A Meta-analysis of Integration Mechanism Outcomes in Multinational Enterprises

ABSTRACT

Despite the multitude of studies on integration in multinational enterprises, we still lack a comprehensive understanding of how firms integrate and the relationship between various integration mechanisms and expected outcomes. Through a meta-analyses of 30 independent samples including a total of 5,007 subsidiaries, we quantitatively synthesize and evaluate the relationships between different integration mechanisms (centralization, formalization and socialization) and expected integration outcomes related to financial performance and knowledge transfer. We find that there is overall support for the hypothesized relationships between the integration mechanisms and expected outcomes. We identify that formalization and socialization are strongly correlated and both have moderately strong positive association with financial performance and knowledge transfer. However, centralization as an integration mechanism is neither positively correlated with financial performance nor knowledge transfer. Centralization is furthermore not significantly correlated with formalization and socialization.

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INTRODUCTION

With increased globalization, many multinational enterprises (MNEs) experience efficiency pressures to remain competitive. Integration can enhance MNEs' efficiencies by enabling seamless coordination of activities and the utilization and transfer of firm-specific advantages (FSAs) across geographically spread organizational units (Kobrin, 1991; Mauri & Sambharya, 2001). Integration in MNEs has been studied extensively over the past decades. Indeed, a Google scholar search of "integration" generates almost 5 million results. The extensive focus on integration has resulted in a substantial body of empirical research on antecedents and outcomes of various integration mechanisms (e.g. Björkman et al., 2004; Kim et al., 2003; Noorderhaven & Harzing, 2009).

To achieve integration, MNEs typically utilize three key mechanisms: centralization, formalization and socialization (Ghoshal & Nohria, 1989; Kim et al., 2003). But empirical results seem inconclusive as to whether these mechanisms enable MNEs to realize expected benefits of integration such as increased efficiency, better utilization of FSAs, and ultimately better performance. Despite the emphasis on the challenges of integration, we still lack a clear understanding of the "tools" MNEs use to achieve desired outcomes (Keupp et al., 2011). Part of challenge in the inconclusive empirical results may be due to the common method bias resulting from analyzing survey data based on same-respondent replies (Chang et al., 2010). However, it is also questioned if integration mechanisms may have changed over time due to evolving external dynamics (Sinkovics et al., 2011).

Several recent studies have provided useful overviews to enhance our understanding of integration in MNEs such as Fan et al.'s (2012) qualitative literature review of integration mechanisms and Rao's (2012) inventory method to review the field. However, qualitative literature reviews or inventory method cannot address statistical artifacts such as sampling error and measurement error which are common in survey data. Meta-analytical techniques can account for

these statistical artifacts that may have influenced results (Cook et al., 1992) and thus give us a more generalizable picture in outcomes brought by different integration mechanisms.

In this study, we conduct a meta-analysis that quantitatively synthesizes and evaluates outcomes of various integration mechanisms. This will help us to identify the state of our progress in research on MNE integration as well as suggest directions for future study. The meta-analysis not only assesses the overall progress that has been made in the study of integration mechanisms, but also corrects for the statistical artifacts in most survey data research. .The paper contributes to our understanding of MNE integration by investigating cumulative research on different integration mechanisms and their impact on desired integration outcomes such as knowledge transfer, and financial performance.

CONCEPTUAL FRAMEWORK AND HYPOTHESES

Definitions and Conceptual Framework

Integration has frequently been defined as the coordination and control of business activities across borders (Cray, 1984; Kim et al., 2003; Martinez & Jarillo, 1989). The concepts of control, coordination and integration are therefore used with some overlap in the international management literature (Smale et al., 2013). In this study we are only interested in the study of integration in the MNE's internal network of organizational units. As a result, when we refer to the term integration, we mean global or regional integration in MNEs. Integration is not a specific phenomenon for MNEs but can also be present in any multi-unit organization, but the complexity and diversity of geographic locations of MNEs make the topic especially important and challenging in MNEs (Martinez & Jarillo, 1991).

