DO LEARNING PROCESSES, ABSORPTIVE CAPACITY AND INTEGRATION CAPABILITIES DRIVE 3PL PERFORMANCE?

Chris Hemstrom and Norma Harrison, Macquarie Graduate School of Management, Macquarie University, NSW 2109 AUSTRALIA
ChrisHemstrom@optusnet.com.au; Norma.Harrison@mgsm.edu.au

ABSTRACT

This research focuses on the third party logistics (3PL) sector, particularly factors thought to influence capability development and their potential effects on 3PL performance. Structural equation modeling is used to test direct and indirect relationships between 3PL learning processes, their absorptive capacity, integration capabilities and performance.

INTRODUCTION

Outsourcing non-core operations has become a common strategic move in many industries (Bustinza et al, 2010). Outsourced functions have led to the formation or transformation of some of the great corporations of the late twentieth century and the early twenty first century. For example, sales by firms involved with information technology business process outsourcing alone reached almost one trillion dollars by 2009 (Narayanan et al. 2011).

Logistics operations within manufacturing, retail and industrial companies are among the non-core operations that have been outsourced progressively more extensively during the last three decades (Large, 2007). Outsourced logistics operations generally

include transport and distribution activities (Zhou et al, 2009); often facilities such as distribution centers and warehouses are outsourced (Maloni et al, 2006); and, in some cases information related technologies, inventory management, and even key aspects of supply chain management are outsourced (Marasco, 2008). The scope of operations involved in logistics outsourcing can clearly be substantial, resulting in the companies supplying logistics outsourcing services, called third-party logistics service providers or 3PLs, growing to considerable scale with multi-billion dollar sales volumes (Lieb et al, 2010) in a global market estimated to be worth US$507 billion in 2009 (Langley et al, 2010).

Third-party Logistics Outsourcing is Driven by Performance Motives

Motives for outsourcing to 3PLs principally relate to cost or service improvements, though other issues, such as environmental improvements, are increasingly seen on the outsourcing agendas. Lieb et al examined the growth of the environmental agenda in 3PL companies and pointed out that "… pressure from customers… " (Lieb et al, 2010, p58) was a significant driver. However, Wolf et al (2010) investigated buying criteria for 3PLs and found that strategic orientation to environmental issues within outsourcing was often lacking for both clients and 3PLs. Focus on cost reductions and service delivery by 3PLs is less controversial. Cost and service delivery are identified as drivers of outsourcing by many researchers reviewing extant literature relating to the sector (Maloni et al, 2006; Marasco, 2008; Selviarides et al, 2007). These observations fit well with the supply chain market winners identified by Mason-Jones et al (2000); these researchers identified the key market winners related to the supply chain as being cost or service levels. One may therefore conclude that motives for outsourcing to 3PLs have a strong fit with performance drivers for competitive supply chains; and,

that companies are seeking to acquire the capabilities required to deliver those market winners by outsourcing their logistics activities to 3PLs.

Research Addressing Capabilities to Deliver 3PL Market Winners is Lacking

Research focusing on capabilities of relevance to deliver market winners is emerging slowly within the supply chain domain, and is perceived to be a particular weakness within the 3PL sector. Selviarides et al (2007) were particularly scathing in their review of the 3PL literature, reporting that almost 70 per cent of the 114 articles they reviewed for the period 1990 – 2005 lacked a theoretical framework. Marasco (2008) reviewed 152 articles published in 33 journals between 1989 and 2006, reporting that approximately 20 per cent of the articles had a theoretical foundation. Maloni et al (2006) reviewed survey based papers published between 1989 and 2004 with an emphasis on US based journals, reporting that a third of the articles tested formal hypotheses. Given the recent emergence of the sector, it is likely that many of the articles were part of at least two, if not all three, of the reviews, providing corroborating evidence for the claim of a lack of theoretical grounding of capabilities within the sector.

Relational capabilities are likely to be relevant in 3PL environments

The nature and characteristics of capabilities that lead to the development of strategic advantage continue to be of interest to researchers in the field of strategic management after more than fifty years of inquiry. Wernerfelt (1984) credited Penrose with initiating the focus on the importance of organizational resources during the 1950s. Wernerfelt was arguing for the symbiotic relationship between organizational

resources and product-market activities in a seminal paper published during a period that launched a generation of research on the resource based view of competitive advantage. Nelson and Winter's 1982 book *An Evolutionary Theory of Economic Change* was also published during this period and led the focus on operational capabilities by orienting them towards organizational routines of substance that deploy resources to achieve meaningful outcomes relevant to the objectives of organizations. This was similar to the insistence of Penrose (revised edition, 2009) that it was the services provided by the resources that were strategically important, not simply the resources themselves. So, early initiatives to understand the nature and characteristics of capabilities emphasized organizational objectives, organizational resources, the services or organizational routines that deploy the resources, and product-market activities.

More recent research has begun to delineate differences between types of capabilities. One key area of research is focused on capabilities that deliver consistent operational outcomes and those that deliver organizational change to enable firms to survive and prosper over time. At its heart, the argument for this delineation is that firms rely on innovation for long-term survival (Nelson, 1991) and the capabilities that drive innovation are those that are capable of *changing* the resource base (Helfat et al, 2007) rather than the capabilities that deploy the existing resource base.

