Facilitating tacit knowledge transfer: routine compatibility, trustworthiness, and integration in M&As

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Abstract

Purpose – *This paper aims to theorize how tacit knowledge influences implementation success in mergers and acquisitions (M&As), and contrasts this with explicit knowledge. Tacit knowledge can be a source of sustained competitive advantage because its lack of codifiability precludes easy appropriation by competitors. However, such non-codifiability also makes it difficult to transfer knowledge within a firm. M&As exemplify this challenge because they are often motivated by opportunities for transferring knowledge. With differing demands for tacit and explicit knowledge across departments (Sales and Operations), the empirical results demonstrate how tacit routine compatibility affects implementation outcomes in different functions.*

Design/methodology/approach – *This research draws from a survey of 86 M&A implementation processes between 1996 and 2002, using seemingly unrelated regression to analyze the predictions.*

Findings – *There is strong empirical support that tacit routine compatibility leads to success in sales but not operations and further support for the differential moderating roles of trustworthiness and integration.*

Practical implications – *Managers should make implementation choices based on the type of knowledge being transferred and where that knowledge will reside post-integration. Routine compatibility, trustworthiness and integration facilitate knowledge transfer in M&As – but only if applied in the right combinations for the context.*

Originality/value – *The type of knowledge is a critical distinction for the value of M&A implementation. Furthermore, despite integration receiving significant attention in this literature, trustworthiness, not integration, facilitates successful tacit knowledge transfer in M&As.*

Keywords *Trust, Knowledge transfer, Tacit knowledge, Integration, Mergers and acquisitions, Organizational routines*

Paper type *Research paper*

1. Introduction

Existing literature establishes a crucial distinction between tacit and explicit knowledge (Nonaka and Von Krogh, 2009; Polanyi, 1966; van den Berg, 2013). Research increasingly focuses on tacit knowledge as a potential source of sustained competitive advantage (Harlow, 2008; Lecuona and Reitzig, 2014), because its lack of codifiability precludes easy appropriation by competing firms (Barney, 1991; Grant, 1996). At the same time, this lack of codifiability hinders the transfer of tacit knowledge between cooperative firms (Inkpen and Pien, 2006) and within firms (Kogut and Zander, 1996; Vaara *et al.*, 2012). Mergers and acquisitions (M&As) make the challenge of transferring tacit knowledge particularly salient, as firms often seek to create value by combining knowledge from the two predecessors (Ranft and Lord, 2002; Casal and Fontela, 2007). Evidence suggests that different approaches to implementing the acquisition can facilitate or impede tacit knowledge transfer (Heimeriks *et al.*, 2012).

This paper develops and tests theory about the combinations of factors associated with successful tacit knowledge transfer in M&As, building on two premises:

> **"For sales implementation quality, tacit routine compatibility is more valuable than explicit, while for operations implementation quality, explicit routine compatibility is more valuable than tacit."**

1. That knowledge resides in firm-specific routines (Szulanski and Jensen, 2004).
2. That routines relating to tacit knowledge are fundamentally distinct from those relating to explicit knowledge (Boisot, 1998).

These premises imply that comparison of the relative compatibility of routines from the merging firms can be connected to observed outcomes by invoking differences in the relative importance of tacit versus explicit knowledge across the functional areas of most firms (Simonin, 1999b; Zander and Kogut, 1995). As a result, compatibility of tacit routines will more centrally relate to performance outcomes in a judgment-based function such as the Sales department rather than a rules-driven function such as an Operations department, which relies more on explicit routines.

This approach enables analysis of the effectiveness of two managerial behaviors in facilitating tacit knowledge transfer. First, prior literature finds that trustworthiness helps bring about tacit knowledge transfer (Dhanaraj *et al.*, 2004; Bresman *et al.*, 1999; Becerra *et al.*, 2008). Trustworthiness is revealed in exchanges between individuals or groups of individuals (Barney and Hansen, 1994) and as a result, managers reveal their trustworthiness through their collaborative or relationship-specific behaviors. Consistently, trustworthiness amplifies the value of tacit routine compatibility in Sales departments where relationships are critical. However, in Operations departments, trustworthiness leads managers to overlook the transfer of tacit knowledge, which though secondary to explicit knowledge in Operations, is still a critical supplement to achieving implementation success. Second, knowledge codification is facilitated by high levels of integration, where acquirers and acquires are aligning or centralizing their products and processes (Zollo and Singh, 2004). As tacit knowledge is difficult to codify, integration degrades the value of tacit routine compatibility when integrating tacit knowledge-dependent Sales departments, but facilitates explicit knowledge transfer in Operations, allowing these departments to also transfer supplemental tacit knowledge. This study examines the empirical support for these predictions from a survey of 86 M&A implementation processes.

In identifying managerial behaviors that facilitate or impede the value of tacit knowledge in multiple settings, this paper responds to calls for modeling the mechanisms that allow knowledge to transfer across organizational boundaries (Easterby-Smith *et al.*, 2008; Venkitachalam and Busch, 2012). Furthermore, this paper contributes to literature on M&A implementation processes by analyzing performance data at a less aggregated level than usual. The dependent variables measure implementation success at the functional level, allowing outcomes to link directly to the predictions made and not simply to general outcomes that could be explained by a host of alternatives. Such an approach draws on the situated performance perspective described by Haas and Hansen (2005), who argue for assessing the value of knowledge not simply by measuring knowledge stocks and flows (Dierickx and Cool, 1989; Gupta and Govindarajan, 2000), but rather by judging the firm's performance in relevant areas.

2. Theory

2.1 Tacit versus explicit knowledge

Research has developed a consensus that firm success depends largely on knowledge (Ahuja *et al.*, 2005; Murtha *et al.*, 2001), with a major distinction between tacit and explicit

knowledge. Whereas explicit knowledge can be written, stored and observed, the lack of such codifiability is the distinguishing characteristic of tacit knowledge (van den Berg, 2013). Polanyi (1966) summarized the essence of tacit knowledge in the famous phrase "we can know more than we can tell". Nonaka and Takeuchi (1995) suggested that tacit knowledge consists of two parts: a technical dimension of knowing how to do something that cannot easily be expressed, and a cognitive dimension of ingrained perceptions that influence an individual's daily interactions. At the organizational level of analysis, tacit knowledge develops idiosyncratically within firms over time and, therefore, has been linked to sustainable competitive advantage (Barney, 1991; Grant, 1996).

Explicit knowledge also has value, resulting primarily from the efficiency gains created by the ease of replication (Argote *et al.*, 1990; Grant and Baden-Fuller, 2000). Such ease of replication, however, often cannot be contained within firms. Competitors can gain access to valuable explicit knowledge, making it necessary but not sufficient for firm success. Because tacit knowledge also has value but lacks codifiability, it can be proprietary to firms and thus offers the competitive advantages associated with innovation (Harlow, 2008) and inimitability (Teece *et al.*, 1997; Coff *et al.*, 2006). Yet these advantages detract from internal operations, as firms would like to transfer knowledge across product lines or locations. Joint ventures, M&As, globalization, product development and other activities that extend firm boundaries call for tacit knowledge transfer, a process impeded by non-codifiability. In short, tacit knowledge has even greater value to firms than explicit knowledge but is harder to transfer internally (Reagans and McEvily, 2003; Ahuja *et al.*, 2005; Szulanski, 2000).

Early empirical studies conceived of tacitness – or its inverse, codifiability – as modifying the more measurable explicit knowledge (Zander and Kogut, 1995). This approach was well-received in the absence of other ways to observe tacit knowledge, but it treats tacit and explicit knowledge as two ends of a continuum (Oguz and Ayse Elif, 2011). More recent analyses have attempted to measure tacit knowledge in its own right (Edmondson *et al.*, 2002; Simonin, 2004; Becerra *et al.*, 2008). Consequently, this paper theorizes about and observes the compatibility of organizational routines for tacit and explicit knowledge separately, and interprets the comparison between them to understand the conditions under which tacit knowledge transfers successfully in M&As.

2.2 Tacit knowledge transfer in M&As

While tacit knowledge itself may be intangible and unobserved, its presence can be inferred from organizational routines (Heimeriks *et al.*, 2012). As described by Nelson and Winter (1982), routines capture the standard procedures firms use to conduct their daily activities. Such routines develop in ways that make them consistent and interdependent, generally changing slowly over time unless confronted with an external stimulus, such as a directive to replicate and innovate the routine. The implementation of an M&A changes firm routines and requires knowledge transfer within the combined firm. Knowledge transfer is often the measure of M&A implementation success, facilitated by the degree the two merging organizations are compatible in their routines (Casal and Fontela, 2007).

