followed by project managers (20.4%), line managers (17.2%), general managers (10.8%), and deputy general managers (7.5%). About 38.7% of the PMPs from the study were currently working for state-owned companies, in comparison to 61.3% of PMPs employed by private companies. As for what types of IT projects they were currently responsible for, a large proportion (60.2%) of respondents were working on business projects, whereas 21.5% were currently working on IT projects and 18.3% on both IT and non-IT projects.

As for project scope and scale, 47.4% of the projects lasted 1 to 10 months, followed by 26.9% of the projects lasting 11–25 months, and 5.4% of the projects lasting longer than 25 months. The remaining 20.3% of the respondents chose not to report the project duration. As for the number of concurrent projects managed by the surveyed project managers, 22.6% of the respondents were managing 1–2 projects, followed by 3–4 projects (17.2%), 5–6 projects (15.1%), and more than 6 projects (6.5%). The remaining 19.4% of the respondents did not report the information. When asked about the years of experiences working as a project manager, 21.5% of the surveyed project managers had 7–10 years of PM experience, followed by 0–1 years (17.2%), 4–6 years (15.1%), and 2–3 years (14%). In addition, the participants also reported their experience in managing different types of projects by industry. Manufacturing projects had the largest share (20.4%) of all projects reported, followed by information and communication (16.1%), construction (7.5%) and finance/insurance (7.5%), energy (6.5%), real estate (3.2%), wholesale and retail (3.2%), as well as transportation and storage (3.2%), and others. As the project profile demonstrates, our samples were fairly distributed across project duration, PM experience, and project types.

3.2 Reliability and validity test of the survey instrument

The questionnaire items were adapted from relevant studies in order to ensure the content validity of the constructs. Table 1 are questions used to measure each construct in our research model. The organisational support construct was operationalised as a formative construct with four reflective first-order dimensions (Table 2). Six items were adapted from prior studies in order to assess the overall project processes (Zwikael and Globerson, 2006). Five items were modified from the survey instruments used in the studies of Zwikael and Globerson (2006) to measure project baseline planning and management. Five items from the same reference were used to measure overall CP. Finally, two items were modified from the previous study (Zwikael and Sadeh, 2007) to measure project customer satisfaction. All of the constructs were measured on a seven-point Likert scale (1 = totally disagree; 7 = totally agree).

Table 1 Project construct measurement items

	Project organisational support
OS1	Project-based organisation
OS6	Extent of communication between the project manager and the organisation during the planning phase
OS10	Extent of organisational project resource planning
OS11	Extent of organisational project risk management
	Company project processes
OS4	Extent of refreshing project procedures
OS7	Extent of existence of project success measurement
OS8	Extent of supportive project organisational structure
OS9	Extent of existence of interactive inter-departmental project planning groups
OS12	Extent of organisational project quality management
OS13	Extent of ongoing project management training programs
	Project baseline planning and management
PPL9	Extent of use: resource costs
PPL10	Extent of use: time-phased budgets
PPL15	Extent of use: risk management plan
PPL16	Extent of use: procurement management plan
PPL17	Extent of use: documented scope, cost, and schedule baselines
	Project control and contingency planning
PPL21	Extent of use: disciplined change control process to manage and update scope, schedule, and cost baselines
PPL22	Extent of use: changes are approved through change control before being implemented
PPL23	Extent of use: roles, responsibilities, accountabilities, and authorities documented
PPL24	Extent of use: contingency plan
PPL25	Extent of use: specific risks covered in the contingency plan are identified

Table 1 Project construct measurement items (continued)

	Overall company performance
PPRF1	Overall, our company is one of the most successful companies in the industry.
PPRF2	From an overall profitability standpoint, our projects have been successful.
PPRF3	Compared to major competitors, our projects are far more successful.
PPRF4	Compared to our major competitors, our on-time project performance time is better.
PPRF5	The overall quality of our projects is higher than that of our competitors.
	Project customer satisfaction
PSPR5	The typical level of customer satisfaction at the end of your projects
PSPR6	The typical level of technical performance at the end of your projects

4 Results

4.1 Variable constructs and validities

The reliability results are given in Table 2. The data indicate that the measures were good in terms of internal consistency reliability. The composite reliabilities of the constructs exceed the threshold value of 0.70 (Guilford, 1954). In addition, the average variance explained exceeded the recommended value of 0.50 for each construct (Fornell and Larcker, 1981).

