

Learning Routines Used By Firms During Construction of Infrastructure Projects Using The Alliance Procurement Method

Joanne Lewis

School of Civil Engineering and Built Environment, Queensland University of Technology, Brisbane
email: jo.lewis@qut.edu.au

Le Chen

School of Civil Engineering and Built Environment, Queensland University of Technology, Brisbane
email: le.chen@qut.edu.au

Karen Manley

School of Civil Engineering and Built Environment, Queensland University of Technology, Brisbane
Email: k.manley@qut.edu.au

Abstract

Collaborative contracting has emerged over the past 15 years as an innovative project delivery framework that is particularly suited to infrastructure projects. Australia leads the world in the development of project and program alliance approaches to collaborative delivery. These approaches are considered to promise superior project results. However, very little is known about the learning routines that are most widely used in support of collaborative projects in general and alliance projects in particular. The literature on absorptive capacity and dynamic capabilities indicates that such learning enhances project performance. The learning routines employed at corporate level during the operation of collaborative infrastructure projects in Australia were examined through a large survey conducted in 2013. This paper presents a descriptive summary of the preliminary findings.

The survey captured the experiences of 320 practitioners of collaborative construction projects, including public and private sector clients, contractors, consultants and suppliers (three per cent of projects were located in New Zealand, but for brevity's sake the sample is referred to as Australian). The majority of projects identified used alliances (78.6%); whilst 9% used Early Contractor Involvement (ECI) contracts and 2.7% used Early Tender Involvement contracts, which are 'slimmer' types of collaborative contract. The remaining 9.7% of respondents used traditional contracts that employed some collaborative elements. The majority of projects were delivered for public sector clients (86.3%), and/or clients experienced with asset procurement (89.6%). All of the projects delivered infrastructure assets; one third in the road sector, one third in the water sector, one fifth in the rail sector, and the rest spread across energy, building and mining.

Learning routines were explored within three interconnected phases: knowledge exploration, transformation and exploitation. The results show that explorative and exploitative learning routines

were applied to a similar extent. Transformative routines were applied to a relatively low extent. It was also found that the most highly applied routine is ‘regularly applying new knowledge to collaborative projects’; and the least popular routine was ‘staff incentives to encourage information sharing about collaborative projects’.

Future research planned by the authors will examine the impact of these routines on project performance.

Keywords: project alliances, collaborative contracting, Australia, New Zealand, project performance, project outcomes, learning, absorptive capacity.

1. Introduction

Collaborative procurement models have emerged over the past 15 years as a means of managing large complex infrastructure projects (Morwood, Scott et al. 2008, Kelly 2011). Collaborative procurement aims to manage the high degree of risk and uncertainty associated with these projects by implementing mechanisms that enable and sustain interdependence and cooperative social behaviour between clients and service providers (Williamson 1991, Rahman and Kumaraswamy 2004, Davis and Love 2011, Scheepbouwer and Humphries 2011). Collaborative procurement is also more suited to facilitating high levels of stakeholder engagement, along with community and environmental outcomes (Morwood, Scott et al. 2008).

Pure project alliancing for infrastructure delivery has been mostly developed in Australia, and was used there to deliver approximately 500 public infrastructure projects during a period of labour and resource shortages from the late 1990's to 2007 (Morwood, Scott et al. 2008, Kelly 2011). Changing market conditions over this time have stimulated the continual evolution of new models of collaborative procurement, such as partnering, early contractor involvement and early tender involvement (Chan, Chan et al. 2010, Kelly 2011, Lahdenperä 2012, Mignot 2012). Similarly, recently difficult economic conditions, coupled with an increasing demand for infrastructure development, have prompted an expectation of more efficient and sophisticated collaborative project performance outcomes in this sector (Morwood, Scott et al. 2008, Ross 2008, Leiringer, Green et al. 2009). Practitioners seek ways to achieve these improvements, against a backdrop of performance heterogeneity between collaborative projects in the infrastructure sector (Department of Treasury and Finance 2009).

The theory of evolutionary economics and dynamic capability theory assert that the learning capability of organisations is associated with project performance (Wernerfelt 1984, Barney 1991, Teece, Pisano et al. 1997, Eisenhart and Martin 2000, Zollo and Winter 2002, Helfat, Finkelstein et al. 2007). This paper draws from these theories to define learning capability as a knowledge-based dynamic capability that is comprised of higher order learning routines distributed throughout three sequential phases of learning: knowledge exploration, transformation and exploitation (Lane, Koka et al. 2006, Lichtenthaler 2009, Lewin, Massini et al. 2011). These routines enable an organisation to configure its knowledge base and lower order operational routines to optimise project performance and continually evolve its capabilities in response to changing market conditions (Cohen and Levinthal 1990, Nonaka 1994, Zahra and George 2002, Leiringer, Green et al. 2009, Nonaka and von Krogh 2009, Nooteboom 2009, Hartmann, Davies et al. 2010, Lewin, Massini et al. 2011).