In the MNE context, various international strategies require different levels of integration (Grøgaard, 2012). MNEs in industries with competitive pressures for efficiency, standardization, and cost reductions typically focus on integration to reap the benefits of economies of scale and an optimal utilization of internal resources (Schmid & Kotulla, 2011; Kobrin, 1991). The fundamental

competitive advantages of MNEs pursuing integration strategies are based on their abilities to seamlessly align, link and coordinate resources and activities across national borders (Verbeke, 2013; Roth et al., 1991). Integration mechanisms are central for our understanding of how firms integrate, not only because they are observable but also because integration "becomes possible only through the use of organizational mechanisms for coordination and control" (Kim et al., 2003, p.329). Our focus in this study is therefore on specific integration mechanisms implemented in the MNE network.

While various integration mechanisms have been identified in the previous research, these can be categorized as representing mechanisms related to centralization of decision-making, formalization of processes and procedures or socialization of people within the MNE (Ghoshal & Nohria, 1989; Grøgaard, 2012; Nohria & Ghoshal, 1994; Rugman et al., 2011). Centralization focuses more on control from headquarters and refers to the decision-making through the hierarchy of formal authority. By formalization, MNEs standardize and routinize 'ways of doing things' through written policies, rules and procedures utilized across different organizational units in the MNE network (Ambos & Schlegelmilch, 2007). Socialization, often also referred to as normative integration, refer to those organizational mechanisms which build interpersonal familiarity, personal affinity, and convergence of shared values among personnel from different units in the MNE network (Bjorkman et al., 2004; Ghoshal & Nohria, 1989). These different mechanisms are predominantly complementary instead of substitutes as they exist simultaneously in many MNEs (Björkman et al., 2004; Kim et al., 2003; Martinez & Jarillo, 1989).

INSERT FIGURE. 1 HERE

In Figure 1, we present the model of integration mechanisms that provides a conceptual framework for our meta-analysis. Although the three key integration mechanisms in MNEs are commonly accepted in the literature, the relationships between them as well as their outcomes remain unclear. For instance, the relationship between centralization and formalization has been

debated over decades (Roth et al., 1991), yet the integration mechanisms are typically examined separately as their association remains unclear. Specifically, although the three different integration mechanisms are correlated and they are still expected to generate different outcomes. We will therefore, in contrast to Liu et al. (2014), code the integration mechanisms separately. We argue that this will address the commensurability problem in meta-analyses more appropriately. Based on the correlations between different integration mechanisms, this meta-analysis also attempts to evaluate the impact of these integration mechanisms on various outcomes.

As the model in Figure 1 highlights, the key purposes of this meta-analysis is to: (1) assess the strength and consistency of the pair wise relationships between integration mechanisms and various outcomes in MNEs by correcting for statistical artifacts; (2) account for variance in these relationships by using study characteristics as moderator variables; (3) assess the impacts of different integration mechanisms on various outcomes by taking into account the relationships among different mechanisms.

Hypotheses Development

The outcomes of integration mechanisms reflect the anticipated benefits of integration. Whether integration is global or regional, there are mainly three types of anticipated benefits that MNEs seek when integrating their international activities: (1) economies of scale in the sense of specializing specific activities in one location; (2) economies of scope from sharing resources such as knowledge across different units; and (3) economies of exploiting location-specific advantages resulting from factor differences across countries (Roth et al., 1991; Rugman & Verbeke, 1992).

Financial performance

It is widely recognized that MNEs may have differentiated needs where integration is not desirable at all times (Ghoshal & Nohria, 1989). However, for firms that actively seek competitive advantages through integration, achieving integration should ultimately result in better performance (Kobrin, 1991). The integration mechanisms are the specific observable means that

enable the MNE to achieve the desired integration (Kim et al., 2003). Successful implementation of the three key integration mechanisms should therefore lead to superior performance (Ghoshal & Gratton, 2002; Verbeke & Asmussen, 2015).