Table 2 Assessment of the measurement model

Variable constructs	*Composite reliability*	*Average variance explained (AVE)*
Project organisational support	0.8766	0.6402
Company project processes	0.8887	0.5711
Project baseline planning and management	0.8605	0.5529
Project control and contingency planning	0.8942	0.6283
Company performance	0.9165	0.6876
Project customer satisfaction	0.9082	0.8321

Table 3 provides the test results for vdiscriminant validity between the constructs. The diagonals are the square root of the average variance extracted (AVE) and the off-diagonal elements are the corresponding construct inter-correlations. Since the diagonals are all greater than the construct inter-correlations, there was discriminant validity.

Convergent validity is demonstrated in Table 4, which indicates the factor and cross loadings of all indicators. Table 4 indicates that all of the items loaded on their respective construct with a value greater than 0.70 and the cross loadings were all, except one, less than their factor loading by more than 0.2. PPL15 in the Project Baseline Planning and Management construct had a cross loading difference of 0.14, with POS.

Table 3 Discriminant validity (inter-correlations of constructs and square root of AVEs)

Variable constructs	*Project organisational support*	*Company project processes*	*Project baseline planning and management*	*Project control and contingency planning*	*Company performance*	*Project customer satisfaction*
Project organisational support	0.8001					
Company project processes	0.5618	0.7557				
Project baseline planning and management	0.6217	0.4643	0.7436			
Project control and contingency planning	0.6387	0.5458	0.6563	0.7927		
Company performance	0.3089	0.3596	0.3529	0.2498	0.8292	
Project customer satisfaction	–0.1042	–0.0016	–0.0864	–0.0514	0.3959	0.9122

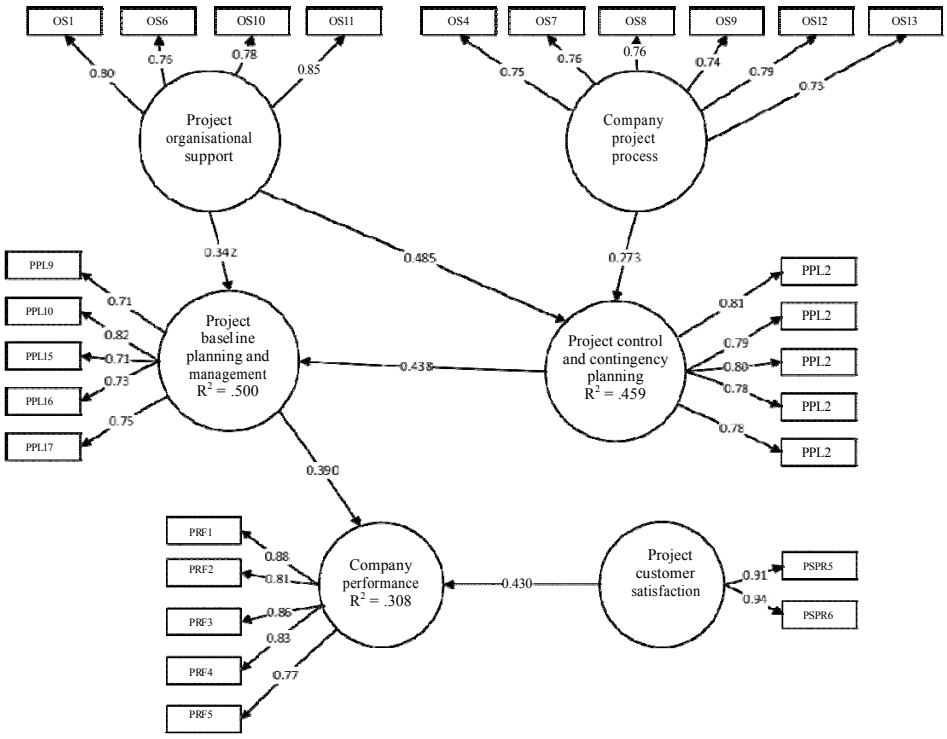
Table 4 Factor loadings (ital) and cross loadings