Learning capability is strongly aligned with the principles of collaborative procurement, which aim to encourage knowledge creation and sharing between participant organisations, through formal and informal networks and relationships (Love, Tse et al. 2002, Carrillo, Robinson et al. 2006). Hence, organisations with better learning routines are more likely to both achieve and benefit from successful collaborative project delivery because they are better able to absorb and apply knowledge generated or held by other organisations (Love, Tse et al. 2002, Hartmann, Davies et al. 2010). Learning capability is organisation-specific, and hence could be inferred to be an important source of

organisational competitive advantage and project performance heterogeneity between organisations (Nelson and Winter 1982, Barney 1991).

To date, studies exploring the cause of performance differences between collaborative projects has focused on the impact of governance mechanisms, such as target cost arrangements, financial risk and reward sharing regimes, team and leadership structures etc (Hauck, Walker et al. 2004, Eriksson 2008, Rahman and Kumaraswamy 2008, Chan, Chan et al. 2010, Love, Mistry et al. 2010, Lahdenperä 2012). Whilst there has been an increase in recent years in studies regarding the resources of construction organisations (Leiringer, Green et al. 2009, Hartmann, Davies et al. 2010, Jin 2010, Rose and Manley 2012), investigation of the learning capability concept remains at an exploratory level with regard to the Australian infrastructure sector. There is little statistically rigorous empirical evidence confirming which learning routines are applied by participant organisations in this context, nor the impact these routines have on project performance. Given the growth of projects delivered through alliances, it is important to understand the learning capability of organisations that work on them.

In response to this knowledge gap, this paper reports the results of a large scale quantitative survey undertaken in 2013 on collaborative infrastructure projects in Australia. Preliminary analysis of the survey data is undertaken to explore the following research objectives: 1) to identify which learning routines are being applied in collaborative infrastructure projects in Australia, and 2) the extent to which these routines are being applied.

The paper very briefly introduces the concept of learning capability and then summarises the survey procedure and data analysis methodology that was used. The demographic profile of the survey respondents is presented to characterise the nature of recent projects and their participants. The results identify the relative extent to which various learning routines were applied in these projects, highlighting those that are most and least prevalent.

2. Learning Capability

Learning capability is underpinned by internal and external learning routines that explore, retain and exploit knowledge both inside and outside of organisational boundaries (Lichtenthaler and Lichtenthaler 2009, Lewin, Massini et al. 2011). Learning routines are defined by Zollo and Winter (2002p.340) as “stable patterns of behaviour that characterise organisational reactions to variegated, internal or external stimuli”. Internal learning routines facilitate variation and new idea generation, dissemination and combination of internally generated knowledge, and use of the knowledge to update old routines (Nonaka 1994, Zollo and Winter 2002). Lewin, Massini et al. (2011) define external learning routines as those that integrate external knowledge into internal knowledge creation and application processes. Lewin, Massini et al. (2011) propose that internal and external routines are interdependent and complimentary, whereby internal routines are required to ensure the knowledge gained through external routines is implemented.

Lane, Koka et al. (2006p.856) defined 3 phases of external learning routines: “(1) recognising and understanding potentially valuable new knowledge outside the organisation through *exploratory learning*; (2) assimilating valuable new knowledge through *transformative learning*, and (3) using the assimilated knowledge to create new knowledge and commercial outputs through *exploitative learning*”. Lichtenthaler (2009) later found through empirical study that these phases also apply to internal routines. Scholars agree that these phases most likely occur within a continuous knowledge cycle, where the development of new operational routines in the exploitation phase is likely to generate further external knowledge acquisition and internal knowledge creation in the exploration phase (Zollo and Winter 2002, Lewin, Massini et al. 2011). Further to this, Lewin, Massini et al. (2011) suggest that internal and external learning routines may become integrated and not easily distinguished. Therefore, the study did not try to separate them.

An organisation can only build its collaborative project management capability by deliberately employing learning routines that enable the exploration, transformation and exploitation of knowledge they have gathered through their prior collaborative project experience; experience alone will not improve their capability without utilisation of the appropriate learning routines (Jin and Doloi 2008).

3. Method

3.1 Data sampling procedures

Data for this study was gathered through a quantitative survey that sought to characterise the learning capability and collaborative project performance of organisations engaged in recent or soon to be completed collaborative infrastructure projects in Australia. The survey was distributed to the contact database of the Alliancing Association of Australasia (AAA), a total sampling frame of 1688 prospective respondents, including construction sector practitioners representing public and private sector clients, contractors, consultants and suppliers. Following a pilot testing process, as recommended by Neuman (2003), the survey was distributed by email as a link to an online form, and was open for response over a period of 12 weeks from November 2012 to February 2013.

At closure of the survey, 357 responses had been received, of which 37 responses were eliminated during analysis of outliers and missing values. In total, 320 valid responses were utilised, providing an overall response rate of 19%. Applying the sample size estimation formula recommended by Bartlett, Kotrlik et al. (2001), this response rate will ensure the statistical rigour of data at an alpha level of 0.05 with a 3% margin of error.