The three integration mechanism contribute to improved performance in various ways. Centralization of decision-making enables headquarters to align and coordinate FSAs throughout the MNE and thus ensure that organizational units do not make sub-optimal decisions related to the MNEs resources and activities. Centralized decision-making also simplifies the information flow and increases efficiency because of specialization. It is recognized that the need for centralized decision making may vary across business areas (Kim et al., 2003; Young & Tavares, 2004). However, if the MNE is seeking to strengthen its competitiveness through integration, low levels of centralization are expected to result in internal fragmentation and deficiencies, which sacrifices key benefits of integration such as economies of scale (Ghoshal & Gratton, 2002). Firms seeking benefits of integration such as economies of scale should thus expect to see better financial performance as a result of centralized decision-making. By formalization or standardization, knowledge and experience is routinized at an organizational level through written policies, rules and standard procedures in the MNE network (Lin & Hsieh, 2010). Formalization is intended to enable the transfer of FSAs and coordinate behavior throughout the MNE (Roth et al., 1991), which ultimately increases the utilization of FSAs as well as the internal efficiencies of resources and activities. An increasing number of MNEs are also recognizing that socialization can be an effective tool to achieve desired levels on integration (Cicekli, 2011; Bjorkman et al., 2004; Birkinshaw & Morrison, 1995). Socialization reflects a less formal process where the organizations seeks to develop shared goals and values that guide, rather than mandate, behaviors (Cicekli, 2011). Developments in information technology, especially the internet, has enabled MNEs to effectively pursue socialization processes without having to rely on traditional hierarchical and formal systems (Ghoshal & Gratton, 2002). The expected increased internal alignment resulting from socialization

processes are expected to enable the transfer of FSAs and improve necessary communication for economies of scale and scope.

The relationships between integration mechanisms and financial performance are hypothesized as follows:

Hypothesis 1: For firms that utilize integration mechanisms to achieve competitive advantages, (1) H1a: Centralization is positively correlated with financial performance; (2) H1b: Formalization is positively correlated with financial performance. (3) H1c: Socialization is positively correlated with financial performance.

Knowledge transfer

MNEs represent networks of knowledge (Crespo et al., 2014; Roth et al., 2009). MNE managers thus often seek to explore and exploit the knowledge embedded in different organizational units within the MNE network (Ambos & Ambos, 2009), recombining it with existing resources to create more competitive advantages (Rugman et al., 2011). When knowledge, a key FSA in most MNEs, is transferred efficiently and effectively across geographically dispersed units, the MNE not only utilizes existing knowledge better but additional value can be created in recipient units through knowledge recombination (Verbeke, 2013). This type of recombination lies at the core of international business strategy since it can ultimately contribute to new FSAs in the MNE network and enhance the MNE's overall competitive advantage (Rugman et al., 2011). Transferring knowledge may not have immediate financial impacts but would enhance corporate performance in the long term through better internal knowledge development and operational improvements (Davenport et al., 1998). Knowledge transfer should therefore be analyzed separately as another important consequence of integration mechanisms.

Effective integration of knowledge, not the type of knowledge per se, is the key driver of sustainable competitive advantage (Crespo et al., 2014). Given that foreign subsidiaries are often embedded in diverse local contexts (Meyer et al., 2011), headquarters may have limited insights

into valuable knowledge residing in the foreign subsidiaries, effectively suffering from bounded rationality Centralization of decision-making may in such instances therefore confine knowledge flows and restrict the flexibility and innovation of subsidiaries to contribute to valuable FSA development in the MNE. High levels of centralization may thus deter a subsidiary to be better integrated into the differentiated MNE networks (Gupta & Govindarajan, 2000).