	Project organisational support	*Company project processes*	*Project baseline planning and management*	*Project control and contingency planning*	*Company performance*	*Project customer satisfaction*
OS1	*0.8013*	0.4562	0.4060	0.4736	0.2713	–0.0114
OS6	*0.7600*	0.4833	0.4730	0.4502	0.3327	–0.0615
OS10	*0.7817*	0.4167	0.5538	0.4672	0.1596	–0.2052
OS11	*0.8546*	0.4507	0.5410	0.6301	0.2401	–0.0495
OS4	0.4098	*0.7509*	0.2700	0.3985	0.2478	–0.0317
OS7	0.3466	*0.7546*	0.2430	0.3237	0.3214	0.0922
OS8	0.5320	*0.7603*	0.4296	0.4059	0.2034	–0.0802
OS9	0.4870	*0.7431*	0.3856	0.4522	0.3606	–0.0250
OS12	0.4208	*0.7928*	0.2850	0.4262	0.2915	0.0703
OS13	0.3342	*0.7310*	0.4575	0.4410	0.2084	–0.0142
PPL9	0.3540	0.2269	*0.7127*	0.2991	0.2597	–0.1247
PPL10	0.4904	0.3172	*0.8150*	0.4997	0.2249	–0.1606
PPL15	0.5655	0.3039	*0.7074*	0.5539	0.2765	0.0325
PPL16	0.4434	0.3972	*0.7266*	0.5468	0.1327	–0.2151

Table 4 Factor loadings (ital) and cross loadings (continued)

	Project organisational support	*Company project processes*	*Project baseline planning and management*	*Project control and contingency planning*	*Company performance*	*Project customer satisfaction*
PPL17	0.4160	0.4520	*0.7510*	0.4846	0.3988	0.0977
PPL21	0.5962	0.3477	0.5331	*0.8095*	0.2490	0.0137
PPL22	0.4481	0.4603	0.4485	*0.7868*	0.1490	–0.0825
PPL23	0.5653	0.4285	0.5300	*0.8020*	0.2742	0.0234
PPL24	0.4831	0.5200	0.5664	*0.7843*	0.1463	–0.0702
PPL25	0.4229	0.4068	0.5130	*0.7802*	0.1621	–0.1003
PPRF1ex	0.2596	0.3497	0.3043	0.1810	*0.8773*	0.3914
PPRF2ex	0.2763	0.2752	0.2453	0.1658	*0.8124*	0.3225
PPRF3ex	0.2326	0.2980	0.2722	0.1930	*0.8553*	0.3428
PPRF4ex	0.3551	0.2546	0.3795	0.3127	*0.8301*	0.2528
PPRF5ex	0.1536	0.3081	0.2560	0.1826	*0.7666*	0.3266
PSPR55	–0.1910	–0.0683	–0.1835	–0.1354	0.2839	*0.8777*
PSPR65	–0.0308	0.0440	–0.0085	0.0127	0.4176	*0.9454*

Figure 2 Structural model results



Note: All paths are significant at $p < 0.05$.

4.2 Hypothesis testing results

The research model was tested using partial least squares (PLS) (Fornell and Bookstein, 1982) because it enables a small sample size and latent constructs to be modelled as formative constructs. An additional benefit of PLS is that it is non-parametric and, thus, does not require that the assumption of a normal data distribution be met (Chin et al., 2003). The final model found significant relationships between six constructs with both moderating and mediating influences. Figure 2 shows the structural model results. All paths are positive (i.e., in the expected direction) and statistically significant at $p < 0.05$.

Hypothesis 1 (H1) was supported with the path coefficient (α) of 0.485 for the path from POS to PCCP. The path between CCP and PCCP was significant with the path coefficient of 0.273. This supports H2. In comparison, POS (environmental factor) was seen to have a stronger influence than CCP (organisational process asset) on PCCP. This indicates that environmental factors should take precedence over OPAs in order to have effective control and contingency planning when managing a project.

POS also exhibited a significantly-positive influence on project baseline planning and management with the path coefficient of 0.342. H3 was supported. PCCP had a positive effect on project baseline planning and management with the path coefficient of 0.438. H4 was supported. In addition, PCCP ($\alpha = 0.438$) had a stronger influence than POS ($\alpha = 0.342$) on project baseline planning and management. This finding indicates that change control processes and contingency plans are more effective than organisational support of resources at the planning and managing project baseline. Hypothesis 5 (H5) was supported with the path coefficient (α) of 0.390 for the path from project baseline planning and management to CP.