3.2 Participant and project characteristics

The survey posed a series of questions to characterise the demographics of the survey respondents. Respondents were also asked to identify a recently, or soon to be, completed collaborative project with which they had been involved, to which their subsequent responses on learning routines pertained. Table 1 illustrates the characteristics of the respondents and their projects.

The majority of projects used alliance delivery systems (78.6%); whilst 9% used Early Contractor Involvement (ECI) contracts and 2.7% used Early Tender Involvement contracts, which are 'slimmer' types of collaborative contract. The remaining 9.7% of respondents used traditional contracts that employed some collaborative elements. The majority of projects identified were delivered for public sector clients (86.3%), and/or clients experienced with asset procurement (89.6%). All projects identified delivered infrastructure assets; approximately one third each in the road and water sectors, one fifth in the rail sector, the remainder capturing assets across the energy, building, mining, oil and gas, waste management and defence industries. Of these projects, 80.3% were completed between 2010 and 2013. Responses were approximately equally distributed between representatives of client (34%), contractor (34%) and consultant (31%) organisations, while sub-contractor and supplier organisations were infrequently represented.

Table 1 shows that the responses gathered represent a broad cross section of participant organisations across a range of sectors, locations and project values.

Table 1: Respondent demographics and project characteristics

Project characteristics	n	%		n	%
Type of client			Experience of client in asset procurement		
Public sector	276	86.3	Experienced	285	89.6
Private sector	44	13.8	Inexperienced	33	10.4
Type of contract			Project Sector		
Project alliance	155	51.8	Road	113	38.0
Program alliance	80	26.8	Water	89	30.0
Early contractor involvement	27	9.0	Rail	52	17.5
Design and construct with collaboration	16	5.4	Energy	14	4.7
Cost plus incentive fee with collaboration	8	2.7	Building	10	3.4
Early tender involvement	8	2.7	Mining	10	3.4
Lump sum with collaboration	4	1.3	Oil & gas	4	1.3
Other contracts with collaboration	1	0.3	Waste management	3	1.0
			Defence	2	0.7
Value of contract held by respondent organisation (m = AUD million)			Project Location		
< \$500,000	30	9.5	NSW	98	30.7
\$500,000 < \$2m	25	7.9	Qld	85	26.6
\$2m < \$5m	15	4.8	WA	71	22.3
\$5m < \$10m	13	4.1	Vic	43	13.5
\$10m < \$50m	61	19.4	NZ	9	2.8
\$50m < \$100m	45	14.3	SA	8	2.5
\$100m < \$500m	82	26.0	ACT	2	0.6
> \$500m	32	10.2	NT	2	0.6
Other	12	3.8	Tas	1	0.3
Total Project Value (m = AUD million)			Year of project completion		
< \$5m	7	2.3	2008 and before	12	4.4
\$5m to < \$10m	3	1.0	2009	16	5.8
\$10m to < \$50m	18	5.9	2010	44	16.0
\$50m to < \$100m	41	13.5	2011	35	12.7
\$100m to < \$500m	142	46.9	2012	113	41.1
> \$500m	92	30.4	2013	29	10.5
			2014 and after	26	9.5
Respondent characteristics					
Number of collaborative projects the respondent had previously worked on prior to the project reported in survey:			Type of organisation you worked for during the project:		
0	35	10.9	Client	108	34.3
1	38	11.9	Contractor	106	33.7
2	60	18.8	Consultant	98	31.1
3	42	13.1	Supplier	2	0.6
4	28	8.8	Subcontractor	1	0.3
5	29	9.1			
6	22	6.9	Type of position you held during project:		
7	5	1.6	Project leadership team	142	48.1
8	5	1.6	Operational management team	103	34.9
9	1	0.3	Advisor/ facilitator	50	16.9
> 10	55	17.2			

3.3 Data measures

Respondents were asked to consider the learning processes applied by their parent organisation during the collaborative project they had described. The survey presented 19 potential learning routines for consideration across the three learning phases of knowledge exploration, transformation and exploitation. The routines were based on findings in the literature about current practice. In addition to the conceptual literature, the measurement scales published by Kale and Singh (2007) and Lichtenthaler (2009) proved particularly useful in defining the 19 routines used in the present survey. These routines were independently identified by each of the authors and triangulated to arrive at the final set which represents the most important routines without overlap or omission. Respondents were asked to use a 7 point Likert scale to identify the degree to which they perceived that each learning routine was implemented by their organisation, where 1 = strongly disagree, 7 = strongly agree.

3.4 Data analysis

The paper presents descriptive charts showing the percentage of respondents that agreed, to some extent, that each routine was applied by their parent organisation during the project they identified. The presentation of data will rank the routines from most applied to least applied.

The results presented will not be differentiated according to respondent or project characteristics; further analysis in subsequent papers will assess the extent to which these contextual factors influence application of learning routines. However, given that 78.6% of the respondent population were involved with project or program alliances, it can be inferred that the results will closely align with routines applied during the use of project alliances.

4. Results and Discussion

Figure 1 shows the percentage of survey respondents that agreed, to varying extents, that each organisational learning routine was applied by their organisation during their collaborative project. The routines are ranked in order from most to least applied.