Ambos and Ambos (2009) suggest that routines are a more efficient way to transfer knowledge between different organizational units since they bring greater clarity to the MNE operations as a whole (Crespo et al., 2014). When tools, techniques, and data are available to all parties, this may stimulate various units to share knowledge (Ghoshal & Gratton, 2002). So formalization, in terms of codified, standardized systems and routines, is expected to facilitate knowledge transfer within MNE networks. With existence of close interpersonal networks, socialization mechanisms increase the openness of communication between the interacting parties and the number of communication channels through which knowledge can be transmitted (Gupta & Govindarajan, 2000). As a result, socialization mechanisms are expected to facilitate knowledge creation and diffusion across different units within an MNE network (Björkman et al., 2004). When more social interactions between different units occur, knowledge spread will be stimulated since organizational boundaries become blurred. As a result, the relationships between the integration mechanisms and knowledge transfer are hypothesized as follows:

Hypothesis 2: For firms that utilize integration mechanisms to achieve competitive advantages, (1) H2a: Centralization is negatively correlated with knowledge transfer; (2) H2b: Formalization is positively correlated with knowledge transfer; (3) H2c: Socialization is positively correlated with knowledge transfer.

Inter-correlations

The preceding hypotheses assume that different integration mechanisms are distinct and separate. However, the different integration mechanisms employed in MNEs are not mutually

exclusive and can be complementary instead of substitutes (Björkman et al., 2004; Kim et al., 2003; Martinez & Jarillo, 1989). Thus it is important to consider the correlations between different integration mechanisms and the level of balance between different integration mechanisms (Roth & Nigh, 1992).

When there is a high level of centralized decision-making, headquarters are seen to intervene directly into the operations of subsidiaries. The interaction between headquarters and subsidiaries often relies on various formal reports, rules, policies, and procedures. Socialization may also be imperative for the success of other integration mechanisms (Roth et al., 1991). On one hand, socialization may serve as a "glue" in the organization (Persson, 2006). On the other hand, formalized reporting of shared goals, objectives, values, and policies can also facilitate the socialization process.

The above discussion leads to the following hypotheses:

Hypothesis 3: For firms that utilize integration mechanisms to achieve competitive advantages, (1) H3a: Centralization is positively correlated with formalization; (2) H3b: Formalization is positively correlated with normative integration; (3) H3c: Socialization is positively correlated with centralization.

METHOD

Literature Search and Criteria for Inclusion

A systematic search of the integration literature in MNEs from 1980 up to 2014 was conducted, using several sources including searches of EBSCO, ABI/INFORM, Web of Science, ProQuest and Google Scholar. To be inclusive, a broad search was conducted using keywords such as *integration mechanism, administrative mechanism, coordination mechanism* or *mode* plus *MNC* or *MNE*. The search was complemented by an ancestry approach to search articles identified in four review articles (Fan et al., 2012; Martinez & Jarillo, 1989; Rao, 2012; Schaaper et al., 2011). A descendancy approach to search articles (Web of Science) citing two important empirical articles

(Ghoshal & Nohria, 1989; Kim et al., 2003) was also conducted. We also checked the references to empirical studies of relevance in those articles coded by us during the meta-analysis.

To be finally included for the meta-analysis, several judgment calls needed to be made. First, the study needed to contain at least two variables that fit the theoretical model. Second, studies that examined integration mechanism in other context other than MNEs were excluded. For example, Cousins and Lawson (2007) discussed impact of integration mechanisms in supply chain management performance was excluded. Third, to be included, studies needed to report sample sizes along with correlations or statistical results adequate to compute a correlation coefficient or effect size between an integration mechanism and an outcome (e.g. *t* score, *d* score, and *F* score). As a result, qualitative research, such as case studies (e.g. Ghoshal & Gratton, 2002), modeling studies (e.g Devinney et al., 2000), and conceptual papers (e.g. Buckley, 2011; Rugman et al., 2011; Sinkovics et al., 2011), were not included. In some instances, when articles did not report data, we contacted the authors to request data to compute effect sizes (e.g. Alharbi & Singh, 2013; Morrison & Roth, 1993). Fourth, some studies were removed because the operationalization of constructs did not adhere to the general definition of the constructs we used. Finally, some articles were excluded because they used the same datasets as other articles. For example, only Gomez and Werner (2004) was meta-analyzed but not Gomez and Sanchez (2005) since the 2004 article included all the variables in the 2005 article. These screens resulted in 27 studies, containing 30 samples and 232 effect sizes involving 5,007 subsidiaries.