Project customer satisfaction ($\alpha = 0.430$) had an even higher effect on CP than project baseline planning and management. H6 was supported.

5 Discussion

5.1 Theoretical implications

For decades, research in quality management, six sigma, and lean production have found many antecedent success factors important are firms achieving the benefits of those initiatives. Chief among those is the importance of senior management support and involvement. The implementation activities of many of the improvement initiatives in these business improvement programs are managed as projects and require changes in the ways firms operate. In the introduction to this research, it was noted that new projects often bring changes to an organisation and can affect stakeholders of all kinds, and CP. Our research has both validated and extended the current understanding of several mechanisms and constructs influencing the success of project initiatives by focusing on the discipline and practice of PM within an organisation specifically using experienced experts well versed in PM tools in gathering the research data.

5.2 Managerial implications

In the context of PM, senior management support is actualised through the establishment of organisational systems that integrate PM goals and activities with other company goals and support the creation and use of company-wide project processes and procedures that help ensure that a disciplined approach is followed. This research has validated the importance of these constructs and their influence on company success, but has also helped extend the understanding by demonstrating how these constructs influence other skilled PM practices in mediating relationships. PBPM and PCCP are both foundational and critical skills in effective PM. However, our research shows that these are both mediating constructs dependent on the antecedent constructs related to senior management support for their success. CP is dependent on PBPM (PBPM), but the effectiveness of PBPM is dependent on POS and PCCP, and PCCP is dependent on company-wide project processes. A key managerial implication of these findings is that the most skilled project managers in organisations without these senior management support mechanisms in place are likely to experience limited success. Therefore, project managers in these situations should consider developing additional baseline activities and risk management plans to create the organisational support and company-wide collaboration necessary for project success.

5.3 Limitations

Since all of the subjects that participated in this study were PMPs in China, the findings warrant careful interpretations because the data were limited to one specific country. Moreover, the PMPs in the sample belonged to various industries. In the future researchers may want to aim at studying a specific industry (e.g., manufacturing, logistics, etc.).

6 Conclusions

Firms that develop company-wide organisational support systems and company-wide procedures and processes for managing projects within an operations organisation do better at overall implementing project planning and control systems. Additionally, these can, and generally do, lead to better planning and management of individual projects, which leads to stronger competitive CP, which also supports higher individual project customer satisfaction. An area of future research is suggested by studying in greater detail the relationships between the constructs associated with the ‘Project Office’ and the ‘Project Management Maturity Model’ and how these enhance CP and customer satisfaction with projects (PMI Standards Committee, 2013). The conceptual framework for this study will be extended in future research and additional critical success factors will then be incorporated into the research models.

References

Bernhardt, K.L., Donthu, N. and Kennett, P.A. (2000) 'A longitudinal analysis of satisfaction and profitability', *Journal of Business Research*, Vol. 47, pp.161–171.

Besteiro, É.N.C., de Souza Pinto, J. and Novaski, O. (2015) 'Success factors in project management', *Business Management Dynamics*, Vol. 4, No. 9, pp.19–34.

Bolles, D. and Hubbard, D.G. (2007) *The Power of Enterprise-Wide Project Management*, American Management Association, New York.

Chin, W.W., Marcolin, B.L. and Newsted, P.R. (2003) 'A partial least squares latent variable modeling approach for measuring interaction effects: results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study', *Information Systems Research*, Vol. 14, No. 2, p.189–217.

Colin, J. and Vanhoucke, M. (2014) 'Setting tolerance limits for statistical project control using earned value management', *Omega – The International Journal of Management Science*, Vol. 49, pp.107–122.

Eynan, A. and Fouque, T. (2005) 'Benefiting from the risk-pooling effect: internal (component commonality) vs. external (demand reshape) efforts', *International Journal of Services and Operations Management*, Vol. 1, No. 1, pp.90–99.

Fornell, C. and Bookstein, F.L. (1982) 'Two structural equation models: LISREL and PLS applied to consumer exit-voice theory', *Journal of Marketing Research (JMR)*, Vol. 19, No. 4, pp.440–452.