A substantive area of capability research related to the existing resource base is focused on relational capabilities required to support alliances and extended organizational networks, such as supply chains. Exploration of issues related to complementary deployment of resources by alliance or network partners in order to

achieve objectives of all participating organizations is a key area of focus of this research (e.g., Dyer, 1996a, 1996b, 1997). The underlying theory, termed the "… relational view of competitive advantage …" (Dyer et al, 1998), posits that competitive advantage is embedded in inter-firm resources and routines rather than the capabilities of a single firm. Grant et al (2004) argue that alliances are particularly good coordinating mechanisms of highly diverse but complementary sets of knowledge. Their proposition is that these diverse knowledge sets are rarely effectively deployed within single organizations because of management complexity associated with the diversity (Grant et al, 2004, p69). They term this form of alliancing 'knowledge accessing' by firms, highlighting its value-adding qualities in long-term alliances (see Grant et al, 2004, Table 1). These streams of research and theory are particularly relevant to outsourcing within supply chain contexts since they provide theoretical bases for the development of competitive advantage in inter-organizational settings.

Objectives of this paper

This paper will examine whether inter-firm capability development is a source of market winners for 3PL firms. The paper will present a model that deploys a theoretical capability development framework based on the work of Zollo et al (2002) within a 3PL environment. The model is designed to identify whether inter-organizational integration capabilities of 3PLs are positively related to 3PL performance, and whether 3PL learning processes and the absorptive capacities of 3PL employees influence the integration capabilities and their effects on 3PL performance. The model will be tested using structural equation modeling relying on data from surveys of first-line 3PL employees, 3PL executives and the clients of 3PLs. This sample frame responds to the call by Ray et al (2004) to test theories based on the

resource-based view by using data at business unit levels rather than at aggregated organizational levels.   The model and research methodology directly address a key proposal of Selviarides et al (2007) to extend and refine existing theoretical frameworks through the use of 3PL environments.

CONCEPTUAL FRAMEWORK

Integration Capabilities May Deliver 3PL Market Winners

Integration of operations and information flows across supply chains has been known to be relevant to organizational performance since Forrester (1958) presented his work on industrial dynamics. He demonstrated how lack of adequate coordination among retailers and manufacturers could cause bullwhip effects throughout the supply chain. Research in recent decades has moved well beyond Forrester's simulations to highlight the need for integration with buyers, suppliers and as well as within organizations (Flynn et al., 2010; Lockstrom et al., 2010). Logistics integration is held to be critical in this framework (Chen, Daugherty and Landry, 2009; Chen and Paulraj, 2004).

One would expect the 3PLs to make material contributions to performance of logistics integration in supply chains that have deployed outsourcing options. Their roles as boundary spanning organizations imply they have influence on outsourcers both with respect to their internal and their external logistics integration. Capabilities that enable and facilitate integration logically become important strategically for 3PLs.

Hypothesis 1: 3PL integration capabilities positively influence 3PL performance

Organizational Learning May Be Responsible for 3PL Integration Capability Improvement

Organizational learning is thought to underpin the evolution of capabilities (Zollo et al, 2002). This is a theme of Nelson et al (1982) that is interesting because it sits on the fine line between improvements in operational capabilities and changes to those capabilities. In the case of the former, improvements and refinements ensure that the established capabilities deliver a competitive advantage by being sufficiently well tuned to meet their underlying objectives (Winter, 2000). In the case of the latter, changes to the capabilities are so extensive that they lead to organizational renewal (Crossan et al, 2011), if the changes are implemented effectively rather than as part of an ongoing series of explorations (Huber, 1991; March, 1991). In the model proposed by Zollo et al (2002) in Figure 1 below, the learning processes affect the evolution of operating routines both directly and through their action on dynamic capabilities, the capabilities that cause operating capabilities to change to the extent that they cause organizational renewal.

FIGURE 1.
Relationship between Learning Mechanisms, Dynamic Capabilities and Evolution of
Operating Routines proposed by Zollo and Winter (2002).
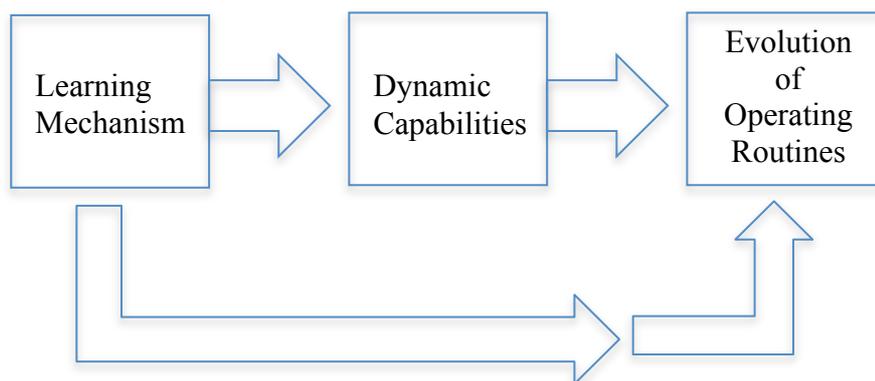
Learning process frameworks thought to influence the evolution of capabilities, competitive advantage, and organizational performance have been developed by various researchers (Crossan et al, 1999; Crossan et al, 2011; Easterby-Smith et al, 2008; Huber, 1991; Kale et al, 2007; Nonaka, 1994; Nonaka et al, 2009; Slater et al, 1995). There is general agreement among the authors of these models that articulation, codification and sharing of knowledge represent key steps in the learning process, though specific details vary across models.