Explicit knowledge has greater mobility than tacit knowledge (Autio *et al.*, 2000; López-Sáez *et al.*, 2010), because of the ambiguity of tacit knowledge (Simonin, 2004). Not only must the ability, motivation and opportunity to transfer be present for success (Chang

"Trustworthiness brings out the value of tacit routine compatibility for sales, but further weakens the effects of tacit routine compatibility for operations."

"Integration undermines the impact of tacit routine compatibility in sales, but bolsters the effects of tacit routine compatibility in operations."

et al., 2012), but the recipient must also have the ability to receive the knowledge (Empson, 2001).

The difficulty in transferring tacit knowledge can sometimes be overcome when employees who carry tacit knowledge are transferred (Birkinshaw *et al.*, 2000, Subramanian *et al.*, 1998). However, simply moving the people with the relevant knowledge may be insufficient, as the routines surrounding the use of that knowledge must be transferred too (Oguz and Ayse Elif, 2011). Furthermore, highly tacit knowledge may only be transferable through the development of routines that allow firm actions to occur without requiring all parties to have a detailed, explicit understanding of the process (Zollo and Winter, 2002; Szulanski and Jensen, 2004). In this conception, routines themselves are a form of tacit knowledge, in that they persistently convey information in ways that can be understood generically without full articulation. Tacit routines are conveyed through a consistent way of thinking and acting, in essence through judgment. In particular, tacit knowledge is revealed in interactions between people (Lecuona and Reitzig, 2014) that reflect judgments based on style and culture.

Routines also transfer explicit knowledge, but through a fundamentally different process in which they are programmed or codified in rules-based manuals, policy documents, blueprints and computer code instead of relying on judgment (Nelson and Winter, 1982). Prior compatibility between the two firms is integral to both tacit and explicit knowledge transfer (Empson, 2001), and thus implementation success, but the *type* of compatibility for tacit knowledge is distinct from the type for explicit knowledge (Edmondson *et al.*, 2003).

Building from the premise that both tacit and explicit knowledge generally have positive value for firms, which therefore seek to transfer knowledge in M&As, positive outcomes depend on organizational conditions that facilitate transferring the *right* knowledge for the situation at hand. At the same time, pursuing knowledge transfer is not the same as achieving it. While the routines of both the target firm and its acquirer will undergo transformation during this potentially disruptive process (Haspeslagh and Jemison, 1991; Sirower, 1997), the effects of knowledge transfer should be observed in subsequent organizational improvement (Argote and Ingram, 2000), such as the quality of M&A implementation.

Several researchers have treated M&A implementation as a process that occurs at a sub-organizational level (Capron *et al.*, 1998; Zollo and Singh, 2004), and we follow this approach by analyzing the integration of the corresponding departments (i.e. Sales or Operations) of the acquiring firm and its target. Departments differ from each other in a number of important respects, including purpose, the educational profiles and training of employees and the type of knowledge that is crucial for success (Zollo and Singh, 2004). Sales departments involve intangible, non-codifiable knowledge (Arnett and Wittmann, 2014) rooted in interpersonal ties and relationships. While Operations departments also have tacit knowledge, such as operations managers' connections with suppliers and organizational interdependencies (Lecuona and Reitzig, 2014), the primary function of Operations departments is to carry out highly programmed tasks (Lepak and Snell, 2002). Consistent with this premise, several prior studies distinguish between departments based on their reliance on tacit or explicit knowledge (Simonin, 1999b; Dhanaraj *et al.*, 2004; Zander and Kogut, 1995). This research focuses on Sales and Operations because their

reliance on one or the other type of knowledge is less ambiguous than for other departments.

Taken together, different factors facilitate knowledge transfer and produce implementation quality when integrating Sales than when integrating Operations. Compatibility on judgment-based criteria – or tacit routines – will be more valuable in Sales than Operations where compatibility of rules-based explicit routines will offer more value. M&As in the airline industry illustrate these relationships. When they merged, Delta and Northwest were considered to have similar cultures (Kaufman, 2013) that facilitated successful post-merger sales growth (Schnurman, 2013). On the other hand, after the merger of United and Continental, floundering sales and loss of corporate customers (Schnurman, 2013) indicated sales integration struggles, which can be attributed to their different cultures and styles (Mouawad, 2012). Furthermore, both mergers deeply struggled with their operational integration (Mouawad, 2011, 2012). Thus, in the case of Delta and Northwest, while cultural compatibility likely contributed to sales implementation, it could not save their operations implementation.

As the theory suggests and the airline example indicates, by comparing implementation outcomes in sales and operations against each other, it is possible to examine the organizational conditions that facilitate the transfer of tacit and explicit knowledge, respectively. The first hypothesis formalizes the ideas that the value of tacit knowledge will be greater when integrating Sales than Operations:

H1. Tacit routine compatibility will contribute more to Sales implementation quality than Operations implementation quality.

2.3 Acquirer trustworthiness

Trustworthiness is revealed through individuals and groups of individuals within organizations and their exchange relationships with others outside of the organization (Barney and Hansen, 1994) and plays a key role in enhancing inter-organizational communication (Van de Ven and Walker, 1984), facilitating information exchange (Tsai and Ghoshal, 1998; Watson and Hewett, 2006) and permitting a more open search in reaching negotiated solutions (Walton *et al.*, 1994). Specifically, trustworthiness facilitates enhanced knowledge sharing because of reciprocity (Casimir *et al.*, 2012). Knowledge sharers can be confident that the knowledge will not be misused, while knowledge recipients feel more assured that the motives for knowledge transfer include the best interests of the recipients.

Scholars have made a related connection between organizational form and the type of knowledge being transferred. In essence, because tacit knowledge is more nuanced, subtle and less articulable than explicit knowledge (Polanyi, 1966), its transfer calls for the deeper understandings made possible by frequent interactions, face-to-face contact, freedom of information sharing and the shared assumptions that frequently accompany transfers within firm boundaries (Kogut and Zander, 1993; Noorderhaven and Harzing, 2009; Chang *et al.*, 2012). Thus, the more tacit the knowledge, the more likely the firm will choose to transfer the knowledge through wholly owned subsidiaries rather than other governance forms that provide less control, such as alliances (Martin and Salomon, 2003).

"To the extent tacit knowledge transfer motivates M&As, the best implementation outcomes can be achieved by choosing high integration for Operations but low integration for Sales."

For these reasons, research has linked relational embeddedness to tacit knowledge transfer. Because trustworthiness represents a key element of relational embeddedness (Gulati, 1998), it allows for the development of shared values and systems, and helps create common interpretations and identities (Dyer and Nobeoka, 2000). Such "relational capital" (Dyer and Singh, 1998; Kale *et al.*, 2000; Reiche, 2012) has greater impact when transferring tacit knowledge than explicit knowledge. This stems from the "intense socialization" implied in a trust-based relationship and the corresponding ability to reduce misinterpretation and misunderstanding (Dhanaraj *et al.*, 2004; Szulanski *et al.*, 2004; Li *et al.*, 2010), as well as the importance of sharing a base of common assumptions and displaying an attitude of openness (Uzzi, 1997). Among co-workers, trust facilitates tacit knowledge exchange (Arnett and Wittmann, 2014). Furthermore, research on alliances has found a stronger relationship between trustworthiness and tacit knowledge transfer than for explicit knowledge transfer because of the greater need for direct contact when transferring tacit knowledge (Becerra *et al.*, 2008).

In particular, more effective knowledge transfer takes place when sources are more trustworthy (Watson and Hewett, 2006) because the greater credibility of the source will result in the recipient being "less suspicious and thus more open and receptive to the message" (Szulanski *et al.*, 2004, p. 601). Levin and Cross (2004) argue that source trustworthiness is particularly important for the transfer of tacit knowledge because the characteristics of tacit knowledge – its subtlety, nuanced nature and difficulty of articulation – require the recipient to place a higher premium on credibility, as the causal relationships and the insights contained in the tacit knowledge have yet to be vetted.

With their common emphasis on relational mechanisms, trustworthiness and tacit routine compatibility are a powerful combination, enhancing sales implementation quality together to a greater degree than on their own. The acquirer's trustworthiness is important to the transfer of tacit knowledge, which is more prominent in departments such as Sales that depend on tacit knowledge. When trustworthiness is coupled with shared languages, akin to tacit knowledge compatibility, knowledge exchange flourishes, boosting Sales outcomes (Collins and Smith, 2006). As knowledge flows more freely between organizations and people in the presence of trust (Fulmer and Gelfand, 2012), when tacit routines are compatible in a department where tacit knowledge is particularly important, the tacit knowledge that is flowing is more easily understood and assimilated.