Figure 1 shows that of the 19 learning routines tested, the most popular was 'regularly applying new knowledge to collaborative projects'; which was implemented by 86% of the survey respondents. The least popular was 'staff incentives to encourage information sharing about collaborative projects', which was implemented by 18% of respondents. While the majority of learning routines that were canvassed (16/19) were applied by at least 50% of respondents, only a relatively smaller proportion of learning routines (7/19) were applied by a large proportion ($\geq 70\%$) of the respondent group.

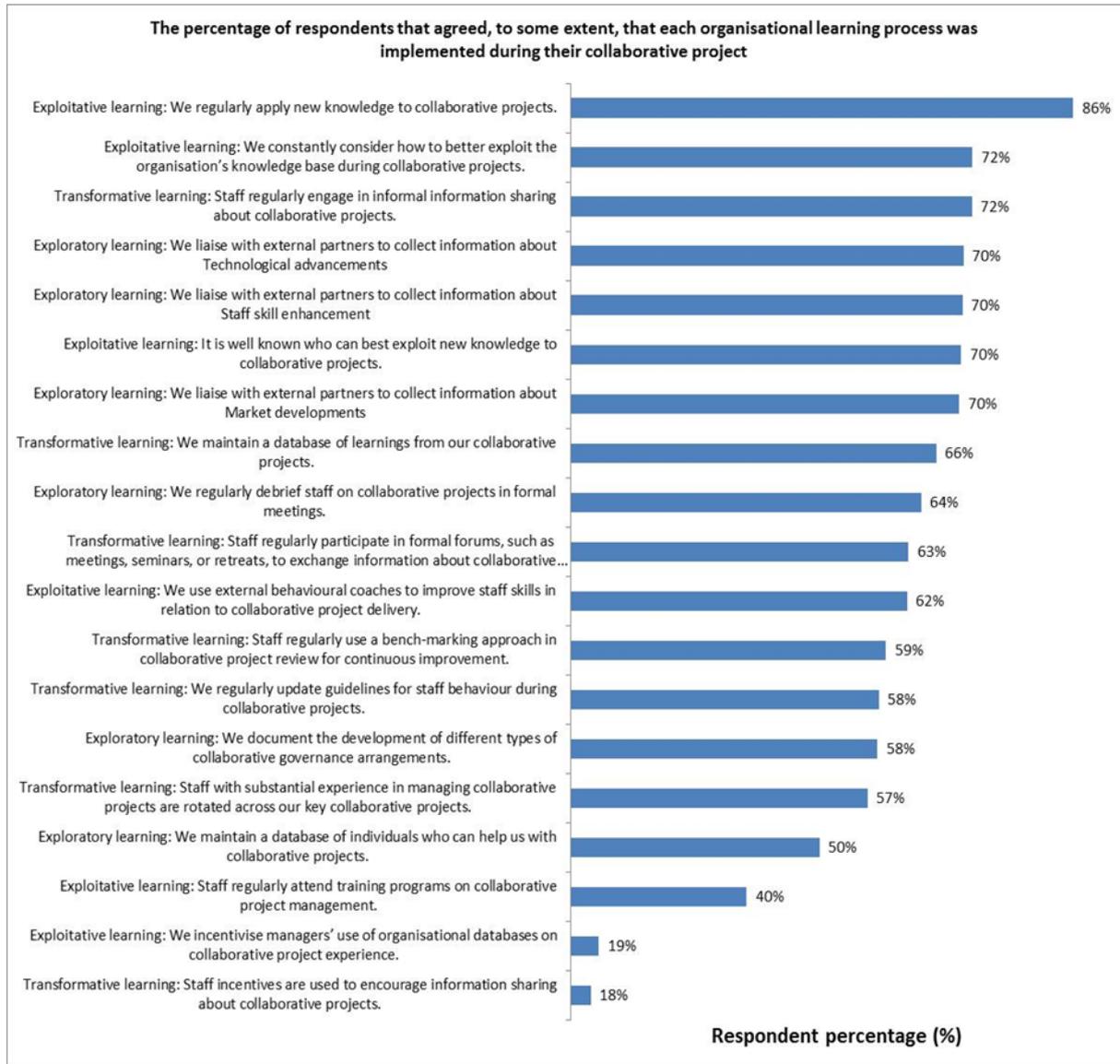


Figure 1: The percentage of respondents that agreed, to varying degrees, that each organisational learning routine was implemented during their collaborative project

4.1 Exploratory, transformative and exploitative learning routines

Figures 2, 3 and 4 illustrate the survey responses relating to each routine, with the routines segregated according to the learning phase to which they belong.