Researchers have used these models in various environments in efforts to map the relationships between learning processes, organizational capabilities and performance. Kale et al (2007), building on the strategic management literature relating to resources and capabilities, demonstrated that the learning process explains alliance success. Cepeda et al (2007) highlighted that knowledge management has a significant effect on dynamic capabilities and their consequent effects on operational capabilities, confirming Zollo and Winter's propositions relating to the relationship between dynamic and operating capabilities, at least in the Spanish technology and communications industry, which was the source of their data. Hult, Ketchen, Cavusgil and Calantone (2006) demonstrated that knowledge is a strategic resource within a supply chain context. Hult and his colleagues (Hult, Ketchen and Slater, 2004; Hult, Ketchen, and Arrfelt, 2007) conducted a series of studies motivated by the framework of Huber (1991) to demonstrate its positive effects on supply chain performance. Fugate et al (2009) also showed that a learning process has a significant effect on logistics performance. Cheung, Myers and Mentzer's (2010) study demonstrated the relationship value of a joint learning process among buyers and suppliers. And Panayides (2007) demonstrated that learning processes affect 3PL performance, and

importantly in the present context, have a role in a relational context. However, studies of the direct and indirect effects of learning processes on integration capabilities of 3PLs and organizational performance are yet to emerge.

Hypothesis 2A: 3PL learning processes directly influence 3PL integration capabilities in a positive manner

Hypothesis 2B: 3PL learning processes indirectly influence 3PL integration capabilities in a positive manner

Hypothesis 3A: 3PL learning processes directly influence 3PL performance in a positive manner

Hypothesis 3B: 3PL learning processes indirectly influence 3PL performance in a positive manner

3PL Employee Absorptive Capacity May Constrain Impact of 3PL Learning Processes

Cohen and Levinthal (1990) used the concept of absorptive capacity to explain why organizations learn more quickly when they build upon prior experiences. They made the point that organizational absorptive capacity is greater than the sum of absorptive capacities of the individuals in the organization because it relates to both assimilation and exploitation of knowledge (Cohen et al, 1990, p131). Zahra et al (2002) argued that assimilation and exploitation of knowledge reflect dynamic capabilities used to drive change within organizational resource bases. Zacharia et al (2011) supported their argument by demonstrating that absorptive capacities enable collaborative process capabilities in collaborative inter-firm environments. These arguments and results suggest absorptive capacities may act as links between the learning process and the

evolution of operational capabilities in the manner of Zollo and Winter's (2002) theoretical model.

Tu et al (2006) recognized the multi-dimensional nature of absorptive capacity and separated the capacity to assimilate knowledge from the organizational mechanisms that transmit and enable exploitation of that knowledge. In their work, they came to recognize the importance of accounting for both manager and worker knowledge as sources of knowledge assimilation though these elements did appear to be less important to performance than the organizational knowledge sharing mechanisms (Tu et al., 2006, p706). Todorova et al (2007) dismissed the performance differences when they re-read Cohen and Levinthal. They brought back into focus the importance to organizations of initially "… recognizing the value …" (Todorova et al, 2007, p777) of new knowledge in order for them to be able to assimilate it. This re-interpretation of the steps that lead to knowledge assimilation is supported by the observations of Huber (1991). He highlighted the problems caused in the learning process by the inability of employees to process information, whether by information overload or lack of adequate understanding caused by "… variability in cognitive maps …" (Huber, 1991, p104). Variability in the breadth of knowledge was a theme discussed at length by Cohen et al. They argued that the greater the diveristy of knowledge, the more likely that the individual would relate new knowledge to the existing knowledge (Cohen et al, 1990, p131). It seems likely that employees' abilities to understand the relevance and value of new knowledge, and to then assimilate that knowledge, influences the efficacy of the learning process. However, extant research remains silent on its relative importance in the relationship between learning processes, operational capabilities and organizational performance.

Hypothesis 4:   3PL learning processes directly influence absorptive capacities of 3PL

employees in a positive manner

Hypothesis 5:   Absorptive capacities of 3PL employees directly influence 3PL

integration capabilities in a positive manner

Hypothesis 6A: Absorptive capacities of 3PL employees directly influence 3PL

performance in a positive manner

Hypothesis 6B: Absorptive capacities of 3PL employees indirectly influence 3PL

performance in a positive manner

The Proposed Research Model Contributes to Theory Development

The proposed 3PL research model is shown in Figure 2 below. To summarize, the model posits the following:

- 3PL learning processes act to directly affect 3PL performance, *and* act directly on the absorptive capacities of the 3PL employees and directly on 3PL integration capabilities to positively to *indirectly* influence 3PL performance

- The absorptive capacity of the 3PL employees directly affects the 3PL integration capabilities, and affects the performance of the 3PL *both* directly, and indirectly through the 3PL integration capabilities

- The 3PL integration capabilities are hypothesized to directly affect 3PL performance.

FIGURE 2.