H2a. Trustworthiness moderates the relationship between tacit routine compatibility and Sales implementation quality in a positive direction.

Under certain circumstances, however, trustworthiness may instead detract from the ability to transfer tacit knowledge. Prior research finds that knowledge overlap can impede learning (De Clercq and Sapienza, 2005) and the combination of high cultural compatibility and high trust leads managers to overlook opportunities for valuable knowledge transfer (Patzelt and Shepherd, 2008). High levels of trust may also cause reduced alertness to information exchange, failure to recognize the incompleteness of information being exchanged (Krishnan *et al.*, 2006) or a reluctance to acknowledge that critical information is not being exchanged and slow down implementation (Patzelt and Shepherd, 2008). In sum, knowledge sharers may trust recipients to understand exactly what they mean, and knowledge recipients may be reluctant to seek clarification from sharers whom they trust.

These challenges should be most severe in rules-based departments such as Operations. Explicit knowledge transfer sensibly gets emphasized in these contexts, but tacit knowledge fills in the firm-specific idiosyncrasies that lead to competitive advantage. High levels of trust may combine with high tacit routine compatibility negatively because managers become so focused on explicit knowledge transfer and so comfortable with each other that they overlook the need to transfer tacit knowledge in this situation as well. Consequently, supplemental but necessary tacit knowledge may not actually be transferred, which in turn reduces implementation quality. These arguments imply a

negative interaction between trustworthiness and tacit routine compatibility in departments like Operations that rely more heavily on explicit knowledge transfer for success.

H2b. Trustworthiness moderates the relationship between tacit routine compatibility and Operations implementation quality in a negative direction.

2.4 Level of integration

The success or failure of an M&A depends heavily on achieving the "right" level of integration (Haspeslagh and Jemison, 1991; Birkinshaw *et al.*, 2010). Integration is higher when the processes and products of both companies are centralized following an acquisition (Zollo and Singh, 2004). Many factors influence the level of integration, and describing them in detail goes beyond the scope of this paper. However, we expect the chosen level of integration to influence tacit knowledge transfer.

Acquisition research focuses primarily on an overall level of integration, and produces a general consensus that high integration facilitates knowledge transfer (Larsson and Finkelstein, 1999; Vaara *et al.*, 2012). The alliance literature, however, places an emphasis on extracting value from tacit knowledge across organizations. In doing so, it offers some more nuanced insights about the level of integration that also apply to M&A research. For example, alliance researchers have suggested limits on the benefits of integration because higher formal control sometimes produces negative outcomes (Patzelt and Shepherd, 2008). Successful alliances need to have sufficient integration to transfer intended amounts of tacit knowledge but not so much integration that proprietary tacit knowledge leaks out as well (Contractor *et al.*, 2011). Returning to the airline industry, we find airlines trying to strike this integration balance. Airlines participate in alliance networks to expand their scope and provide their customers with global coverage. Alliance partners share codes and even maintenance facilities, but they limit their integration to maintain their proprietary knowledge, such as critical local marketplace knowledge that permeates their sales and customer interactions.

While merging firms need not protect their tacit knowledge from each other as in alliances, they still face the risk that overzealous integration might cause the unique tacit knowledge of predecessor firms to be lost or altered. When airliner KLM planned to merge with Alitalia in the late 1990s, they moved beyond the typical airline alliance arrangements, merging sales offices and standardizing policies and procedures across the firms, only to have the merger attempt fail, with KLM managers citing the integration as the issue destroying some of the value that management expected Alitalia to bring to the merger (Mitchell *et al.*, 2008).

In M&As, Ranft and Lord (2002) describe a tension "between the need to *preserve* valuable knowledge of the acquired firm and the need to *integrate* these resources" (emphasis in original). Consistent with Haspeslagh and Jemison's (1991) conclusions, this suggests that valuable tacit knowledge could be an unintended casualty of extensive integration motivated by cost savings in areas relying primarily on rules-based explicit knowledge. To the extent that merging firms apply similar levels of integration across departments, high levels of integration may interact negatively with tacit routine compatibility in judgment-based departments such as Sales. As a result, firms may use a more autonomous integration model when focused on preventing the loss of knowledge assets instead of the acquisition of physical assets (Birkinshaw *et al.*, 2010).

Comparing tacit and explicit knowledge helps illuminate the role of integration in different departments. Explicit knowledge transfer implies a useful role for integration to develop a single set of codifications. The value creation potential arises from applying the better set of codes (i.e. specific elements of explicit knowledge) across a larger enterprise, or from tangibly bringing together components of the predecessor firms to create new products or processes unattainable by either predecessor firm on its own. Having multiple codes for the same processes is inefficient and potentially counterproductive. Furthermore, as explicit knowledge can be articulated and compared between firms, it can be more fully and easily

integrated. On the other hand, tacit knowledge is more ambiguous (Simonin, 1999b) and more difficult to transfer (Simonin, 1999a, 2004). There are no codes to consolidate. Value creation results from the newly enabled interaction of *different* processes and thought patterns between the two firms, and eliminating one or the other through high integration may inhibit these opportunities (Zaheer *et al.*, 2013).

Scholars have long recognized that intangible assets can lose value from integration (Birkinshaw *et al.*, 2010) because high levels of integration constrain judgment and produce inertia and rigidity (Heimeriks *et al.*, 2012). Consequently, the value of tacit knowledge diminishes with increasing levels of integration, particularly in departments where tacit knowledge is prominent because high integration impedes managers' ability to exercise their judgment. The Southwest–AirTran merger illustrates this point. These two airlines were largely considered to have similarly good service and compatible management (McCartney, 2013), which would indicate compatible tacit routines. However, when they started to more fully integrate, they simultaneously started destroying the customer experience (McCartney, 2013), which is the foundation of their Sales strategy. Thus, consistent with theory and exemplified through this example, high levels of integration will negatively interact with (i.e. offset) the value of tacit knowledge for Sales implementation quality because the merged firm is consolidating tacit routines instead of exploiting their compatibility.

H3a. Level of integration moderates the relationship between tacit routine compatibility and Sales implementation quality in a negative direction.

In departments where explicit knowledge is prominent, however, tacit routine compatibility has less inherent value for high integration to impede. On the contrary, high integration may force the merging firms to codify existing tacit rules as much as possible – making this knowledge more useable in the Operations context. Prior research finds that integrating tacit routines facilitates higher-quality operational task integration by mitigating the opportunity for satisficing (Birkinshaw *et al.*, 2000). The interaction between tacit routine compatibility and integration should therefore influence Operations implementation quality positively because existing knowledge can flow more quickly through consolidated channels.

H3b. Level of integration moderates the relationship between tacit routine compatibility and Operations implementation quality in a positive direction.

3. Research methods

3.1 Data

Data for this study were collected through a survey questionnaire of senior executives at firms involved in at least one M&A between 1995 and 2002. Using the Securities Data Corporation database, any firms that did not complete the announced M&A were purged. The survey was mailed to all such firms in the Midwest region of the USA, which numbered 585 in total. From these, survey responses were returned on 96 M&As from 68 acquiring firms, for a response rate of 11.6 per cent. To analyze the likelihood of non-response bias, size differences between the 68 respondents and a control group of 68 non-responding firms were tested. This analysis concluded that non-response bias is unlikely given the limited differences observed between responding and non-responding firms in either sales ($t = 0.54$) or number of employees ($t = 0.77$). The final sample comprises 86 M&As, as insufficient data on the variables of interest were provided in ten cases. Dummy variables are included for seven firms that provided data on multiple M&As to capture any unobserved firm-specific effects.

Most of the questionnaire items are measured using a five-point Likert-type scale. Several variables comprise multi-item scales constructed from the survey responses. The Appendix provides the wording of specific questionnaire items for all variables and the

reliability (i.e. Cronbach's alpha) exceeds Nunnally's (1978) acceptability criterion of 0.70 for multi-item scales. Factor analysis confirms the unidimensionality of all scales.

Because both dependent and explanatory variables are generated through responses to the questionnaire, Harman's one-factor test was used to assess the extent of single source bias (Podsakoff and Organ, 1986). There was no evidence that single source bias posed a significant concern in our survey data. The minimum, maximum, mean values, standard deviations and zero-order correlations are shown in Table I.