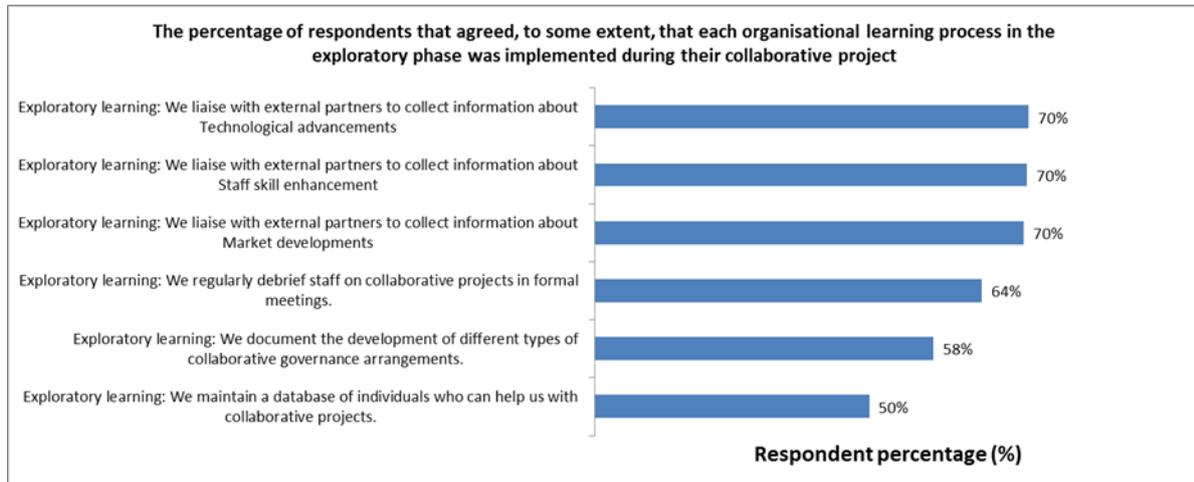


Figure 2: The percentage of respondents that agreed, to varying degrees, that each organisational learning routine in the exploratory phase was implemented during their collaborative project

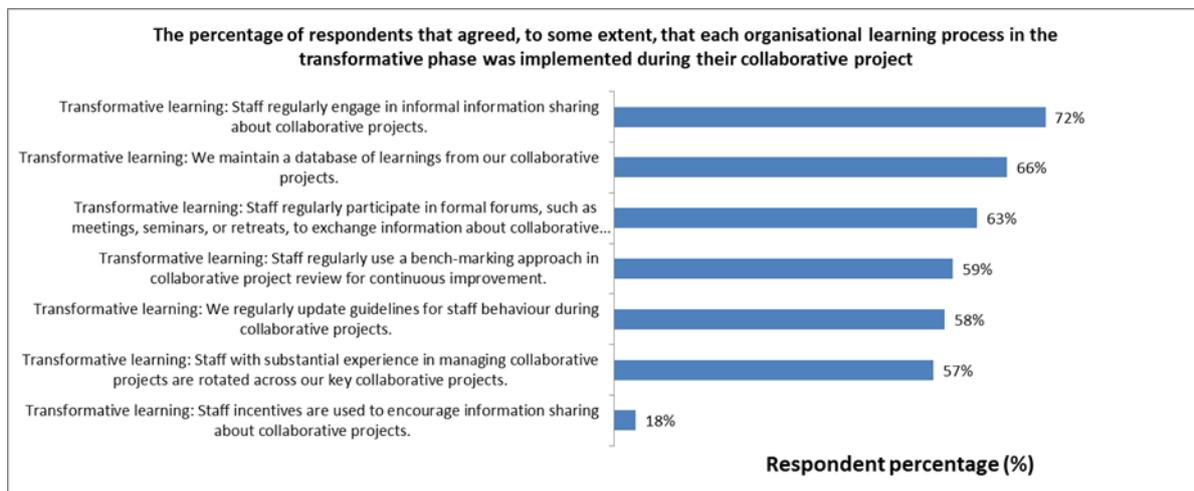


Figure 3: The percentage of respondents that agreed, to varying degrees, that each organisational learning routine in the transformative phase was implemented during their collaborative project

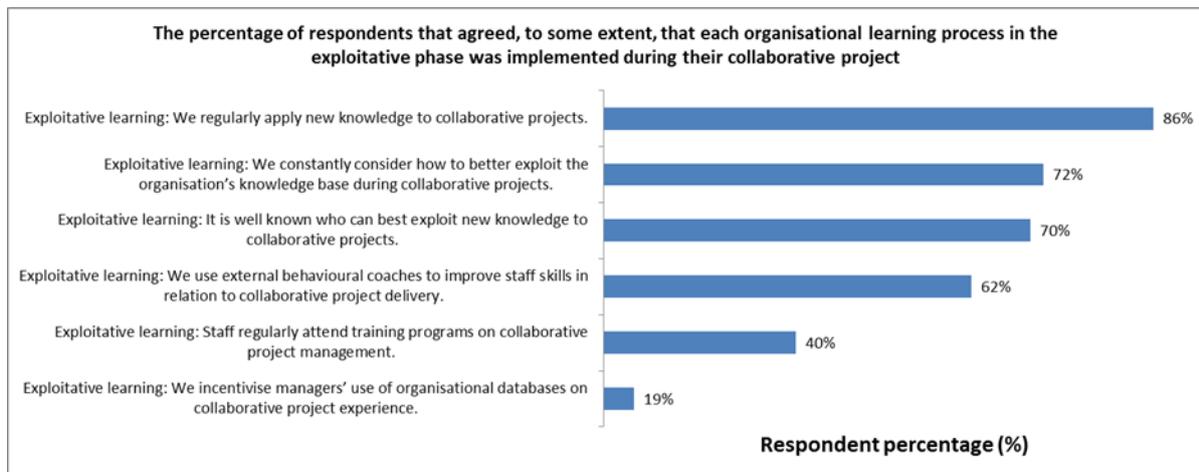


Figure 4: The percentage of respondents that agreed, to varying degrees, that each organisational learning routine in the exploitative phase was implemented during their collaborative project