Relationship between 3PL Learning Processes, 3PL Employee Absorptive Capacity, 3PL Integration Capabilities and Performance in 3PL organizations.
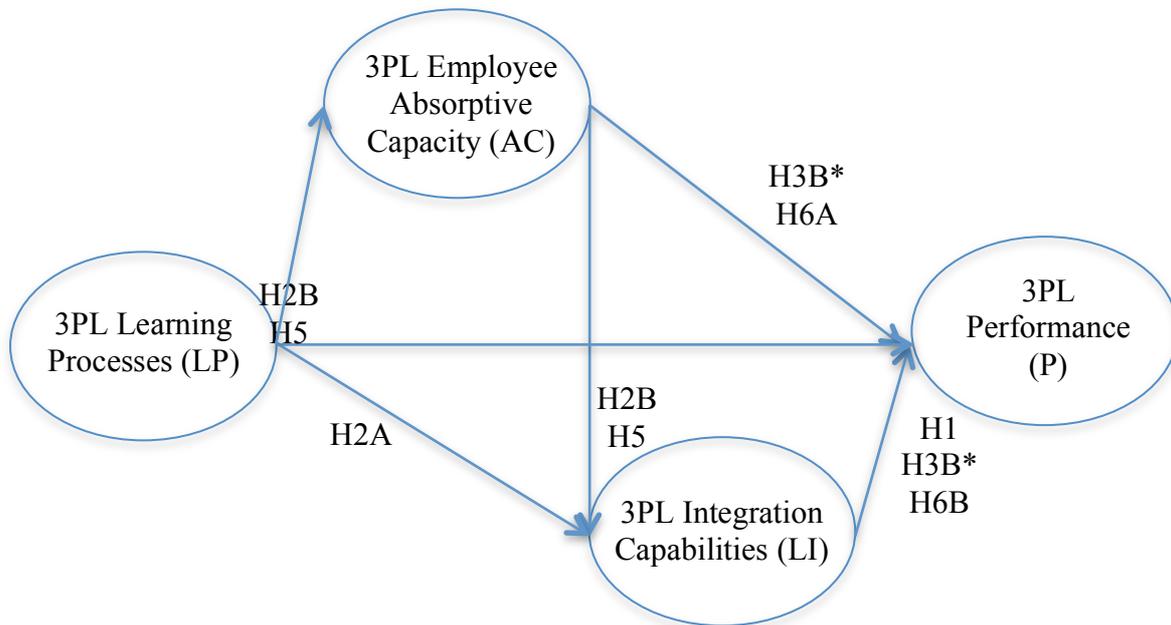
Note: LI: 3PL Integration Capabilities; P: 3PL Performance,
LP: 3PL Learning Processes; AC: 3PL Employee Absorptive Capacity
H2A: Hypothesis 2A; H3B: Hypothesis 3B, etc.
Note the present measurement model does not distinguish between LP's indirect paths acting on P.

The research model provides theoretical grounding to explain why a key capability evolves to positively affect 3PL performance. The model also provides reasons to explain the relationship between learning processes and performance by identifying some of the mediating factors (see Mathieu et al., 2008, for a discussion on general issues relating to mediation) within a broader theoretical framework. The theoretical grounding answers the calls of Maloni et al (2006, p33) to use "… theory-based hypotheses …" within 3PL research, and of Marasco (2008, p142) to increase the theoretical base of 3PL research. The model also directly addresses the proposition of Selviarides et al (2007, p140) to use the 3PL environment to extend and refine existing generic theories.

METHODOLOGY

The general model specification and the specific hypotheses were tested via the use of structural equation modeling (SEM). SEM is a technique that enables multiple relationships, including mediated relationships, to be tested within a single model. The proposed models to be tested, including the directionality of the relationships, must be specified ahead of testing and must be based on sound theory (Kline, 2011). These demands are consistent with the current model and theory development, making the technique appropriate for this research.

Sample

Participants were sourced from a large third-party logistics service provider in Australia. This 3PL provider services many of Australia's largest retailers, manufacturers and industrial companies. Participants were sourced from organizational charts using the organizational levels from Vice-President to site supervisor. Clients were also invited to participate. Names of clients were sourced from relationship management documents and checked with Vice-Presidents to ensure relationships were current and relevant. Roles of clients included Supply Chain Director, Procurement and Logistics Manager, Logistics & Customer Operations Manager and Operations Manager. A total of 494 prospective participants were contacted by email using a three-stage process based on the recommendations of Cook et al (2000): an initial invitation, distribution of a survey instrument, and a final follow up. There were 38 respondents who opted out following the initial invitation. A total of 241 usable responses were received and 28 of these were removed from the final model due to model fit issues.

Data Analysis and Model Development

The basic data review and examination process deployed the missing data procedure recommended by Schafer et al (2002). Missing values were imputed using the regression imputation algorithm for pre-defined Confirmatory Factor Analysis (CFA) variables in the statistical program Amos 18 (Allison, 2003; Enders et al 2001; Schafer et al, 2002).

The "jigsaw" approach recommended by Bollen (2000) was employed to analyze CFAs and SEMs using SPSS 18 and Amos 18. CFA models were specified using indicators selected from extant literature, and the SEMs were extensions of the CFAs that tested the hypothesized relationships among the latent variables. The indicators selected for testing are not shown here in order to conserve space but are available by contacting the authors. Rotation of variables within factors (c.f., Bollen, 2000) was used where relevant to test models with poor fit characteristics.

Method for Analysis of Normality

1. The CFA analyses focused initially on examination of normality and detection of outliers for each indicator. Normality was examined manually via SPSS 18 using histograms and Q-Q plots (Johnson et al, 2002), and numerically using scores for skewness and kurtosis (Kline, 2011).

2. Each CFA data set was also examined in Amos 18 for outliers with cases removed based on the critical values of Mahalanobis d-squared (De Maesschalck et al., 2000) and for multivariate normality using critical values for Mardia's coefficient (Cunningham, 2010; Mardia, 1970).

3. There is some dispute in regard to the selection of appropriate statistics for analysis of normality (e.g., Bollen, 1987; Finch et al., 1997; Hopkins et al, 1990; Shapiro et al., 1968) and critical values for selection of outliers (De Maesschalck et al. 2000; Gao et al., 2008; Penny, 1996; Yuan et al, 2010; Yuan et al, 2008). The recommendations of DeCarlo (1997), Lei et al (2005) and Gao et al (2008) were therefore selected as a compromise and used in a progressive manner (De Maesschalck et al. 2000) to identify the data sets with the least number of cases removed.