3.2 Dependent variables

Following an approach from prior research (Berman *et al.*, 2002; Edmondson *et al.*, 2002), the dependent variables are measured through proxies based on situations in which tacit and explicit knowledge transfer should lead to specific outcomes. Specifically, assuming that Sales and Operations rely on knowledge in systematically different ways, a distinction is drawn between implementation quality in Sales and Operations departments. Four regression results are presented to capture both dependent variables with and without interaction terms. In models 1 and 3, the dependent variable is *Sales implementation quality* (see the Appendix for questionnaire wording). In Models 2 and 4, the dependent variable is *Operations implementation quality*.

3.3 Explanatory variables

Implementation quality is expected to result from the prior compatibility of routines between acquirer and target. *Tacit routine compatibility* is a two-item scale ($\alpha = 0.89$) measuring the degree to which informal, subjective managerial characteristics of the two combining firms were in accordance before the acquisition.

Acquirer *trustworthiness* should also facilitate knowledge transfer, especially for tacit knowledge, and is measured with a five-item scale ($\alpha = 0.74$) that captures the extent to which the acquirer exhibited trustworthy traits prior to the acquisition. *Level of integration* is a four-item scale ($\alpha = 0.77$) that measures the extent to which activities of the target and acquiring firms were consolidated structurally as the M&A was implemented.

Two of our hypotheses predict moderating effects, which are tested using interaction terms. To reduce the potential for collinearity, the values of the explanatory variables are mean-centered before multiplying them to create the interaction terms (Jaccard *et al.*, 1990).

3.4 Control variables

To isolate the role of knowledge transfer in M&A implementation success from the many other factors that may also influence M&A outcomes, the model includes several control variables relevant to M&A performance. A crucial control variable is *explicit routine*

Table I Descriptive statistics and zero-order correlations

Variable	*Mean*	*SD*	*Minimum*	*Maximum*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Sales implementation quality	3.07	1.13	1.00	5.00	1.00									
Operations implementation quality	3.49	0.97	1.00	5.00	0.35	1.00								
Tacit routine compatibility*	2.60	0.94	1.00	5.00	0.23	0.13	1.00							
Explicit routine compatibility*	2.02	0.75	1.00	4.00	0.11	0.19	0.46	1.00						
Trustworthiness*	3.61	0.53	2.33	4.67	0.36	0.36	0.29	0.31	1.00					
Level of integration*	3.24	1.06	1.00	5.00	0.06	0.51	0.02	−0.03	0.17	1.00				
Acquisition experience	8.29	7.86	1.00	40.00	0.12	−0.01	−0.13	0.09	0.28	0.08	1.00			
Acquisition size	1.31	3.31	0.01	22.50	0.02	−0.05	0.19	0.10	0.22	−0.02	0.05	1.00		
Size similarity	1.80	0.85	1.00	4.00	−0.16	0.20	−0.09	0.18	−0.11	−0.02	−0.07	−0.05	1.00	
International target	0.10	0.31	0.00	1.00	0.08	−0.06	−0.10	−0.01	−0.18	−0.06	−0.08	0.03	−0.05	1.00

Notes: *To facilitate the calculation of interaction terms, mean-centered versions of these variables are used in regression analysis; $N = 86$; SD = standard deviation; correlations with an absolute value greater than 0.20 are statistically significant

compatibility so that the distinction between tacit and explicit routines can be clearly drawn. This variable is measured with a three-item scale ($\alpha = 0.81$) that captures the extent to which formal, codified systems used by managers of the two firms were comparable prior to the M&A.

Another control is *acquisition experience*, which is a count of the acquirer's prior acquisitions completed over a five-year period, that has been shown to have a significant effect on performance outcomes in extant research (Haleblian and Finkelstein, 1999, Mitchell and Shaver, 2003). In addition the model controls for *acquisition size* because prior research has found a negative association with performance (Copeland *et al.*, 1994). Six respondents did not report these data, so multiple imputation was used to estimate these instances (Schafer, 1999), as this technique has advantages over mean substitution (Fichman and Cummings, 2003).

Given the emphasis on compatibility, the model controls not only for the total acquisition size, but also the extent to which the acquirer and target are of a *similar size*, on the grounds that such similarity might be conflated with our measures of routine compatibility. The added complexity of acquiring an *international target* (Lubatkin *et al.*, 1998) might impede knowledge transfer, so a binary indicator for whether the target firm is based outside the USA is included.

Finally, despite the premise that different departments implement an acquisition differently, it is possible that some corporate policies will apply across them. Thus, the model does not assume independence between the implementation quality for Sales and Operations. Therefore, each is included as a control variable in the regressions for the other dependent variable. Such an approach also helps control for any idiosyncratic bias of the survey respondents.

4. Results

Four sets of results are presented, which calls for a system of equations that accounts for the likely correlation of residual values across models, such as seemingly unrelated regression (SUR). SUR produces distinct coefficients and standard errors for each equation, but determines the covariance structure jointly across equations. If residual terms are indeed correlated, the resulting estimates are more efficient than in ordinary least squares (OLS) regression. A Breusch and Pagan (1980) test of independence confirms this correlation by rejecting the null hypothesis of no cross-equation correlation ($\chi^2 = 13.30$, $p < 0.01$, df = 1). OLS would therefore produce inefficient estimates compared to SUR.

Table II presents the SUR results for all models. Dummy variables for seven firms that reported on multiple acquisitions are calculated (but not shown) to account for any unobserved firm-specific effects. Small sample test statistics are reported (e.g. *t*-scores instead of *z*-scores). All of the models have *F*-statistics that indicate statistical significance beyond the 99 per cent confidence level. Goodness-of-fit measures in SUR are not sufficiently defined to use in test statistics, but they can be used descriptively and indicate that the modeled variables account for between 35 and 55 per cent of the overall variance.

Models 1 and 2 exclude the interaction terms in predicting Sales and Operations implementation quality, respectively. *H1* predicted that tacit routine compatibility has more value in Sales implementation quality than Operations. A comparison of coefficients generated by Models 1 and 2 provides evidence to support this expectation (difference = 0.47, $t = 2.76$, $p < 0.01$). In its own right, the negative effect of tacit routine compatibility on operations implementation quality is almost marginally significant (b = −0.17, $t = -1.61$, $p = 0.11$; see Model 2). This suggests that tacit routine compatibility not only has more value to Sales than Operations, but may also detract from implementation quality in Operations. Such results strongly support the premises of this research that distinguishing between tacit and explicit knowledge helps explain successful knowledge transfer in

Table II Seemingly unrelated regression results

	Implementation quality											
	Sales Model 1			Operations Model 2			Sales Model 3			Operations Model 4		
Dependent variable	*Coefficient*	*SE*	*T-statistic*	*Coefficient*	*SE*	*T-statistic*	*Coefficient*	*SE*	*T-statistic*	*Coefficient*	*SE*	*T-statistic*
Explanatory variables												
Tacit routine compatibility	0.31	0.14	2.24*	−0.17	0.10	−1.61	0.19	0.14	1.33	−0.08	0.10	−0.77
Explicit routine compatibility	−0.27	0.17	−1.66***	0.19	0.12	1.57	−0.26	0.16	−1.59	0.18	0.12	1.52
Trustworthiness	0.10	0.24	0.43	0.33	0.17	1.92***	0.12	0.23	0.53	0.25	0.17	1.49
Level of integration	−0.40	0.12	−3.45**	0.47	0.07	6.46**	−0.38	0.11	−3.39**	0.43	0.07	5.94**
Interaction terms												
Trust × tacit routine comp							0.60	0.23	2.60*	−0.48	0.17	−2.84**
Integration × tacit rout. comp							−0.23	0.12	−1.99*	0.17	0.09	2.05*
Control variables												
Acquisition experience	0.03	0.02	1.96***	−0.03	0.01	−2.28*	0.02	0.02	1.32	−0.02	0.01	−1.56
Acquisition size	0.06	0.04	1.58	−0.07	0.03	−2.26*	0.04	0.04	0.99	−0.04	0.03	−1.53
Size similarity	−0.26	0.13	−2.04*	0.28	0.09	3.01**	−0.35	0.13	−2.70**	0.33	0.09	3.63**
International target	0.26	0.33	0.80	0.02	0.24	0.10	0.31	0.32	0.97	−0.05	0.24	−0.20
Sales implementation quality				0.46	0.07	6.61**				0.50	0.07	7.38**
Operations impl. quality	0.85	0.13	6.61**				0.93	0.13	7.38**			
NCS	0.04	0.33	0.11	−0.15	0.24	−0.61	0.10	0.33	0.29	−0.17	0.24	−0.72
Donaldson	0.69	0.50	1.40	−0.80	0.36	−2.23*	0.49	0.49	1.01	−0.59	0.35	−1.69***
Medtronic	−0.63	0.67	−0.94	0.26	0.50	0.52	−0.29	0.66	−0.44	0.02	0.49	0.05
ADC	−1.98	0.79	−2.50*	1.61	0.58	2.78**	−2.05	0.78	−2.63*	1.64	0.56	2.91**
Brock	1.40	0.48	2.93**	−0.44	0.37	−1.19	1.33	0.47	2.84**	−0.46	0.36	−1.28
SuperValu	−0.24	0.73	−0.32	0.24	0.54	0.44	0.43	0.76	0.56	−0.28	0.56	−0.51
Abra	0.18	0.43	0.42	0.02	0.31	0.06	0.43	0.42	1.02	−0.20	0.31	−0.64
Constant term	−0.03	0.55	−0.05	2.02	0.32	6.38**	−0.16	0.53	−0.30	1.83	0.31	5.86**
F-statistic			5.57**			8.79**			5.81**			9.06**
Degrees of freedom			(15, 70)			(15, 70)			(17, 68)			(17, 68)
Goodness-of-fit description			0.35			0.52			0.38			0.55
N			86			86			86			86

