



The relationship between broker's power, strength of ties and NPD project outcomes in an innovation driven inter-firm network.

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- ***Sustainable innovation*** requires the need to gain access into insights and capabilities of other organizations (Brower, 1993 and Harryson, 1997)
- The ***locus for innovation*** is no longer considered to be the individual or the firm but increasingly the network in which a firm is embedded (Powell et al., 1996)
- Firms involved in some form of relationships or collaborations have been described as being in a **network**

Why study Horizontal networks?



- Provides the **greatest gains** and is the force behind industry growth (Madhavan et al., 1998)
- Enables better the pooling of **complementary skills** (Hagedoorn and Duysters, 2002)
- Helps to share **risks** better (Grandori, 1997)
- A channel for obtaining access to external **knowledge** (Powell et al., 1996)
- Securing **access** to new markets and technologies (Grandori and Soda, 1995)

What about Horizontal Networks?



- The need to understand the basis for **successful management** of collaborations continues to drive network research (Child and Faulkner, 1998)
- There is a need for a guarantor, a broker or a network champion for an effective management of a horizontal network (Rosenfeld, 1996) because **network management affects network performance** (Ritter and Gemunden, 2003)
- Very little expository work has been done on horizontal network brokers – who they are, role played, their duties and their influence and impact upon networks



- Managers of a network – executives, participant firm, representatives of network members (steering group)
- Network management facilitated by a broker affects network performance (Ritter and Gemunden, 2003)
- A broker's influence in ensuring the success of an innovation-driven network has been recognized (Thorelli, 1986; Wolpert, 2002)

Theoretical Framework: Broker's Power

The political power theory has implications for power dynamics within the Network in the form of and exercise of influence among network members and the broker (French and Raven, 1968)

- Reward Power (Amabile, 1998; Mullins 1999)
 - Coercive Power (Delbridge et al., 1990; Mullins, 1999)
 - Legitimate Power (Mullins, 1999)
 - Referent Power (Mullins, 1999)
 - Expert Power (Mullins, 1999)
 - Information Power
- Mediated Power bases
- Non-mediated power bases (Johnson et al., 1993)



- The strength of a tie is the combination of the amount of time, the emotional intensity, the intimacy and the reciprocal services that characterize a tie (Granovetter, 1982)
- Three types of ties: Strong, weak and absent (Granovetter, 1982; 1992)
- Successful networks are associated with ties that are strong and long term with little relational distance (Dahlstrom and Ingram, 2003)



- Use of non-mediated power help to build social bonds and close relationships and are likely to provide the ability to overcome lack of consensus, reach decisions quickly and promote innovation and change (Achrol, 1997; Cox, 2001; Ireland and Webb, 2006)
- Use of mediated power is likely to have an opposite effect on ties as relational tensions may result from its use (Lazega, 2000; Kolowsky et al., 2001)
- ***H1: Non-mediated power is positively related to strength of ties***
- ***H2: Mediated power is negatively related to strength of ties***