Figures 2, 3 and 4 show that three each of the six exploratory and six exploitative routines were applied by at least 70% of the respondents, while only one of the seven transformation routines were applied by this proportion of respondents. This indicates that exploratory and exploitative routines are valued most highly, and at a comparable level, by the survey respondents. It is to be expected that participant organisations in collaborative projects would value and apply exploratory routines that enable the external knowledge sharing and relationship building that is characteristic of collaborative procurement (Morwood, Scott et al. 2008, Edwards 2009, Love, Mistry et al. 2010, Ruana, Ochiengb et al. 2012). Similarly, it is also expected that infrastructure organisations would focus on exploitative routines that enable them to achieve a competitive market advantage and increasingly efficient and sophisticated stakeholder expectations in a challenging infrastructure market (Manley 2006, Department of Treasury and Finance 2009, Department of Infrastructure and Transport 2011). This includes enhancing their capability to modify and reconfigure collaborative contracts and procurement models to suit fluctuating project and market needs (Morwood, Scott et al. 2008, Leiringer, Green et al. 2009, Miller, Furneaux et al. 2009, Love, Niedzweicki et al. 2012). The comparable degree to which exploratory and exploitative routines are applied is consistent with the finding in the literature that these learning phases are closely linked in a continuous knowledge cycle (Zollo and Winter 2002).

The distribution of the exploitative routines shows that four of the six routines were applied extensively, while the remaining two routines were applied to a relatively low extent. This indicates that there is a large degree of variation in the perceived value of the exploitative routines tested, and may indicate that the least applied exploitative routines are not perceived to be as relevant or valuable to collaborative infrastructure organisations. Conversely, the distribution of all six of the exploratory routines tested seems closely clustered, suggesting that they are applied very similarly by infrastructure organisations, and/or that the respondents interpreted the meaning of these routines very similarly.

Transformative routines were the least strongly applied learning phase. This probably reflects the role of such routines in providing the bridge between explorative and exploitative learning phases. It might be hard for respondents to identify with the subtle activities that bridge these two important functions. Also, the value and importance of transformative learning routines may not be as tangibly understood as the other two phases. Transformation routines involve assimilating new knowledge through conversion of tacit knowledge to explicit knowledge. It might be that this phase is not conceptually distinct and that the routines involved are better located within the other two phases. The distribution of all seven of the transformative routines tested was strongly clustered, suggesting that as per the exploratory routines, these routines are interpreted and/or applied similarly by the respondents.

4.2 Utilisation of specific routines

The results support the expectation from the literature that the use of external advisors and behavioural coaches for both provision of external knowledge and staff training would be prevalent (Morwood, Scott et al. 2008, Hartmann, Davies et al. 2010, Love, Mistry et al. 2010, Department of Infrastructure and Transport 2011). However, the results show that there is relatively minimal investment in formal internal training programs, in contradiction with expectations reported in this same literature. Similarly, the use of experienced staff to coach new staff on new projects was less applied than might have been expected.

The literature asserts that both formal and informal communication mechanisms are applied across the three learning phases to facilitate knowledge generation and transfer within organisations. The results suggest that organisations in the Australian infrastructure sector may favour informal routines to a higher degree than formal routines in their internal communications (Abdul-Rahman, Yahya et al. 2008, Morwood, Scott et al. 2008, Hartmann, Davies et al. 2010, Love, Mistry et al. 2010). For example, the routine “staff regularly engage in informal information sharing about collaborative projects” was applied by 72% of the respondents, whereas the routine “staff regularly participate in formal forums, such as meetings, seminars or retreats, to exchange information about collaborative project implementation” was applied by 63% of respondents, comparatively. The results also suggest that there is little emphasis on the formal documentation of knowledge and development of prescriptive guidelines associated with transformative routines, although transformative routines associated with face to face dissemination of knowledge occur to a moderate-high extent, for informal and formal mechanisms, respectively. Similarly, the use of transformative routines to periodically benchmark and audit project performance for continuous improvement were not as highly applied as might be expected (Love, Tse et al. 2002, Robinson, Anumba et al. 2005, Bresnen 2007). Knowledge sharing and application incentives were the routines that were applied the least.