Method for CFA and SEM Analyses

1. CFA and SEM models were analyzed using maximum likelihood estimation and the Bollen-Stine bootstrap procedure using 2000 samples in Amos 18 for non-normal data. The Bollen-Stine bootstrap procedure followed that presented by Cunningham (2010, p5-23).

2. Data were examined to ensure uni-dimensionality via the use of sample correlation Eigenvalues with one item exceeding 1.

3. The corresponding variables were also analysed in SPSS 18 for Cronbach's alpha with a threshold of .7 being used (Hinkins, 1995; MacKenzie et al., 2005).

4. Correlations were examined to ensure there was no item redundancy using r<0.8 (Cunningham, 2010) but that they were of sufficient magnitude that they were at the higher end of the scale (Bollen et al, 1991).

5. Psychometric properties were deemed acceptable if standardized regression weights approached .7 (Kline, 2011) or higher.

6. Tests of construct reliability, variance extraction and discriminant validity for the latent variables were based on the recommendations of Fornell et al (1981) using the process presented by Cunningham (2010).

7. Cunningham's (2010, p6-4) process for analyzing pattern and structure coefficients of latent variables was also applied to establish discriminant validity of latent variables.

8. Data were accepted as fitting specified models based on the recommendations of Cunningham (2010) and Kline (2011):

    a. Chi-squared scores were not significant at p=.05, or the Bollen-Stine bootstrap p > .05 for multivariate non-normal data

    b. chi-square/degrees of freedom <2,

    c. the root mean square error of approximation (RMSEA) <.05 with the lower and upper bounds of the 90% confidence interval below .05 and .1 respectively, with a p value that does not exceed .05 (Pclose)

    d. the comparative fit index (CFI) >.95,

    e. the Tucker-Lewis coefficient (TLI) > .95,

    f. the standardized root mean square residual (SRMS) <.05, and

    g. there were no standardized residual covariances above 2.

9. Where relevant, Kline's (2011, pp51 – 54) suggestions were applied using SPSS 18 to examine potential collinearity.

10. The process recommended by Cheung et al (2008) was used to analyze mediation with Amos 18 used to generate 2000 bootstrap samples to estimate 90% confidence intervals.

RESULTS

The fit of the model was acceptable with Chi-square = 263.739, DF = 201, p = .002, Chi-square / DF = 1.312, TLI = .970, CFI = .974, RMSEA = .038 (.024 - .051, Pclose = .941), and SRMR = .0449. The Bollen-Stine bootstrap registered at p = .650 with Mardia's coefficient equal to 143.826 and its critical ratio at 32.297. Peak kurtosis was 4.049 and peak skew was – 1.568. Though not shown here to conserve space, all unstandardized regression weights of all measured variables that were free to vary were significant. The standardized regression weights were also significant for all measured variables in the model.

The unstandardized and standardized regression weights of the hypothesized relationships in the model are shown in Table 1. The results support Hypothesis 1. The results suggest 3PL integration capabilities could directly influence 3PL performance. The model partly supports the hypotheses associated with the Learning Process.   The results suggest the model effectively explains the mediation of 3PL Learning Processes (LP) > 3PL Performance (P) via 3PL Employee Absorptive Capacity (AC) and 3PL Integration Capabilities (LI), supporting hypotheses 2B, 3B, and 4. The hypothesized direct relationships between LP and LI, and between LP and P were non-significant; thus hypotheses 2A and 3A were not supported. The hypothesized influence of absorptive capacity on logistics integration and 3PL performance within the model was partly supported. The results suggest the model effectively explains mediation of AC > P via LI supporting hypothesis 5, and hypothesis 6B through the mediated relationship. Hypothesis 6A, suggesting that AC directly affects P, was not supported.

TABLE 1

Unstandardized and standardized regression weights for hypothesized relationships

Hypothesis	Hypothesized Relationship	Unstandardized Regression Weight*	Standardized Regression Weight*
1	LI > P	.926 (.615 – 1.258, p = .002)	.726 (.514 - .888, p = .003)
2A	LP > LI (Direct)	.196 (-.088 - .451, p = .202)	.189 (-.087 - .427, p = .216)
2B	LP > LI (Indirect)	.403 (.216 - .742, p = .002)	.387 (.215 - .626, p = .003)
3A	LP > P (Direct)	.063 (-.377 - .506, p = .816)	.047 (-.304 - .356, p = .819)
3B	LP > P (Indirect)	.446 (.150 - .807, p = .031)	.336 (.110 - .599, p = .033)
4	LP > AC	.755 (.557 - .945, p = .002)	.701 (.563 - .813, p = .002)
5	AC > LI	.534 (.275 - .840, p = .004)	.552 (.296 - .790, p = .005)
6A	AC > P (Direct)	-.144 (-.594 - .237, p = .539)	-.117 (-.450 - .216, p = .561)
6B	AC > P (Indirect)	.494 (.245 - .845, p = .003)	.401 (.206 - .678, p = .003)

*90% confidence intervals and significance levels shown in brackets.
Note: LI: 3PL Integration Capabilities; P: 3PL Performance,
        LP: 3PL Learning Processes, AC: 3PL Employee Absorptive Capacity.

The squared multiple correlations for the model variables show that the model explains 49.1% (p = .002) of the variance of AC, 48.7% (p = .004) of the variance of LI and 45.8% (p = .010) of the variance of P. These results suggest that the model explains significant proportions of the overall variance for these latent variables.