Coding and Sample Characteristics

As recognized in previous studies, variables are often operationalized in multiple ways in international business research (Liu et al., 2014; Reus & Rottig, 2009). To ensure the commensurability, we closely compared the construct definitions and operationalizations to make sure that they were similar to definitions we introduced in the hypotheses development section. Sometimes, different authors used the same terminology to define different concepts. Other times,

different authors used different terminology for the same concepts. For instance, n the study by Noorderhaven and Harzing (2009) "formal coordination" was coded as formalization since its conceptualization focuses on "use of planning systems, formal procedures, and reporting, and ERP systems" which corresponds to our definition of formalization. Their study also has a construct referred to as "subsidiary autonomy", which assesses the "influence that HQs would normally have on a range of issues" (selection of suppliers, advertising, etc.). This was therefore coded as "centralization". Kumar and Seth (1998) used the term “integrative mechanism” to represent socialization mechanisms (which is also referred to as normative integration in other papers).

The sampling characteristics are as follows. First, most data in the meta-analyzed articles are self-reported data from a single source; only 2 studies (7%) used archival data. 9 studies (33%) collected data from headquarters (HQ); 14 studies (52%) collected data from subsidiaries (sub); 3 studies (11%) collected data from both sources (mixed). Second, the majority of integration studies have been cross-sectional. 14 studies are in the manufacturing industry, 9 studies in the mixed industry. 6 studies are in industries identified as “global”.

Meta-Analytic Procedures

We used the meta-analytic procedures in Hunter and Schmidt (2004) to calculate the weighted mean correlations between various integration mechanisms and consequence variables. Effect sizes were only analyzed where at least three studies were available (Lipsey & Wilson, 2001). Some researchers have argued that measurement errors need to be accounted for to provide a more accurate estimate (Cook et al., 1992; Hunter & Schmidt, 2004). We therefore corrected for measurement error. In the cases where reliability estimates were not provided, we used the average obtained from our meta-analysis for the same construct. As to some cases where such averages were not available, we only controlled for sampling error (Hunter & Schmidt, 2004). In addition to reporting the weighted mean uncorrected correlations and weighted mean corrected correlations, we also reported Q statistics and 90% credibility intervals to describe variability in the correlations.

95% confidence intervals following random effects procedures (Hunter & Schmidt, 2004) were reported to indicate whether the weighted mean corrected effects were statistically significant or not. To assess the potential causes of non-robustness, fail-safe N was estimated to see whether there was possibility of publication bias since it indicates the number of unpublished non-significant studies needed to remove the significance from the meta-analysis (Rosenthal, 1995). Also meta-analytic results deleting outliers were compared to assess the robustness of the meta-analytically derived statistics (Hunter & Schmidt, 2004).

All the computations (effect sizes, conversion, credibility intervals, confidence intervals, Q statistic, fail-safe N, etc.), except for the moderator analysis, were performed by using MetaExcel (Steel, 2007) which followed Hunter and Schmidt's (2004) method. We conducted weighted least square regression (WLS) to carry the moderator analysis using STATA (v.13). Compared with other moderator estimation techniques, WLS is recommended because of its robustness under conditions of multicollinearity and heteroscedasticity (Steel & Kammeyer-Mueller, 2002).

RESULTS AND DISCUSSIONS

Main effect results

We briefly discuss the magnitudes of the relationships shown in Table 1 before discussing the specific hypothesized relationships. Overall the variables assessed exhibited substantial relationships. Specifically, in 6 of the 9 cases, the relationship was significant (i.e. as indicated by a 95% confidence interval that did not cross zero). In addition, the simple average of the absolute magnitudes of all the relationships examined was $\rho=0.21$, which can be regarded medium to moderately large (Cohen, 2013). By category, socialization demonstrated the strongest relationships. Although substantial variation existed as most Q statistics were significant and 90% credibility intervals were wide, the overall message was clear that the integration mechanisms exhibited significant relationships with the different outcomes.