5. Conclusion

Organisational learning capability is considered to be a knowledge-based dynamic capability, comprised of internal and external learning routines that are positively associated with collaborative project performance. These learning routines can be categorised into 3 interconnected phases of learning: knowledge exploration, transformation and exploitation. A large scale quantitative survey was conducted to explore the specific learning capability of collaborative infrastructure projects in Australia, of which little empirical data has been gathered to date. The survey captured data on both the performance of recently completed collaborative infrastructure projects and the learning routines applied by the participant organisations during these projects. In particular, the survey was dominated by the alliance procurement method. This paper reports on the preliminary findings of this survey, presenting a descriptive summary of the learning routines that were applied. It was found that the most highly applied routine is 'regularly applying new knowledge to collaborative projects'; and the least popular routine was 'staff incentives to encourage information sharing about collaborative projects'.

The results in this paper are preliminary only and a limitation is the lack of statistical analysis. Future research is planned by the authors to: a) statistically confirm the descriptive patterns observed in this paper, b) establish whether there is a relationship between these learning routines and project performance, c) highlight which learning routines are most influential on project performance' and d) undertake factor analysis which will provide more information about the role of the transformative learning phase in this context. Additional empirical studies exploring the application of learning routines within collaborative infrastructure projects in other nations and within other sectors within Australia would be beneficial. It is intended that this research will inform guidelines to be used by practitioners to enhance organisational capability, and thus support improvements in the efficient delivery of collaborative infrastructure projects, and the optimal evolution of collaborative procurement models.

References

- Abdul-Rahman, H., I. A. Yahya, M. A. Berawi and L. W. Wah (2008). "Conceptual delay mitigation model using a project learning approach in practice." Construction Management & Economics **26**(1): 15-27.
- Barney, J. (1991). "Firm resources and sustained competitive advantage." Journal of Management **17**(1): 99-120.
- Bartlett, J. E., J. W. Kotrlik and C. C. Higgins (2001). " Preview Organizational research: Determining appropriate sample size in survey research." Information Technology, Learning, and Performance Journal **19 (Spring)**(1): 43-50.
- Bresnen, M. (2007). "Deconstructing partnering in project-based organisation: Seven pillars, seven paradoxes and seven deadly sins." International Journal of Project Management **25** (4): 365-374.
- Carrillo, P. M., H. S. Robinson, C. J. Anumba and N. M. Bouchlaghem (2006). "A knowledge transfer framework: The PFI context." Construction Management & Economics **24**(10): 1045-1056.
- Chan, A. P. C., D. W. Chan and J. F. Yeung (2010). Relational Contracting for Construction Excellence: Principles, Practices and Case Studies. Abingdon, Spon Press.
- Cohen, W. and D. Levinthal (1990). "Absorptive capacity: A new perspective on learning and innovation." Administrative Science Quarterly **35**: 128-152.
- Davis, P. and P. Love (2011). "Alliance contracting: adding value through relationship development." Engineering, Construction and Architectural Management **18**(5): 444-461.
- Department of Infrastructure and Transport (2011). National Alliance Contracting Guidelines, Guide to Alliance Contracting, Department of Infrastructure and Transport, Australian Government.
- Department of Treasury and Finance (2009). In Pursuit of Additional Value: A benchmarking study into alliancing in the Australian Public Sector. Melbourne, Victoria, Australia.
- Edwards, R. (2009). Early Contractor Involvement (ECI) Contracts in the South Australian Transport Infrastructure Construction Industry. Adelaide, South Australian Department of Transport, Energy and Infrastructure.
- Eisenhart, K. M. and J. A. Martin (2000). "Dynamic capabilities: What are they?" Strategic Management Journal **21**(10/11): 1105-1121.

Eriksson, P. E. (2008). "Procurement effects on cooperation in client-contractor relationships." Journal of Construction Engineering and Management **134**(2): 103-111.

Hartmann, A., A. Davies and L. Frederiksen (2010). "Learning to deliver service-enhanced public infrastructure: Balancing contractual and relational capabilities." Construction Management and Economics **28**(11): 1165-1175.

Hartmann, A., A. Davies and L. Frederiksen (2010). "Learning to deliver service-enhanced public infrastructure: balancing contractual and relational capabilities." Construction Management & Economics **28**(11): 1165-1175.

Hauck, A. J., D. H. T. Walker, K. D. Hampson and R. J. Peters (2004). "Project alliancing at national museum of Australia—collaborative process." Journal of Construction Engineering and Management **130**(1): 143-152.

Helfat, C. E., S. Finkelstein, W. Mitchell, M. A. Peteraf, H. Singh, D. J. Teece and S. G. Winter (2007). Dynamic Capabilities: Understanding Strategic Change in Organizations. Malden, MA, USA, Blackwell Publishing.

Jin, X.-H. (2010). "Determinants of efficient risk allocation in privately financed public infrastructure projects in Australia." Journal of Construction Engineering and Management **136**(2): 138-150.

Jin, X.-H. and H. Doloi (2008). "Interpreting risk allocation mechanism in public-private partnership projects: an empirical study in a transaction cost economics perspective." Construction Management & Economics **26**(7): 707-721.

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**(10): 981-1000.

Kelly, J. (2011). Cracking the VFM Code: How to identify & deliver genuine value for money in collaborative contracting. Australia, New Zealand, Big Fig Publishing Limited, under the imprint of Intelligentsia Press.