DISCUSSION

The research presented in this paper seeks to operationalize a theoretical model of capability development and its links to performance within a third party logistics environment.   The model explains almost half the variance of logistics integration and 3PL performance, suggesting that the theoretical ideas that underpin the model contribute meaningfully to our understanding of both capability development and its influence on performance in 3PL environments.   The results suggest that learning processes directly influence the absorptive capacities of employees. The results also suggest that it is the absorptive capacities of the employees that directly influences

logistics integration, and that the learning processes influence the operational

capability through the absorptive capacities of the employees. Similarly, the results

suggest it is the operational capability that directly influences operational performance,

and that both learning processes and the absorptive capacities of the employees

influence performance indirectly in 3PL environments.

The research adds to our knowledge at theoretical levels and at more practical

management levels within 3PL environments. The results support the theoretical ideas

that dynamic capabilities influence operational capabilities, and that in turn, the

operational capabilities influence performance (see Helfat et al., 2007, for discussions

in relation to these arguments). The results also highlight the important role learning

processes play in support of both dynamic and operational capabilities (see Vera et al.,

2011, for a comprehensive review of literature). However, the results do not support

the direct link between learning processes and operational capabilities hypothesized by

Zollo and Winter (2002).

The practical implications of the research reported here include highlighting the

applicability of theoretical models to the 3PL environment, which many reviewers of

3PL research have previously sought (e.g., Selviarides and Spring, 2007). More

specifically, the present research highlights the importance of ensuring there is

sufficient emphasis on integration capabilities when 3PL relationships are established.

The research also highlights the critical role of employee knowledge and robust

learning processes in 3PL relationships.

There are limitations associated with the present research. The research is based on the use of items from extant literature. While use of this approach was deliberate to continue to build on the published work of other researchers, there is room to build more 3PL centric measures of each of the key latent variables. Qualitative research that explores each construct within the model in more depth in a 3PL environment would also help us more effectively understand why the factors relate in a 3PL environment. Finally, the present research was conducted within one large 3PL organization in Australia. This gives opportunities for replication of the structure of this study across a broader range of 3PLs both within Australia and within global supply chains.

REFERENCES

ALLISON, P. 2003. Missing Data Techniques for Structural Equation Modeling. *Journal of Abnormal Psychology,* 112**,** 545–557.

BOLLEN, K., AND R. LENNOX 1991. Conventional Wisdom on Measurement, A Structural Equation Perspective *Psychological Bulletin,* 110**,** 305-314.

BOLLEN, K. A. 1987. Outliers and Improper Solutions: A Confirmatory Factor Analysis Example. *Sociological Methods & Research,* 15**,** 375-384.

BOLLEN, K. A. 2000. Modeling Strategies: in Search of the Holy Grail. *Structural Equation Modeling,* 7**,** 74-81.

BUSTINZA, O. F., ARIAS-ARANDA, D., AND L. GUTIERREZ-GUTIERREZ 2010. Outsourcing, competitive capabilities and performance: an empirical study in service firms. *Int. J. Production Economics,* 126**,** 276-288.

CEPEDA, G., AND D. VERA 2007. Dynamic capabilities and operational capabilities: A knowledge management perspective. *Journal of Business Research,* 60**,** 426-437.

CHEN, H., DAUGHERTY, P.J., AND T.D. LANDRY 2009. Supply Chain Process Integration: A Theoretical Framework. *Journal of Business Logistics,* 30**,** 27-46.

CHEN, I. J., AND A. PAULRAJ 2004. Towards a Theory of Supply Chain Management: the Constructs and Measurements. *Journal of Operations Management,* 22**,** 119-150.

CHEUNG, G. W., AND R.S. LAU 2008. Testing the Mediation and Suppression Effects of Latent Variables – Bootstrapping with Structural Equation Models. *Organizational Research Methods,* 11**,** 296-325.

CHEUNG, M.-S., MYERS, M.B., AND J.T. MENTZER 2010. Does relationship learning lead to relationship value? A cross-national supply chain investigation. *Journal of Operations Management,* 28**,** 472-487.

COHEN, W. M., AND D.A. LEVINTHAL 1990. Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly,* 35**,** 128-152.

COOK C., HEATH, F., AND R.L. THOMPSON 2000. A Meta-Analysis of Response Rates in Web- or Internet-based Surveys. *Educational and Psychological Measurement,* 60**,** 821-836.

CROSSAN, M. M., LANE, H.W., AND R. E. WHITE 1999. An Organizational Learning Framework: From Intuition to Institution. *The Academy of Management Review,* 24**,** 522-537.

CROSSAN, M. M., MAURER, C.C., AND R.E. WHITE 2011. Reflections on the 2009 AMR Decade Award: Do We Have a Theory of Organizational Learning *Academy of Management Review,* 363**,** 446-460.

CUNNINGHAM, E. 2010. *A Practical Guide To Structural Equation Modeling Using AMOS,* Melbourne, Victoria, Statsline.

DE MAESSCHALCK, R., JOUAN-RIMBAUD, D. AND D.L. MASSART 2000. The Mahalanobis distance. *Chemometrics and Intelligent Laboratory Systems,* 50**,** 1-18.

DECARLO, L. T. 1997. On the Meaning and Use of Kurtosis. *Psychological Methods,* 2**,** 292-307.

DYER, J. H. 1996a. Does Governance Matter? Keiretsu Alliances and Asset Specificity as Sources of japanese Competitive Advantage. *Organization Science,* 7**,** 649-666.

DYER, J. H. 1996b. Specialized Supplier Networks as a Source of Competitive Advantage: Evidence from the Auto Industry *Strategic Management Journal,* 17**,** 271-291.

DYER, J. H. 1997. Effective Interfirm Collaboration: How Firms Minimize Transaction Costs and Maximize Transaction Value. *Strategic Management Journal,* 18**,** 535-556.