Notes: Dummy variables for seven companies with multiple responses calculated but not shown; SE = standard error; **significant at the 0.01 level; *significant at the 0.05 level; ***significant at the 0.10 level

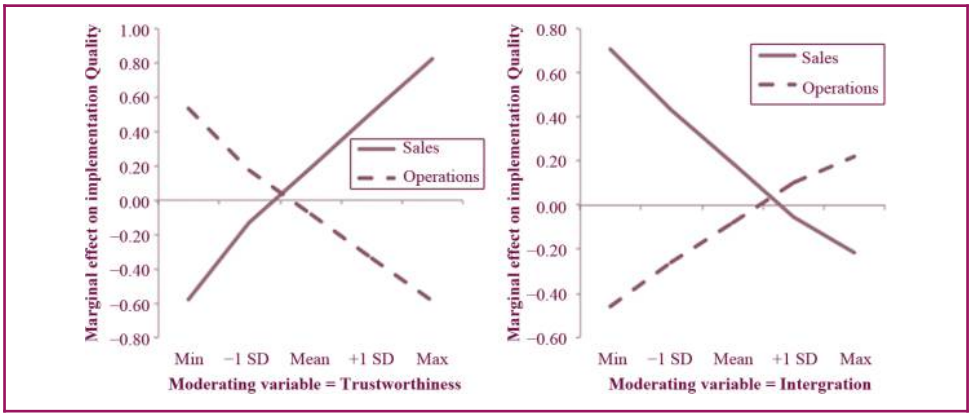
M&As, and the type of routine compatibility between combining firms will largely dictate which departments are able to implement the M&A most successfully.

Model 1 also indicates that tacit routine compatibility has more value than explicit routine compatibility in Sales implementation quality (difference = 0.58, $t = 2.71$, $p < 0.01$). In fact, the coefficient on tacit routine compatibility is positive and significant in its own right (b = 0.31, $t = 2.24$, $p < 0.05$). Consistent with *H1*, these results provide evidence that compatible stylistic and cultural routines among two firms in an M&A contributes more to implementation quality in Sales departments than Operations because the tacit nature of these routines helps transfer tacit knowledge that is more critical to Sales than Operations.

Models 3 and 4 add interaction terms to the regressions of Sales and Operations implementation quality, respectively. In Model 3, the value of tacit routine compatibility in Sales implementation increases at higher levels of acquirer trustworthiness (b = 0.60, $t = 2.60$, $p < 0.01$), but declines at higher levels of integration (b = −0.23, $t = -1.99$, $p < 0.05$). These results provide initial support for *H2a* and *H3a*, but a visual translation helps illustrate what this means. Figure 1 shows the slope for sales with tacit routine compatibility increasing at higher levels of trustworthiness, but decreases at higher levels of integration. Together these results strongly support *H2a* and *H3a*. In Sales, trustworthiness magnifies the value that compatible styles and routines create for implementation quality by enhancing the flow and assimilation of department-critical tacit knowledge. On the other hand, integration destroys that value by constraining and directing the transfer process, which is not amendable to transferring non-codifiable knowledge.

The hypotheses predict different relations between tacit routine compatibility and implementation quality in Operations, where explicit knowledge dominates. These results appear in Model 4. The coefficient on tacit routine compatibility is negative (although not to a statistically significant degree once the model includes interaction terms). Consistent with

Figure 1 Contingent value of tacit routine compatibility



H2b, high trustworthiness makes this negative effect even stronger (b = −0.48, $t = -2.84$, $p < 0.01$). Note that this result does not suggest that trustworthiness itself destroys value when implementing M&As for Operations. The coefficient for trustworthiness is positive in Models 2 and 4, and even to a marginally significant degree in Model 2, when no interactions are included. Instead, the results show the combination of high tacit routine compatibility and high trustworthiness correlates with negative performance implications in a rules-based department like Operations. Conversely, there is also support for the prediction in *H3b* that higher integration reverses the negative relation between tacit routine compatibility and implementation quality in Operations (b = 0.17, $t = 2.05$, $p < 0.05$). The right-hand side of Figure 1 illustrates these relationships for Operations implementation quality. In Operations where tacit knowledge is secondary to explicit knowledge, the combination of integration and compatible tacit routines facilitates explicit knowledge transfer, which contributes most substantially to implementation quality. However, when trustworthiness is combined with compatible tacit routines, managers become more complacent in the transfer of supplemental, but competitively important tacit knowledge, impairing implementation quality.

5. Discussion

Knowledge transfer is an integral aspect of the M&A implementation process, but the factors that facilitate knowledge transfer require greater understanding, particularly in hybrid organizational forms such as joint ventures and M&As (Ranft and Lord, 2002; Casal and Fontela, 2007). Identifying conditions under which knowledge can be successfully transferred during M&A implementation has the potential to contribute not only to the knowledge literature, but also to the broader M&A literature on acquisition success. Recently, scholars have begun to make empirical distinctions between tacit and explicit knowledge (Chen, 2004; Dhanaraj *et al.*, 2004; Li *et al.*, 2010). The difficulty in measuring tacit knowledge, which is inherent in its definition, has constrained empirical research in this area (Ambrosini and Bowman, 2001). At the same time, the role of knowledge in firms appears to be increasingly important, and the value of more fully establishing the conditions under which tacit knowledge successfully transfers in organizational contexts has both theoretical and practical importance (Venkitachalam and Busch, 2012). This paper contributes to and extends this line of research, by distinguishing between the compatibility of tacit and explicit routines both conceptually and empirically.

Not only does this work identify the types of routine compatibility most closely associated with tacit and explicit knowledge, but it also makes a distinction between departments in firms that are most reliant on each type of knowledge. Specifically, for sales implementation quality, tacit routine compatibility is more valuable than explicit, while for operations implementation quality, explicit routine compatibility is more valuable than tacit.

Furthermore, managerial behaviors can also facilitate or impede these general relationships. Trustworthiness brings out the value of tacit routine compatibility for sales, but further weakens the effects of tacit routine compatibility for operations. Conversely, integration undermines the impact of tacit routine compatibility in sales, but bolsters the effects of tacit routine compatibility in operations. These contingent results suggest that to the extent tacit knowledge transfer motivates M&As, the best implementation outcomes can be achieved by choosing high integration for Operations but low integration for Sales. Likewise, trustworthiness helps substantially to transfer tacit knowledge in Sales, but appears to produce a false sense of security that inhibits success in combining Operations.

Figure 2 illustrates this trade-off by calculating the influence of tacit routine compatibility on implementation quality at various combinations of integration and trustworthiness (the sample minimum, mean and maximum values of each after mean-centering). If we assumed a single level of integration and trustworthiness across the board, Operations implementation quality would thrive at the expense of Sales implementation quality when trustworthiness is low and integration is high. By contrast, when firms choose high trustworthiness and low integration, Sales implementation quality would flourish over Operations. Managers can make the best implementation choices based on realistic assessments of the type of knowledge being transferred and where that knowledge will reside post-integration.