INSERT TABLE 1 HERE

Outcomes of different integration mechanisms

For the financial performance as the outcome, nine empirical studies reported a correlation between centralization and performance in MNEs. The corrected true correlation was ρ=-0.08 (k = 9, N = 2128) with a 95% confidence interval from -0.21 to 0.04. The meta-analysis results do not support H1a that there is a positive correlation between centralization and performance and the results actually indicate a negative correlation. So it may imply that subsidiaries create significant value through autonomy and empowerment. Centralization, although a good mechanism to achieve economies of scale, may stifle the responsiveness to local markets and does not directly contribute to performance improvements. However, the 90% credibility interval spans from -0.38 to 0.23, suggesting that the negative relationship may not likely be generalizable in other circumstances. The significant Q statistic and wide credibility interval also suggest the necessity of a moderator analysis.

As to the seven empirical studies reporting a correlation between formalization and performance in MNEs, the corrected true correlation was ρ=0.19 (k = 7, N = 1713) with a 95% confidence interval from 0.10 to 0.28. The meta-analysis results support H1b that there is a positive correlation between formalization and financial performance and the 90% credibility interval spans from 0.02 to 0.35, suggesting that the positive relationship will likely be generalizable in other circumstances. The significant Q statistic and wide credibility interval also suggest the necessity of a moderator analysis.

Eight empirical studies reported the correlation between socialization and performance in MNEs. The corrected true correlation was ρ=0.34 (k = 8, N = 1770) with a 95% confidence interval from 0.21 to 0.47. The mean effect size ρ=0.34 can be regarded as large (Cohen, 2013). The meta-analysis results support H1c that there is a positive correlation between socialization and performance and the 90% credibility interval spans from 0.07 to 0.61, suggesting that the strong

positive relationship will likely be generalizable in other circumstances. The significant Q statistic and wide credibility interval also suggest the necessity of a moderator analysis.

For the knowledge transfer as the outcome, nine empirical studies reported a correlation between centralization and knowledge transfer in MNEs. The corrected true correlation was ρ=-0.17 (k = 9, N = 1755) with a 95% confidence interval from -0.32 to -0.03. The meta-analysis results support H2a that there is a negative correlation between centralization and knowledge transfer, but The 90% credibility interval spans from -0.69 to 0.24, suggesting that the negative relationship will not likely be generalizable in other circumstances. The significant Q statistic and wide credibility interval also suggest the necessity of a moderator analysis.

Seven empirical studies reported a correlation between formalization and knowledge transfer in MNEs. The corrected true correlation was ρ=0.17 (k = 7, N = 1150) with a 95% confidence interval from 0.09 to 0.32. The meta-analysis results support H2b that there is a positive correlation between formalization and knowledge transfer and the 90% credibility interval spans from 0.00 to 0.42 suggesting that the positive relationship may be generalizable in other circumstances. The significant Q statistic and wide credibility interval also suggest the necessity of a moderator analysis.

Fourteen empirical studies reported the correlation between socialization and performance in MNEs. The corrected true correlation was ρ=0.35 (k =14, N = 2386) with a 95% confidence interval from 0.24 to 0.46. The mean effect size ρ=0.35 can be regarded as large (Cohen, 2013). The meta-analysis results support H2c that there is a positive correlation between socialization and knowledge transfer and the 90% credibility interval spans from 0.02 to 0.68, suggesting that the strong positive relationship will likely generalize in other circumstances. The significant Q statistic and wide credibility interval also suggest the necessity of a moderator analysis.