Lahdenperä, P. (2012). "Making sense of the multi-party contractual arrangements of project partnering, project alliancing and integrated project delivery." Construction Management & Economics **30**(1): 57-79.

Lane, P. J., B. R. Koka and S. Pathak (2006). "The reification of absorptive capacity: A critical review and rejuvenation of the construct." The Academy of Management Review **31**(4): 833-863.

Leiringer, R., S. D. Green and J. Z. Raja (2009). "Living up to the value agenda: The empirical realities of through-life value creation in construction." Construction Management & Economics **27**(3): 271-285.

Lewin, A. Y., S. Massini and C. Peeters (2011). "Microfoundations of internal and external absorptive capacity routines." Organization Science **22**(1): 81-98.

Lichtenthaler, U. (2009). "Absorptive capacity, environmental turbulence, and the complementarity of organizational learning processes." Academy of Management Journal **52**(4): 822-846.

Lichtenthaler, U. and E. Lichtenthaler (2009). "A capability-based framework for open innovation: Complementing absorptive capacity." Journal of Management Studies **46**(8): 1315-1338.

Love, P., M. Niedzweicki, P. Bullen and D. Edwards (2012). "Achieving the green building council of Australia's world leadership rating in an office building in Perth." Journal of Construction Engineering and Management **138**(5): 652-660.

Love, P. E. D., D. Mistry and P. R. Davis (2010). "Price competitive alliance projects: Identification of success factors for public clients." Journal of Construction Engineering and Management **136**(9): 947-956.

Love, P. E. D., R. Y. C. Tse, G. D. Holt and D. G. Proverbs (2002). "Transaction costs, learning, and alliances." Journal of Construction Research **3**(2): 193-207.

Manley, K. (2006). "The innovation competence of repeat public sector clients in the Australian construction industry." Construction Management & Economics **24**(2): 1295-1304.

Mignot, A. (2012) "Who moved my cheese? Adapting to the changing nature of collaboration in infrastructure." **June 2012**.

Miller, G., C. Furneaux, P. Davis, P. Love and A. O'Donnell (2009). Built Environment Procurement Practice: Impediments to Innovation and Opportunities for Changes, Curtin University of Technology.

Morwood, R., D. Scott and I. Pitcher (2008). Alliancing A Participant's Guide: Real Life Experiences for Constructors, Designers, Facilitators and Clients, AECOM.

Nelson, R. R. and S. G. Winter (1982). An Evolutionary Theory of Economic Change. Cambridge, Harvard University Press.

Neuman, W. L. (2003). Social Research Methods: Qualitative and Quantitative Approaches. Boston, Allyn and Bacon.

Nonaka, I. (1994). "A dynamic theory of organizational knowledge creation." Organization Science **5**(1): 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**(3): 635-655.

Nooteboom, B. (2009). A Cognitive Theory of the Firm : Learning, Governance and Dynamic Capabilities. Cheltenham, UK., Edward Elgar.

Rahman, M. M. and M. M. Kumaraswamy (2004). "Contracting relationship trends and transitions." Journal of Management in Engineering **20**(4): 147-161.

Rahman, M. M. and M. M. Kumaraswamy (2008). "Relational contracting and teambuilding: Assessing potential contractual and non-contractual incentives." Journal of Management in Engineering **24**(1): 48-63.

Robinson, H. S., C. J. Anumba, P. M. Carillo and A. M. Al-Ghassani (2005). "Business performance measurement practices in construction engineering organisations." Measuring Business Excellence **9**(1): 13-22.

Rose, T. M. and K. Manley (2012). "Adoption of innovative products on Australian road infrastructure projects." Construction Management & Economics **30** (4): 277-298.

Ross, J. (2008). Price competition in the alliance selection process. 9 reasons I favour the single DCT approach - a personal perspective. Infrastructure Delivery Alliance Forum, Main Roads Western Australia.

Ruana, X., E. G. Ochiengb, A. D. F. Pricec and C. O. Egbud (2012). "Knowledge integration process in construction projects: A social network analysis approach to compare competitive and collaborative working." Construction Management & Economics **30**(1): 5-19.

Scheepbouwer, E. and A. B. Humphries (2011). "Transition in adopting project delivery: Method with early contractor involvement." Transportation Research Record: Journal of the Transportation Research Board **2228**: 44-50.

Teece, D. J., G. Pisano and A. Shuen (1997). "Dynamic capabilities and strategic management." Strategic Management Journal **18**(7): 509-533.

Wernerfelt, B. (1984). "A resource-based view of the firm." Strategic Management Journal (pre-1986) **5**(2): 171-174.

Williamson, O. E. (1991). "Comparative economic organization: The analysis of discrete structural alternatives." Administrative Science Quarterly **36**(2): 269–296.

Zahra, S. A. and G. George (2002). "Absorptive capacity: A review, reconceptualization, and extension." Academy of Management Review **27**(2): 185-203.

Zollo, M. and S. G. Winter (2002). "Deliberate learning and the evolution of dynamic capabilities." Organization Science **13**(3): 339-351.