Because level of integration is one of the key decision points in M&A implementation (Haspeslagh and Jemison, 1991), it bears special attention. Ranft and Lord (2002) summarize prior research as indicating that the benefits of pursuing acquisitions for knowledge transfer purposes imply a relatively high level of integration. The findings corroborate this position with regard to explicit knowledge, but point to a very different conclusion for tacit knowledge. As the Southwest acquisition of AirTran suggests and this research confirms, firms with compatible tacit routines and high levels of integration hurt the quality of their sales implementation. Such results add to a long-standing discussion in the M&A literature aimed at developing a nuanced view of the role of integration (Haspeslagh and Jemison, 1991; Zaheer *et al.*, 2013) and an expectation that higher integration is ordinarily beneficial (Larsson and Finkelstein, 1999). For managers, these findings suggest that while tacit routine compatibility might tempt managers to integrate extensively across departments because their culture and management styles are similar, they could end up destroying the value of the tacit knowledge they try to integrate.

Although the evidence presented here is far from the final word on the subject, it offers at least three important insights. First, this research is among the first to identify the type of knowledge as a potential contingency for the value of integration in M&A, and produce results that yield compelling evidence to support this thesis. This suggests that M&A

Figure 2 Value of tacit routine compatibility at different combinations of trustworthiness and integration

researchers should join knowledge researchers in differentiating between tacit and explicit knowledge to better understand an acquiring firm's implementation approach. Second, if it is true that tacit knowledge is more valuable to firms than explicit knowledge, but integration is more relevant to the transfer of explicit knowledge, it is possible that the large amount of attention paid to integration in the M&A literature is obscuring a more important variable: trustworthiness. Integration is almost automatically included in M&A research, whereas trustworthiness is not, but our findings are suggestive that it deserves comparable consideration in future studies.

Third, an important implication of this research is that the value of knowledge in M&As has less to do with finding acquisition targets that have the "most" knowledge, and more to do with finding targets that have the "right" kind of knowledge. In particular, creating value through tacit knowledge transfer demands prior routine compatibility and trustworthiness. Moreover, while our empirical setting is M&As, our theoretical arguments apply to other phenomena that cross firm boundaries, including strategic alliances and joint ventures, and these findings are likely applicable to these areas as well.

6. Conclusion

This study provides empirical support for the idea that knowledge in general, and tacit knowledge in particular, helps explain performance differences in M&A implementation. More specifically, it distinguishes between the departments where tacit and explicit knowledge play key roles, and establishes the conditions under which tacit and explicit knowledge transfer are associated with implementation success. These results hold above and beyond the effects of other facilitators of knowledge transfer, namely, trustworthiness and integration.

Although this study offers empirical validation of some important tenets of knowledge research, it also has several limitations worth discussing. Like any other operationalization of abstract concepts, our measures require the acceptance of several inferences about what constitutes different types of knowledge. The study is also USA-centric; all of the acquirers are based in the Midwest region of the USA, and only a handful of the target firms are located in other nations. Although this raises concerns about generalizability to non-USA settings, it offers a point of distinction from much extant knowledge research, which is tightly interconnected with the international management literature. By focusing on USA acquirers, these results add credence to the idea that it is knowledge transfer *per se* that has value in M&As, rather than another cross-national artifact. Finally, the questionnaire approach relies on single respondents from only the acquiring firms and a sample size that is toward the low end of the acceptance range for the large-scale statistical techniques used here. All of these concerns are important to consider when interpreting the results, but similar concerns have been identified in other empirical work in this area.

Ultimately the importance of developing a greater understanding of knowledge in the M&A implementation process seems to outweigh the methodological limitations. Routine compatibility, trustworthiness and integration facilitate knowledge transfer in M&As – *but only if applied in the right combinations for the context*. Managers should consider the balance of these factors and the type of knowledge being integrated when making M&A implementation choices across departments. Absent this nuanced perspective, an emphasis on quantity of knowledge transfer rather than quality of it could prove counterproductive if the costly nature of knowledge transfer is acknowledged. Such a contingent perspective also has implications for researchers, who should consider the differing knowledge needs across internal organizational boundaries. Future research could extend this nuanced view of knowledge within organizations to examine how the variance in knowledge value and type across different departments impacts organizational knowledge outcomes.

References

Ahuja, G., Coff, R.W. and Lee, P.M. (2005), "Managerial foresight and attempted rent appropriation: insider trading on knowledge of imminent breakthroughs", *Strategic Management Journal*, Vol. 26 No. 9, pp. 791-808.

Ambrosini, V. and Bowman, C. (2001), "Tacit knowledge: some suggestions for operationalization", *Journal of Management Studies*, Vol. 38 No. 6, pp. 811-829.

Argote, L., Beckman, S.L. and Epple, D. (1990), "The persistence and transfer of learning in industrial settings", *Management Science*, Vol. 36 No. 2, pp. 140-154.

Argote, L. and Ingram, P. (2000), "Knowledge transfer: a basis for competitive advantage in firms", *Organizational Behavior and Human Decision Processes*, Vol. 82 No. 1, pp. 150-169.

Arnett, D.B. and Wittmann, C.M. (2014), "Improving marketing success: the role of tacit knowledge exchange between sales and marketing", *Journal of Business Research*, Vol. 67 No. 3, pp. 324-331.

Autio, E., Sapienza, H. and Almeida, J.G. (2000), "Effects of age at entry, knowledge intensity, and imitability on international growth", *Academy of Management Journal*, Vol. 43 No. 5, pp. 909-924.

Barney, J. (1991), "Firm resources and sustained competitive advantage", *Journal of Management*, Vol. 17 No. 1, pp. 99-120.

Barney, J.B. and Hansen, M.H. (1994), "Trustworthiness as a source of competitive advantage", *Strategic Management Journal*, Vol. 15 No. S1, pp. 175-190.

Becerra, M., Lunnan, R. and Huemer, L. (2008), "Trustworthiness, risk, and the transfer of tacit and explicit knowledge between alliance partners", *Journal of Management Studies*, Vol. 45 No. 4, pp. 691-713.

Berman, S.L., Down, J. and Hill, C.W.L. (2002), "Tacit knowledge as a source of advantage in the National Basketball Association", *Academy of Management Journal*, Vol. 45 No. 1, pp. 13-31.

Birkinshaw, J., Bresman, H. and Hakanson, L. (2000), "Managing the post-acquisition integration process: how the human integration and task integration processes interact to foster value creation", *Journal of Management Studies*, Vol. 37 No. 3, pp. 395-425.

Birkinshaw, J., Bresman, H. and Nobel, R. (2010), "Knowledge transfer in international acquisitions: a retrospective", *Journal of International Business Studies*, Vol. 41 No. 1, pp. 21-26.

Boisot, M.H. (1998), *Knowledge Assets: Securing Competitive Advantage in the Information Economy*, Oxford University Press, Oxford.

Bresman, H., Birkinshaw, J. and Nobel, R. (1999), "Knowledge transfer in international acquisitions", *Journal of International Business Studies*, Vol. 30 No. 3, pp. 439-462.

Breusch, T.S. and Pagan, A.R. (1980), "The Lagrange multiplier test and its applications to model specification in econometrics", *Review of Economic Studies*, Vol. 47 No. 1, pp. 239-254.

Capron, L., Dussauge, P. and Mitchell, W. (1998), "Resource redeployment following horizontal acquisitions in Europe and North America, 1988-1992", *Strategic Management Journal*, Vol. 19 No. 7, pp. 631-661.

Casal, C.C. and Fontela, E.N. (2007), "Transfer of socially complex knowledge in mergers and acquisitions", *Journal of Knowledge Management*, Vol. 11 No. 4, pp. 58-71.

Casimir, G., Lee, K. and Loon, M. (2012), "Knowledge sharing: influences of trust, commitment and cost", *Journal of Knowledge Management*, Vol. 16 No. 5, pp. 740-753.

Chang, Y.-Y., Gong, Y. and Peng, M.W. (2012), "Expatriate knowledge transfer, subsidiary absorptive capacity, and subsidiary performance", *Academy of Management Journal*, Vol. 55 No. 4, pp. 927-948.

Chen, C.-J. (2004), "The effects of knowledge attribute, alliance characteristics, and absorptive capacity on knowledge transfer performance", *R&D Management*, Vol. 34 No. 3, pp. 311-321.

Coff, R.W., Coff, D.C. and Eastvold, R. (2006), "The knowledge-leveraging paradox: how to achieve scale without making knowledge imitable", *Academy of Management Review*, Vol. 31 No. 2, pp. 452-465.

Collins, C.J. and Smith, K.G. (2006), "Knowledge exchange and combination: the role of human resource practices in the performance of high-technology firms", *Academy of Management Journal*, Vol. 49 No. 3, pp. 544-560.