Fornell, C. and Larcker, D.F. (1981) 'Structural equation models with unobservable variables and measurement error: Algebra and Statistics', *Journal of Marketing Research (JMR)*, Vol. 18, No. 3, pp.382–388.

Gertner, E.J., Sabino, J.N., Mahady, E., Deitrick, L.M., Patton, J.R. and Grim, M.K. et al. (2010) 'Developing a culturally competent health network: a planning framework and guide', *Journal of Healthcare Management*, Vol. 55, No. 3, pp.190–204.

Görög, M. (2016) 'A broader approach to organizational project management maturity assessment', *International Journal of Project Management*, Vol. 34, pp.1658–1669.

Guilford, J.P. (1954) *Psychometric Methods*, McGraw-Hill, New York.

Güngör, Z.D. and Gözlü, S. (2016) 'An analysis of the links between project success factors and project performance', *Sigma Journal Engineering and National Science*, Vol. 34, No. 2, pp.223–239.

Haumann, T., Quaiser, B., Wieseke, J. and Rese, M. (2014) 'Footprints in the sands of time: a comparative analysis of the effectiveness of customer satisfaction and customer-company identification over time', *Journal of Marketing*, Vol. 78, No. 6, pp.78–102.

Heravi, A., Coffey, V. and Trigunarsyah, B. (2015) 'Evaluating the level of stakeholder involvement during the project planning processes of building projects', *International Journal of Project Management*, Vol. 33, pp.985–997.

Hollmann, J.K. (2014) 'Improve your contingency cost estimates for more realistic project budgets', *Chemical Engineering*, Vol. 121, No. 12, pp.36–43.

Khalema, L.S., van Waveren, C.C. and Chan, K.Y. (2015) 'The relationship between project management office maturity and organizational project management maturity: an empirical study of the South African government infrastructure departments', *South African Journal of Industrial Engineering*, Vol. 26, No. 3, pp.12–26.

Kirsch, L.J. (1996) 'The management of complex tasks in organizations: controlling the systems development process', *Organization Science*, Vol. 7, No. 1, pp.1–21.

Olson, D.L., Chae, B. and Sheu, C. (2005) 'Issues in multinational ERP implementations', *International Journal of Services and Operations Management*, Vol. 1, No. 1, pp.7–21.

PMI Standards Committee (2013) *A Guide to the Project Management Body of Knowledge*, Project Management Institute.

Ramasubbu, N., Bharadwaj, A. and Tayi, K.G. (2015) 'Software process diversity: conceptualization, measurement, and analysis of impact on project performance', *MIS Quarterly*, Vol. 39, No. 4, pp.787–807.

Shimizu, T., Park, Y. and Hong, P. (2013) 'Supply chain risk management and organizational decision making: a case study of a major Japanese automotive firm', *International Journal of Services and Operations Management*, Vol. 15, No. 3, pp.293–312.

Slamanig, M. and Winkler, H. (2012) 'Management of product change projects: a supply chain perspective', *International Journal of Services and Operations Management*, Vol. 11, No. 4, pp.481–500, Author abstract.

Smith, A.D. (2011) 'Chaos theory and recessional business environments: case studies of operational health of service and manufacturing organizations', *International Journal of Services and Operations Management*, Vol. 8, No. 2, pp.191–221.

Suchánek, P. and Králová, M. (2015) 'The influence of customer satisfaction on corporate performance', *Proceedings of the European Conference on Management, Leadership and Governance*, pp.454–461.

Wiener, M., Mähring, M., Remus, U. and Saunders, C. (2016) 'Control configuration and control enactment in information systems projects: review and expanded theoretical framework', *MIS Quarterly*, Vol. 40, No. 3, pp.741–D714.

Williams, P., Ashill, N.J., Naumann, E. and Jackson, E. (2015) 'Relationship quality and satisfaction: customer-perceived success factors for on-time projects', *International Journal of Project Management*, Vol. 33, pp.1836–1850.

Wysocki, R.K. (2004) *Project Management Process Improvement*, Artech House, Boston.

Zwikael, O. and Globerson, S. (2006) 'From Critical success factors to critical success processes', *International Journal of Production Research*, Vol. 44, No. 17, pp.3433–3449.

Zwikael, O. and Sadeh, A. (2007) 'Planning effort as an effective risk management tool', *Journal of Operations Management*, Vol. 25, No. 4, pp.755–767.