DYER, J. H., AND H. SINGH 1998. The Relational View: Cooperative Strategy and Sources of Interorganizational Competitive Advantage. *Academy of Management Review,* 23**,** 660-679.

EASTERBY-SMITH, M., AND I.M. PRIETO 2008. Dynamic Capabilities and Knowledge Management: an Integrative Role for Learning? *British Journal of Management,* 19**,** 235-249.

ENDERS, C. K., AND D.L. BANDALOS 2001. The Relative Performance of Full

 Information Maximum Likelihood Estimation for Missing Data in Structural

 Equation Modeling. *Structural Equation Modeling: A Multidisciplinary*

 Journal, 8**,** 430 — 457.

FINCH, J. F., WEST, S.G., AND D.P. MACKINNON 1997. Effects of Sample Size

 and Nonnormality on the Estimation of Mediated Effects in Latent Variable

 Models. *Structural Equation Modeling: A Multidisciplinary Journal,* 4**,** 87-107.

FLYNN, B. B., HUO, B., AND X. ZHAO 2010. The impact of supply chain

 integration on performance: A contingency and configuration approach.

 Journal of Operations Management, 28**,** 58-71.

FORNELL, C., AND D.F. LARCKER 1981. Evaluating Structural Equation Models

 with Unobserved Variables and Measurement Error. *Journal of Marketing*

 Research, 18**,** 39-50.

FORRESTER, J. W. 1958. Industrial Dynamics: A Major Breakthrough for Decision

 Makers. *Harvard Business Review***,** 37-66.

FUGATE, B. S., STANK, T.P., AND J.T. MENTZER 2009. Linking improved

 knowledge management to operational and organizational performance.

 Journal of Operations Management, 27**,** 247-264.

GAO, S., MOKHTARIAN, P.L., AND R.A. JOHNSTON 2008. Non-normality of

 Data in Structural Equation Models. *Transportation Research Board's 87th*

 Annual Meeting. Washington, D.C.: downloaded from

 http://www.uctc.net/papers/839.pdf , 4 January 2011.

GRANT, R. M., AND C. BADEN-FULLER 2004. A Knowledge Accessing Theory of

 Strategic Alliances. *Journal of Management Studies,* 41**,** 61-84.

HELFAT, C. E., FINKELSTEIN, S., MITCHELL, W., PETERAF, M.A., SINGH, H. TEECE, D.J., AND S. G. WINTER (ed.) 2007. *Dynamic Capabilities: Understanding Strategic Change In Organizations,* Malden, MA: Blackwell Publishing.

HINKIN, T. R. 1995. A Review of Scale Development Practices in the Study of Organizations. *Journal of Management Studies,* 21**,** 967-988.

HOPKINS, K. D., AND D.L. WEEKS 1990. Tests for Normality and Measures of Skewness and Kurtosis: Their Place in Research Reporting. *Educational and Psychological Measurement,* 50**,** 717-729.

HUBER, G. P. 1991. Organizational Learning: The Contributing Processes and the Literatures. *Organization Science,* 2**,** 88-115.

HULT, G. T. M., KETCHEN JR, D.J., AND M. ARRFELT 2007. Strategic Supply Chain Management: Improving Performance Through a Culture of Competitiveness and Knowledge Development. *Strategic Management Journal,* 28**,** 1035-1052.

HULT, G. T. M., KETCHEN, JR., D.J., CAVUSGIL, S.T., AND R.J. CALANTONE 2006. Knowledge as a strategic resource in supply chains. *Journal of Operations Management,* 24**,** 458-475.

HULT, G. T. M., KETCHEN JR, D.J., AND S.F. SLATER 2004. Information Processing, Knowledge Development, and Strategic Supply Chain Performance. *Academy of Management Journal,* 47**,** 241-253.

JOHNSON, R. A., AND D.W. WICHERN 2002. *Applied Multivariate Statistical Analysis,* Upper Saddle River, N.J., Prentice-Hall, Inc.

KALE, P., AND H. SINGH 2007. Building Firm Capabilities Through Learning: The Role of the Alliance Learning process in Alliance Capability and Firm-Level Alliance Success. *Strategic Management Journal,* 28**,** 981-1000.

KLINE, R. B. 2011. *Principles and Practice of Structural Equation Modeling (3rd Ed.),* New York, The Guilford Press.

LANGLEY, J. J., AND CAPGEMINI 2010. 2010 Third-Party Logistics: The State of Logistics Outsourcing - Results and Findings of the 15th Annual Study.

LARGE, R. O. 2007. The influence of customer-specific adaptations on the performance of third-party-logistics relationships - document studies and propositions. *International Journal of Logistics Research and Applications,* 10**,** 123-133.

LEI, M., AND R.G. LOMAX 2005. The Effect of Varying Degrees of Nonnormality in Structural Equation Modeling. *Structural Equation Modeling: A Multidisciplinary Journal,* 12**,** 1-27.

LIEB, R. C., AND K.J. LIEB 2010. The North American Third-Party Logistics Industry in 2008: The Provider CEO Perspective. *Transportation Journal***,** 54-65.

LOCKSTROM, M., SCHADEL, J., HARRISON, N., MOSER, R., AND M. K. MALHOTRA 2010. Antecedents to supplier integration in the automotive industry: A multiple-case study of foreign subsidiaries in China. *Journal of Operations Management,* 28**,** 240-256.

MACKENZIE, S. B., PODSAKOFF, P.M., AND C.B. JARVIS 2005. The Problem of Measurement Model Misspecification in Behavioral and Organizational Research and Some Recommended Solutions. *Journal of Applied Psychology,* 90**,** 710-730.