Contractor, F.J., Woodley, J.A. and Piepenbrink, A. (2011), "How tight an embrace? Choosing the optimal degree of partner interaction in alliances based on risk, technology characteristics, and agreement provisions", *Global Strategy Journal*, Vol. 1 No. 1, pp. 67-85.

Copeland, T., Koller, T. and Murrin, J. (1994), *Valuation: Measuring and Managing the Value of Companies*, Wiley, New York, NY.

De Clercq, D. and Sapienza, H. (2005), "When do venture capital firms learn from their portfolio companies?", *Entrepreneurship Theory and Practice*, Vol. 29 No. 4, pp. 517-535.

Dhanaraj, C., Lyles, M.A., Steensma, H.K. and Tihanyi, L. (2004), "Managing tacit and explicit knowledge transfer in IJVs: the role of relational embeddedness and the impact on performance", *Journal of International Business Studies*, Vol. 35 No. 5, pp. 428-442.

Dierickx, I. and Cool, K. (1989), "Asset accumulation and sustainability of competitive advantage", *Management Science*, Vol. 35 No. 1, pp. 554-571.

Dyer, J.H. and Nobeoka, K. (2000), "Creating and managing a high-performance knowledge-sharing network: the Toyota case", *Strategic Management Journal*, Vol. 21 No. 3, pp. 345-367.

Dyer, J.H. and Singh, H. (1998), "The relational view: cooperative strategy and sources of interorganizational competitive advantage", *Academy of Management Review*, Vol. 23 No. 4, pp. 660-679.

Easterby-Smith, M., Lyles, M.A. and Tsang, E.W.K. (2008), "Inter-organizational knowledge transfer: current themes and future prospects", *Journal of Management Studies*, Vol. 45 No. 4, pp. 677-690.

Edmondson, A.C., Winslow, A.B., Bohmer, R.M.J. and Pisano, G.P. (2002), "Different patterns of performance improvement for tacit and explicit knowledge: an empirical test", *Proceedings of the 2002 Academy of Management Proceedings, TIM*, Denver, pp. B1-B6.

Edmondson, A.C., Winslow, A.B., Bohmer, R.M.J. and Pisano, G.P. (2003), "Learning how and learning what: effects of tacit and codified knowledge on performance improvement following technology adoption", *Decision Sciences*, Vol. 34 No. 2, pp. 197-223.

Empson, L. (2001), "Fear of exploitation and fear of contamination: impediments to knowledge transfer in mergers between professional service firms", *Human Relations*, Vol. 54 No. 7, pp. 839-862.

Fichman, M. and Cummings, J.N. (2003), "Multiple imputation for missing data: making the most of what you know", *Organizational Research Methods*, Vol. 6 No. 3, pp. 282-308.

Fulmer, C.A. and Gelfand, M.J. (2012), "At what level (and in whom) we trust: trust across multiple organizational levels", *Journal of Management*, Vol. 38 No. 4, pp. 1167-1230.

Grant, R.M. (1996), "Prospering in dynamically-competitive environments: organizational capability as knowledge integration", *Organization Science*, Vol. 7 No. 4, pp. 375-387.

Grant, R.M. and Baden-Fuller, C. (2000), "Knowledge and economic organization: an application to the analysis of interfirm collaboration", in Von Krogh, G., Nonaka, I. and Nishiguchi, T. (Eds), *Knowledge Creation: A Source of Value*, Palgrave, New York, NY.

Gulati, R. (1998), "Alliances and networks", *Strategic Management Journal*, Vol. 19 No. 4, pp. 293-317.

Gupta, A.K. and Govindarajan, V. (2000), "Knowledge flows within multinational corporations", *Strategic Management Journal*, Vol. 21 No. 4, pp. 473-496.

Haas, M.R. and Hansen, M.T. (2005), "When using knowledge can hurt performance: the value of organizational capabilities in a management consulting company", *Strategic Management Journal*, Vol. 26 No. 1, pp. 1-24.

Haleblian, J. and Finkelstein, S. (1999), "The influence of organizational acquisition experience on acquisition performance: a behavioral learning perspective", *Administrative Science Quarterly*, Vol. 44 No. 1, pp. 29-56.

Harlow, H. (2008), "The effect of tacit knowledge on firm performance", *Journal of Knowledge Management*, Vol. 12 No. 1, pp. 148-163.

Haspeslagh, P.C. and Jemison, D.B. (1991), *Managing Acquistions: Creating Value through Corporate Renewal*, The Free Press, New York, NY.

Heimeriks, K.H., Schijven, M. and Gates, S. (2012), "Manifestations of higher-order routines: the underlying mechanisms of deliberate learning in the context of postacquisition integration", *Academy of Management Journal*, Vol. 55 No. 3, pp. 703-726.

Inkpen, A.C. and Pien, W. (2006), "An examination of collaboration and knowledge transfer: China-Singapore Suzhou industrial park", *Journal of Management Studies*, Vol. 43 No. 4, pp. 779-811.

Jaccard, J., Turrisi, R. and Wan, C.K. (1990), *Interaction Effects in Multiple Regression*, Sage Publications, Newbury Park, CA.

Kale, P., Singh, H. and Perlmutter, H. (2000), "Learning and protection of proprietary assets in strategic alliances: building relational capital", *Strategic Management Journal*, Vol. 21 No. 3, pp. 217-237.

Kaufman, W. (2013), "Airline mega-mergers: 'good, bad and ugly'", *National Public Radio*, available at: www.npr.org/2013/02/14/172018757/airline-mega-mergers-good-bad-and-ugly (accessed 1 September 2014).

Kogut, B. and Zander, U. (1993), "Knowledge of the firm and the evolutionary theory of the multinational enterprise", *Journal of International Business Studies*, Vol. 24 No. 4, pp. 625-645.

Kogut, B. and Zander, U. (1996), "What firms do? Coordination, identity, and learning", *Organization Science*, Vol. 7 No. 5, pp. 502-518.

Krishnan, R., Martin, X. and Noorderhaven, N. (2006), "When does trust matter to alliance performance?", *Academy of Management Journal*, Vol. 49 No. 5, pp. 894-917.

Larsson, R. and Finkelstein, S. (1999), "Integrating strategic, organizational, and human resource perspectives on mergers and acquisitions: a case survey of synergy realization", *Organization Science*, Vol. 10 No. 1, pp. 1-26.

Lecuona, J.R. and Reitzig, M. (2014), "Knowledge worth having in 'excess': the value of tacit and firm-specific human resource slack", *Strategic Management Journal*, Vol. 35 No. 7, p. 954.

Lepak, D.P. and Snell, S.A. (2002), "Examining the human resource architecture: the relationships among human capital, employment, and human resource configurations", *Journal of Management*, Vol. 28 No. 4, pp. 517-543.

Levin, D.Z. and Cross, R. (2004), "The strength of weak ties you can trust: the mediating role of trust in effective knowledge transfer", *Management Science*, Vol. 50 No. 11, pp. 1477-1490.

Li, J.J., Poppo, L. and Zhou, K.Z. (2010), "Relational mechanisms, formal contracts, and local knowledge acquisition by international subsidiaries", *Strategic Management Journal*, Vol. 31 No. 4, pp. 349-370.

López-Sáez, P., Navas-López, J.E., Martín-De-Castro, G. and Cruz-González, J. (2010), "External knowledge acquisition processes in knowledge-intensive clusters", *Journal of Knowledge Management*, Vol. 14 No. 5, pp. 690-707.

Lubatkin, M., Calori, R., Very, P. and Veiga, J.F. (1998), "Managing mergers across borders: a two-nation exploration of a nationally bound administrative heritage", *Organization Science*, Vol. 9 No. 6, pp. 670-684.

McCartney, S. (2013), "Southwest and AirTran Airlines: mergers and aggravations", available at: http://online.wsj.com/news/articles/SB10001424127887324448104578611980670019710 (accessed 10 September 2014).

Martin, X. and Salomon, R. (2003), "Knowledge transfer capacity and its implications for the theory of the multinational corporation", *Journal of International Business Studies*, Vol. 34 No. 4, pp. 356-373.

Mitchell, J., Arino, A. and Ozcan, P. (2008), *The KLM Approach to Alliances: Case Study*, IESE Business School, Barcelona, Spain.

Mitchell, W. and Shaver, J.M. (2003), "Who buys what? How integration capability affects acquisition incidence and target choice", *Strategic Organization*, Vol. 1 No. 2, pp. 171-202.

Mouawad, J. (2011), "Delta-northwest merger's long and complex path", available at: www.nytimes.com/2011/05/19/business/19air.html?pagewanted=all (accessed 1 September 2014).