Inter-correlation between different integration mechanisms

Twelve empirical studies reported a correlation between centralization and formalization in MNEs. The corrected true correlation was ρ=0.04 (*k* = 12, *N* = 2622) with a 95% confidence interval from -0.21 to 0.25. The meta-analysis results do not support H3a that there is a positive correlation between centralization and formalization. The 90% credibility interval spans from -0.60 to 0.68. The significant Q statistic and wide credibility interval suggest the necessity of a moderator analysis.

Nineteen empirical studies reported a correlation between formalization and intermediate process in MNEs. The corrected true correlation was ρ=0.42 (*k* = 19, *N* = 3619) with a 95% confidence interval from 0.34 to 0.51. The mean effect size of ρ=0.42 can be regarded as large (Cohen, 2013). The meta-analysis results support H3b that there is a positive correlation between formalization and socialization and the 90% credibility interval spans from 0.13 to 0.70, suggesting that the positive relationship will likely be generalizable in other circumstances.. The significant Q statistic and wide credibility interval also suggest the necessity of a moderator analysis.

Twelve empirical studies reported the correlation between socialization and centralization in MNEs. The corrected true correlation ρ=-0.09 (*k*= 12, *N* = 3108) with a 95% confidence interval from -1.15 to 0.29. The meta-analysis results do not support H3c that there is a positive correlation between socialization and centralization. The significant Q statistic and wide credibility interval still suggest the necessity of a moderator analysis.

Outliers can distort results, especially when they represent a big discontinuity from the rest of studies. In our meta-analysis, we also carried analysis after eliminating outliers if their effect sizes were four standard deviations away from the mean correlation and represented a big discontinuity from the rest of studies (eg. Crespo et al., 2014; Noorderhaven & Harzing, 2009). In the outlier analysis, the majority of changes only represent the strength of effect sizes. The statistical significance and generalizability did not change. The only exception is the relationship

between centralization and performance. But overall, the analysis is robust to outliers. So the continued analysis was based on all studies. The details of outlier analysis results are available from the authors upon request.

Test of Moderating Effects

Table 2 summarizes the results of our first moderator search, where we consider whether any relationships in Table 1 were affected by data sources: data obtained from subsidiaries, HQs or both, as there is always common method variance from analyzing survey data in international business research (Chang et al., 2010). Through this moderator analysis, we will test if the differences in data sources influence the perceived relationship.

Two dummy variables were created to represent the three groups of data source. The WLS regression was adopted for the moderator analysis since it usually provides the most robust results compared with other moderator estimation techniques (Steel & Kammeyer-Mueller, 2002). The weight used in the multiple regression analysis is based on the inverse of sampling error, as in the following equation (Steel & Kammeyer-Mueller, 2002). As a result, we give more weight to studies with larger sample size and larger effect size.

$$Weight = \frac{N-1}{(1-r_{xy}^2)^2}$$

Only four relationships in Tables 1 and 2 were analyzed in Table 4 as we do not have a sufficient number of studies to do the moderator search for other relationships. Two additional columns were added to the previous tables, namely R^2 and F which indicate the percentage of variance the moderator accounts for and statistical significance of differences among groups respectively.

INSERT TABLE 2 HERE

As can be seen, the results indicate that the data source is an important moderator in some pairwise relationships. For the relationship between centralization and performance as the outcome,

the moderator effect was weakly significant at $p<0.10$. Its mean main effect size was ρ=-0.08, non-significant at 95% (95% confidence interval being from -0.21 to 0.04 as in Table 1). The moderator analysis showed that one of major reasons for the non-significance of the relationship was due to differences from data sources. When data were collected from HQs, the mean effect size ρ=-0.15 was statistically significant, with a 95% confidence interval from -0.29 to -0.01. But when data were collected from subsidiaries, the effect size was close to zero and not significant. This finding is somewhat surprising. There was good reason to believe that the motivation for economies of scale through centralization would be headquarter driven. If data were collected from headquarters, the probability of obtaining a positive relationship between centralization and performance would therefore be higher than in the case of collecting data from subsidiaries. But the moderator analysis suggests that headquarters thinks that centralization limits the potential for subsidiaries and MNEs as a whole to tap into the opportunities in local markets. But the wide credibility intervals still suggests that other moderators exist.