MALONI, M., AND C.R. CARTER 2006. Opportunities for Research in Third Party Logistics. *Transportation Journal*, 24-38.

MARASCO, A. 2008. Third-party logistics: A literature review. *Int. J. Production Economics,* 113, 127-147.

MARCH, J. G. 1991. Exploration and Exploitation in Organizational Learning. *Organization Science,* 2, 71-87.

MARDIA, K. V. 1970. Measures of Multivariate Skewness and Kurtosis with Applications. *Biometrika,* 57, 519-530.

MASON-JONES, R., NAYLOR, B., AND D. TOWILL 2000. Engineering the leagile supply chain. *International Journal of Agile Management Systems,* 2, 54-61.

MATHIEU, J. E., DESHON, R.P., AND D. D. BERGH 2008. Mediational Inferences in Organizational Research: Then, Now, and Beyond. *Organizational Research Methods,* 11, 203-223.

NARAYANAN, S., JAYARAMAN, V., LUO, Y., AND J. M. SWAMINATHAN 2011. The antecedents of process integration in business process outsourcing and its effect on firm performance. *Journal of Operations Management,* 29, 3-16.

NELSON, R. R. 1991. Why do firms differ, and how does it matter? *Strategic Management Journal,* 12, 61-74.

NELSON, R. R., AND S.G. WINTER 1982. *An Evolutionary Theory of Economic Change,* Cambridge, MA, Harvard University Press.

NONAKA, I. 1994. A Dynamic Theory of Organizational Knowledge Creation. *Organization Science,* 5, 14-37.

NONAKA, I., AND G. VON KROGH 2009. Tacit Knowledge and Knowledge Conversion: Controversy and Advancement in Organizational Knowledge Creation Theory. *Organization Science,* 20**,** 635-652.

PANAYIDES, P. M. 2007. Effect of Organizational Learning in Third-Party Logistics *Journal of Business Logistics,* 28**,** 133-158.

PENNY, K. I. 1996. Appropriate Critical Values When Testing for a Single Multivariate Outlier by Using the Mahalanobis Distance. *Journal of the Royal Statistical Society Series C (Applied Statstics),* 45**,** 73-81.

PENROSE, E. 2009, originally published 1959. *The Theory of the Growth of the Firm,* Oxford, Oxford University Press.

RAY, G., BARNEY, J.B., AND W.A. MUHANNA 2004. Capabilities, Business Processes, and Competitive Advantage: Choosing the Dependent Variable in Emperical Tests of the Resource-Based View. *Strategic Management Journal,* 25**,** 23-37.

SCHAFER, J. L., AND J.W. GRAHAM 2002. Missing Data: Our View of the State of the Art. *Psychological Methods,* 7**,** 147-177.

SELVIARIDIS, K. & SPRING, M. 2007. Third party logistics: a literature review and research agenda. *The International Journal of Logistics Management,* 18**,** 125-150.

SHAPIRO, S. S., WILK, M.B., AND H.J CHEN 1968. A Comparative Study of Various Tests for Normality. *Journal of the American Statistical Association,* 63**,** 1343-1372.

SLATER, S. F., AND J.C. NARVER 1995. Market Orientation and the Learning Organization. *Journal of Marketing,* 59**,** 63-74.

TODOROVA, G., AND B. DURISI 2007. Absorptive Capacity: Valuing a Reconceptualisation. *Academy of Management Review,* 32**,** 774-786.

TU, Q., VONDEREMBSE, M.A., RAGU-NATHAN, T.S., AND T.W. SHARKEY 2006. Absorptive capacity: Enhancing the assimilation of time-based manufacturing practices. *Journal of Operations Management,* 24**,** 692-710.

VERA, D., CROSSAN, M., AND M. APAYDIN 2011. A Framework for Integrating Organizational Learning, Knowledge, Capabilities and Absorptive Capacity. *In:* EASTERBY-SMITH, M., AND M.A. LYLES (ed.) *Handbook of Organizational Learning and Knowledge Management.* 2nd ed. Chichester, West Sussex: John Wiley & Sons.

WERNERFELT, B. 1984. A Resource-based View of the Firm. *Strategic Management Journal,* 5**,** 171-180.

WINTER, S. G. 2000. The Satisficing Principle in Capability Learning *Strategic Management Journal,* 21**,** 981-996.

WOLF, C., AND S. SEURING 2010. Environmental impacts as buying criteria for third party logistical services. *International Journal of Physical Distribution & Logistics Management,* 40**,** 84-102.

YUAN, K.-H., AND K. HAYASHI 2010. Fitting Data to Model: Structural Equation Modeling Diagnosis Using Two Scatter Plots. *Psychological Methods,* 15**,** 335 - 351.

YUAN, K.-H., AND X. ZHONG 2008. Outliers, Leverage Observations, and Influential Cases in Factor Analysis: Using Robust Procedures to Minimize Their Effect. *Sociological Methodology,* 38**,** 329 - 368.

ZACHARIA, Z. G., NIX, N. W., AND R.F. LUSCH 2011. Capabilities that enhance outcomes of an episodic supply chain collaboration. *Journal of Operations Management,* 29**,** 591-603.

ZAHRA, S. A., AND G. GEORGE 2002. Absorptive Capacity: A Review, Reconceptualization, and Extension. *The Academy of Management Review,* 27**,** 185-203.

ZHOU, W.-H., AND C-Y. LEE 2009. Pricing and competition in a transportation market with empty equipment repositioning. *Transportation Research Part B,* 43**,** 677-691.

ZOLLO, M., AND S.G. WINTER 2002. Deliberate Learning and the Evolution of Dynamic Capabilities. *Organization Science,* 13**,** 339-351.