Mouawad, J. (2012), "For united, big problems at biggest airline", available at: www.nytimes.com/2012/11/29/business/united-is-struggling-two-years-after-its-merger-with-continental.html?pagewanted=all&_r=0 (accessed 1 September 2014).

Murtha, T.P., Lenway, S.A. and Hart, J.A. (2001), *Managing New Industry Creation: Global Knowledge Formation and Entrepreneurship in High Technology*, Stanford University Press, Stanford, CA.

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

Nonaka, I. and Takeuchi, H. (1995), *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*, Oxford University Press, New York, NY.

Nonaka, I. and Von Krogh, G. (2009), "Tacit knowledge and knowledge conversion: controversy and advancement in organizational knowledge creation theory", *Organization Science*, Vol. 20 No. 3, pp. 635-652.

Noorderhaven, N. and Harzing, A.-W. (2009), "Knowledge-sharing and social interaction within MNEs", *Journal of International Business Studies*, Vol. 40 No. 3, pp. 719-741.

Nunnally, J.C. (1978), *Psychometric Theory*, McGraw-Hill, New York, NY.

Oguz, F. and Ayse Elif, S. (2011), "Mystery of the unknown: revisiting tacit knowledge in the organizational literature", *Journal of Knowledge Management*, Vol. 15 No. 3, pp. 445-461.

Patzelt, H. and Shepherd, D.A. (2008), "The decision to persist with underperforming alliances: the role of trust and control", *Journal of Management Studies*, Vol. 45 No. 7, pp. 1217-1243.

Podsakoff, P.M. and Organ, D.W. (1986), "Self reports in organizational research: problems and prospects", *Journal of Management*, Vol. 12 No. 4, pp. 531-544.

Polanyi, M. (1966), *The Tacit Dimension*, Peter Smith, Gloucester, MA.

Ranft, A.L. and Lord, M.D. (2002), "Acquiring new technologies and capabilities: a grounded model of acquisition implementation", *Organization Science*, Vol. 13 No. 4, pp. 420-441.

Reagans, R. and McEvily, B. (2003), "Network structure and knowledge transfer: the effects of cohesion and range", *Administrative Science Quarterly*, Vol. 48 No. 2, pp. 240-267.

Reiche, B.S. (2012), "Knowledge benefits of social capital upon repatriation: a longitudinal study of international assignees", *Journal of Management Studies*, Vol. 49 No. 6, pp. 1052-1077.

Schafer, J.L. (1999), "NORM: multiple imputation of incomplete multivariate data under a normal model", Version 2. Software found at: www.stat.psu.edu/~jls/misoftwa.html

Schnurman, M. (2013), "Delta and United offer two sides of an airline merger" [Online], available at: www.dallasnews.com/business/columnists/mitchell-schnurman/20130128-delta-and-united-offer-two-sides-of-an-airline-merger.ece (accessed 1 September 2014).

Simonin, B.L. (1999a), "Ambiguity and the process of knowledge transfer in strategic alliances", *Strategic Management Journal*, Vol. 20 No. 1, pp. 595-623.

Simonin, B.L. (1999b), "Transfer of marketing know-how in international strategic alliances: an empirical investigation of the role and antecedents of knowledge ambiguity", *Journal of International Business Studies*, Vol. 30 No. 3, pp. 463-490.

Simonin, B.L. (2004), "An empirical investigation of the process of knowledge transfer in international strategic alliances", *Journal of International Business Studies*, Vol. 35 No. 5, pp. 407-427.

Sirower, M.L. (1997), *The Synergy Trap: How Companies Lose the Acquisition Game*, The Free Press, New York, NY.

Subramanian, M., Rosenthal, S.R. and Halten, K.J. (1998), "Global new product development processes: preliminary findings and research propositions", *Journal of Management Studies*, Vol. 35 No. 6, pp. 773-796.

Szulanski, G. (2000), "The process of knowledge transfer: a diachronic analysis of stickiness", *Organizational Behavior and Human Decision Processes*, Vol. 82 No. 1, pp. 9-27.

Szulanski, G., Cappetta, R. and Jensen, R.J. (2004), "When and how trustworthiness matters: knowledge transfer and the moderating effect of causal ambiguity", *Organization Science*, Vol. 15 No. 5, pp. 600-613.

Szulanski, G. and Jensen, R.J. (2004), "Overcoming stickiness: an empirical investigation of the role of the template in the replication of organizational routines", *Managerial and Decision Economics*, Vol. 25 Nos 6/7, pp. 347-363.

Teece, D., Pisano, G.P. and Shuen, A. (1997), "Dynamic capabilities and strategic management", *Strategic Management Journal*, Vol. 18 No. 7, pp. 509-533.

Tsai, W. and Ghoshal, S. (1998), "Social capital and value creation: the role of intrafirm networks", *Academy of Management Journal*, Vol. 41 No 4, pp. 464-476.

Uzzi, B. (1997), "Social structure and competition in interfirm networks: the paradox of embeddedness", *Administrative Science Quarterly*, Vol. 42 No. 1, pp. 37-69.

Vaara, E., Sarala, R.M., Stahl, G.K. and Bjorkman, I. (2012), "The impact of organizational and national cultural differences on social conflict and knowledge transfer in international acquisitions", *Journal of Management Studies*, Vol. 49 No. 1, pp. 1-27.

Van de Ven, A.H. and Walker, G. (1984), "The dynamics of interorganizational coordination", *Administrative Science Quarterly*, Vol. 29 No. 4, pp. 598-621.

van den Berg, H.A. (2013), "Three shapes of organisational knowledge", *Journal of Knowledge Management*, Vol. 17 No. 2, pp. 159-174.

Venkitachalam, K. and Busch, P. (2012), "Tacit knowledge: review and possible research directions", *Journal of Knowledge Management*, Vol. 16 No. 2, pp. 357-372.

Walton, R.E., Cutcher-Gershenfeld, J.E. and Mckersie, R.B. (1994), *Strategic Negotiations*, Harvard Business School Press, Boston, MA.

Watson, S. and Hewett, K. (2006), "A multi-theoretical model of knowledge transfer in organizations: determinants of knowledge contribution and knowledge reuse", *Journal of Management Studies*, Vol. 43 No. 2, pp. 141-173.

Zaheer, A., Castaner, X. and Souder, D. (2013), "Synergy sources, target autonomy, and integration in acquisitions", *Journal of Management*, Vol. 39 No. 3, pp. 604-632.

Zander, U. and Kogut, B. (1995), "Knowledge and the speed of the transfer and imitation of organizational capabilities: an empirical test", *Organization Science*, Vol. 6 No. 1, pp. 76-92.

Zollo, M. and Singh, H. (2004), "Deliberate learning in corporate acquisitions: post-acquisition strategies and integration capability in US bank mergers", *Strategic Management Journal*, Vol. 25 No. 13, pp. 1233-1256.

Zollo, M. and Winter, S.G. (2002), "Deliberate learning and the evolution of dynamic capabilities", *Organization Science*, Vol. 13 No. 3, pp. 339-351.

Further reading

D'adderio, L. (2014), "The replication dilemma unravelled: how organizations enact multiple goals in routine transfer", *Organization Science*, Vol. 25 No. 5, pp. 1325-1350.

Appendix

Dependent Variables (Survey key: 1 = Very poor, 2 = Poor, 3 = Average, 4 = Good, 5 = Very good):

Sales implementation quality

How would you rate today the implementation of the acquisition on sales integration or cross-selling?

Operations implementation quality

How would you rate today the implementation of the acquisition on operational integration?

Explanatory Variables (Survey key: 1 = Not at all, 2 = To a limited extent, 3 = To some extent, 4 = To a considerable extent, 5 = To a great extent):

Tacit routine compatibility *(two items, $\alpha = 0.89$)*

1. Management style
2. Organizational culture

Trustworthiness *(five items, $\alpha = 0.74$)*

To what extent do the following traits describe your organization prior to the acquisition?

1. Collaborative
2. Relationship-oriented
3. Sociable
4. Equitable
5. Trusting

Level of integration *(four items, $\alpha = 0.78$)*

To what extent did you integrate the following functions?

1. Strategy formulation
2. Marketing
3. R&D
4. Operations

Control Variables

Explicit routine compatibility *(three items, $\alpha = 0.81$)*

1. IT systems
2. Financial and accounting systems
3. HR systems

Acquisition experience

How many acquisitions has your firm completed in the last five years?

Size similarity *(two items, $\alpha = 0.88$)*

Prior to the acquisition, to what extent were your firm and the target similar in the following areas?

1. Number of employees
2. Sales volume

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