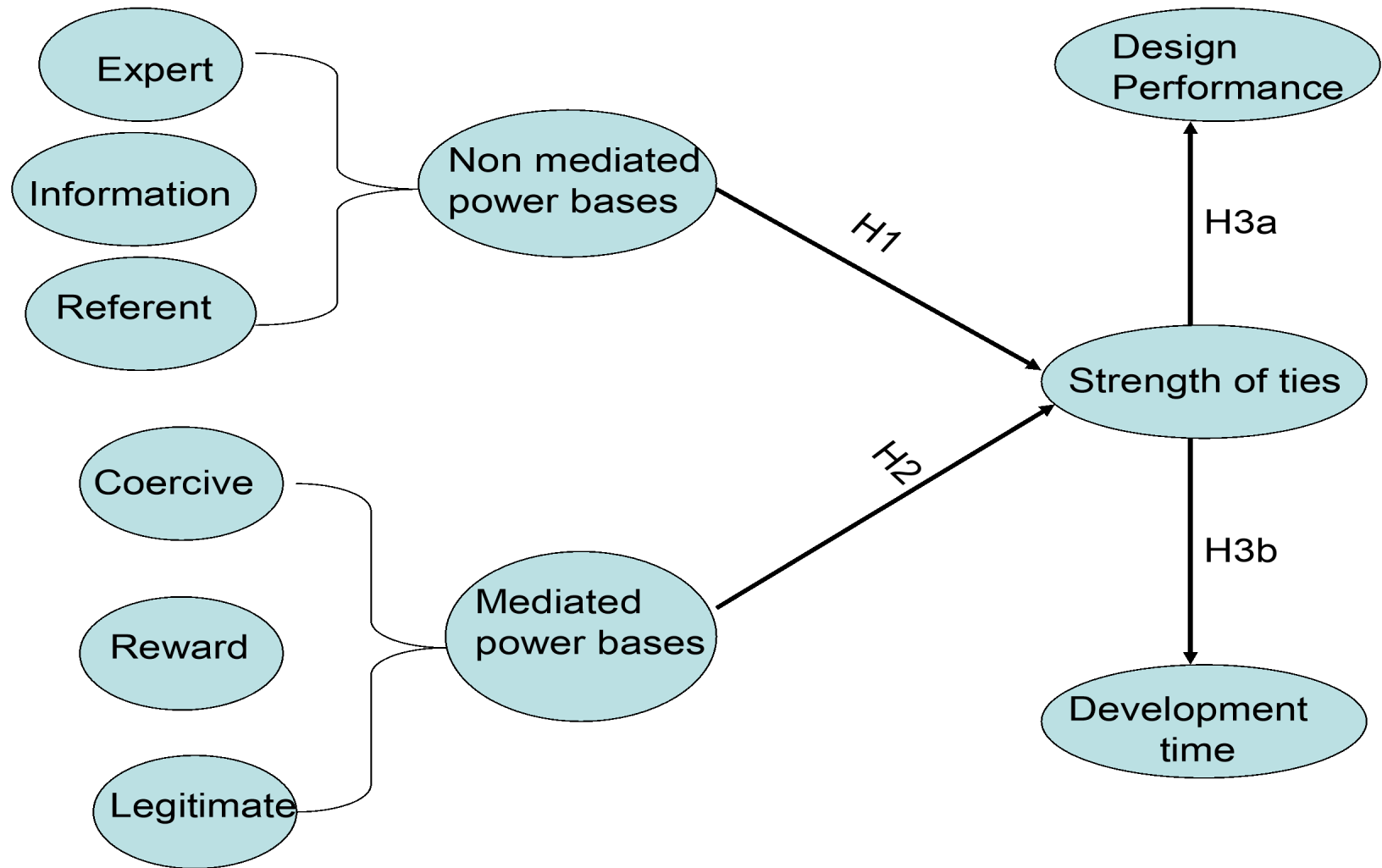


- The relationship between strength of ties and network performance is worth examining
- For an innovation-driven network, NPD project outcomes represent a good measure of network performance
- Several measures of NPD project outcomes (e.g. Primo and Amundson, 2002; Spina et al., 2002; Stump et al., 2002; Petersen et al., 2005)
- **Design performance** (Primo and Amundson, 2002; Petersen et al., 2005)
- **Project development time** (Primo and Amundson, 2002; Petersen et al., 2005)



- H3: Strength of ties is **positively** related to (a) design performance and (b) development time
- H4: Strength of ties will **mediate** the association that non-mediated power has with (a) design performance and (b) development time
- H5: Strength of ties will **mediate** the association that mediated power has with (a) design performance and (b) development time

Conceptual Framework





- Questionnaire items based on previous studies' validated scales
- Power bases (e.g. Kohli, 1989; Swasy, 1979)
 - Legitimate power
 - Reward power
 - Expert power
 - Coercive power
 - Information power
 - Referent power
- Strength of tie (Katsikeas, 1989; Boyle, et al., 1992))
- Development time (Primo and Amundson, 2002)
- Design performance (Petersen et al., 2005)
- Project Complexity (a control variable) (Fitsimmons et al., 1991; Choi and Krause, 2006)



- Mail survey
- Sample
 - 13 networks sampled in the UK
 - A total of 289 companies in the 13 networks
 - Questionnaires sent to a total of 578 representatives of all the companies in the networks
- Response rate – 100 or 17.3%

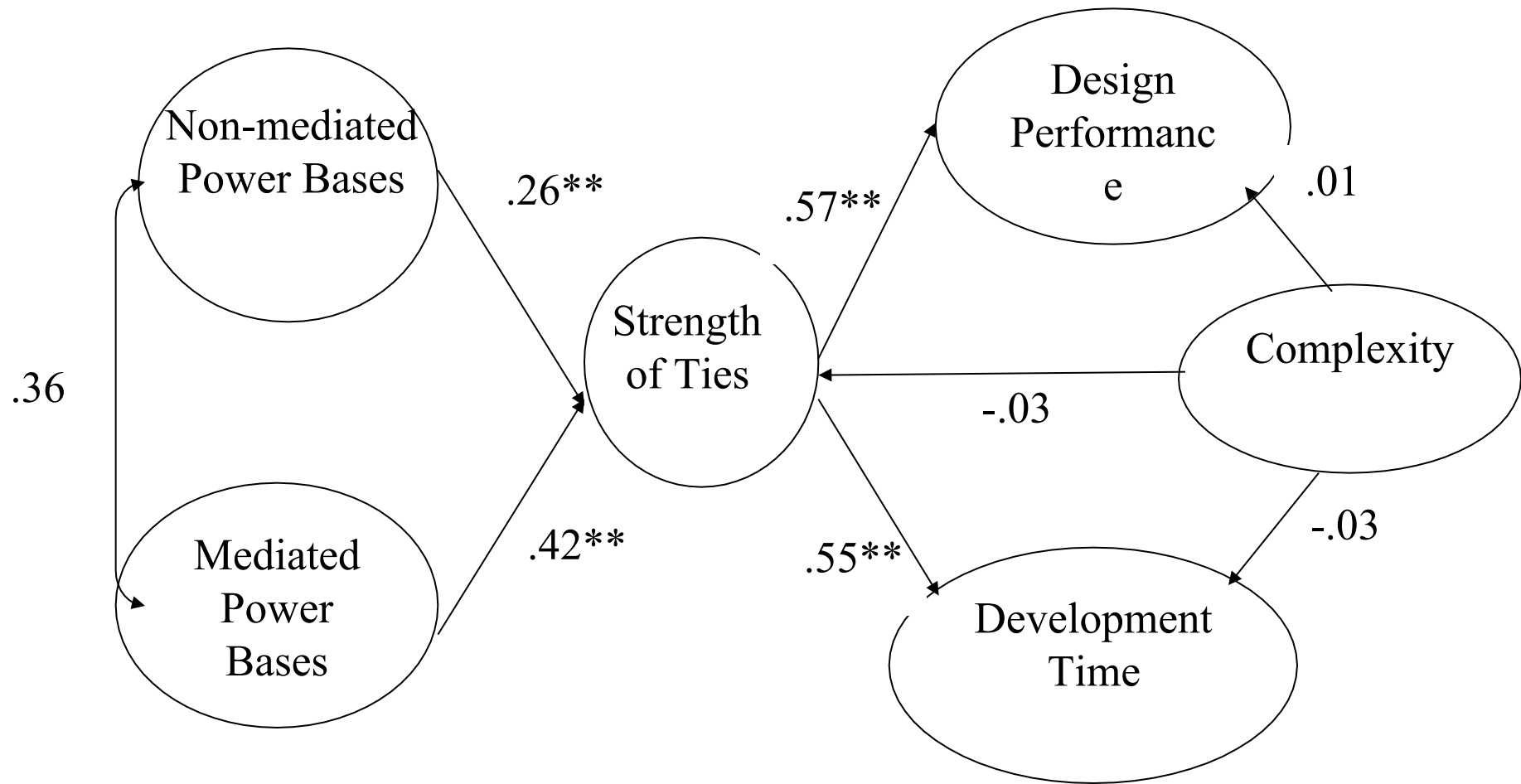
Analytic Strategy

- Analytic Strategy – Structural Equation Modeling
 - Mediation models are best estimated in a SEM context (Hayes, 2006)
- Estimated the measurement model including all the variables in the study using AMOS maximum likelihood procedure (Arbuckle & Wothke, 1999)
- Estimated the structural model and then used model comparison to test our direct effects represented in H1-3 and nested model comparison to test the mediation hypotheses in H4-5
- Assessed the measurement and structural models using chi-square, incremental fit index (IFI), Tucker-Lewis coefficient (TLI), comparative fit index (CFI), root mean square residual (RMR) and root mean square error of approximation (RMSEA).

Results: Means, Standard deviations and Correlations

	Mean	s.d.	1	2	3	4	5	6
1. Complexity	1.92	.60						
2. Non-mediated power	3.28	.55	-.06	.91				
3. Mediated power	2.26	.62	.03	.28**	.88			
4. Strength of ties	3.09	.94	-.07	.21*	.18†	.91		
5. Design performance	2.91	.81	-.02	.18†	.18†	.67**	.93	
6. Development time	2.95	.86	-.08	.13	.21*	.67**	.50**	.95

Results – Figure 2



Results: Direct, Indirect and Total Effects of Power Bases

Power Dimension	Effect		
	Direct	Indirect	Total
Non-mediated power			
Strength of ties	.26**	----	.26**
Design performance	----	.15**	.15**
Development time	----	.14**	.14**
Mediated power			
Strength of ties	.42**	----	.42**
Design performance	----	.24**	.24**
Development time	----	.23**	.23**

Discussion

- Significant links between the perceived use of a broker's power bases (both mediated and non-mediated) and strength of ties
 - **Positive links** between non-mediated power and strength of ties expected
 - **Unexpected positive links between mediated power and strength of ties** (type of broker? Encourages members to get down to business?)
- Strength of ties positively influenced NPD project outcomes of design performance and project development time
 - **Consistent with prior research** in supply chains and vertical networks that investigated suppliers' involvement in NPD projects (Petersen et al., 2005)
- Strength of ties mediated the relationships between a broker's power bases and the NPD project outcomes
 - ***Confirms the existence of a process by which power bases affect performance which has not been investigated in prior research***
 - Perhaps the most compelling result of the study

Summary and Conclusions



- The **management** or the governance structure of a horizontal network is important and could be instrumental to the success of the network
- The appointment of a **broker** is essential for effective management
- Interaction patterns in a network are shaped by power relationships between individuals and the efforts to achieve balance in exchange relations
- Encouraging norms that lead to minimal relational distance between network members could result in increased sharing of knowledge, creativity and norms of solidarity between members of an innovation-driven horizontal network

The End

- Thank you for your attention