As to the correlation between formalization and centralization, the moderator effect was significant at $p<0.01$. Its mean main effect size was ρ=0.04 (Table 1), not significant at 95% as the confidence interval was from -0.21 to 0.25. The moderator analysis showed that one of major reasons for the non-significance of the relationship was due to differences in data sources. When data were collected from HQs, the mean effect size was ρ=-0.14 with a 95% confidence interval from -0.29 to 0.03. But when data were collected from subsidiaries, the effect size was ρ=-0.41 with a 95% confidence interval from -0.08 to 0.79. The finding showed that headquarters typically did not perceive that formalization and centralization go hand in hand. On the contrary, headquarters perceived these two mechanisms as substitutes. Subsidiaries perceived formalization and centralization as complements rather than substitutes. However, the wide credibility intervals still suggest that other moderators exist.

As to the relationship between socialization and knowledge transfer as the outcome, the WLS model was significant at $p<0.01$ but the mean differences among the three groups were very small. A closer examination showed that when data were collected from HQ or mixed sources, the credibility intervals were very narrow. When data were collected from subsidiaries, the credibility intervals were very wide. This suggests that other moderator searches are necessary to explain the heterogeneity between these two constructs when data were collected from subsidiaries. When data were collected from HQs or both HQ and subsidiaries, there is quite homogeneous belief that socialization is strongly positively associated with knowledge transfer.

As to the relationship between formalization and socialization, we did not have sufficient power for statistical significance. In all the three cases, the relationship between these two integration mechanisms were moderately strong (over 0.35), but the credibility interval for sub was extremely wide, suggesting the existence of other moderators.

CONCLUSION

The implementation of integration mechanisms is essential to realize expected benefits of integration. In this meta-analysis, we seek to better understand the relationships between various integration mechanisms and integration outcomes, and to examine if these relationships differ across the various integration mechanisms. We specifically meta-analyze all available empirical studies on MNE integration with respect to the correlations between different integration mechanisms and their associated outcomes.

By removing the sampling error and measurement error, which are two important sources of error in survey based research in international business, this meta-analysis provides evidence for several key relationships based on cumulative research results. First, formalization and socialization are strongly correlated and both have moderately strong positive relationships with financial performance and knowledge transfer. The effect sizes for these relationships are moderately large to large and are generalizable to other circumstances. It suggests that

formalization and socialization mechanisms lead to similar directions for MNEs, potentially serving as complements in practice. Second, centralization does not bear significant relationships with the other two types of integration mechanisms. Neither substitution nor complementarity relationships are supported. Although H2a is supported, suggesting that centralization is negatively correlated with knowledge transfer, this relationship is not generalizable to other circumstances. The relationship between centralization and financial performance is not supported. It may suggest the existence of an inverse U shaped non-linear relationship between centralization and financial performance. Differentiated MNEs have to achieve a balance of central and decentralized decision-making to realize good performance. Centralization brings about efficiencies of concentration such as scale economies (Mauri & Sambharya, 2001) but can lead to bounded rationality challenges and stifle subsidiary initiatives which favor more decentralized organic forms of control (Birkinshaw et al., 1998). Third, data sources (whether data were collected from headquarters, subsidiaries or both) explained some of the heterogeneity of results. From the moderator analysis of data sources, we found that when data were collected from subsidiaries only, there was larger heterogeneity than the cases when data were collected from headquarters. For example, for the relationship between socialization and knowledge transfer, it is significantly positive in all three cases. However, the results may not be generalizable in other circumstances if data were collected from subsidiaries only, but are generalizable in the other two cases. This implies that other unexplored variables should be analyzed to better explain the relationship when data were collected from subsidiaries only.

Our research not only extends our understanding in what mechanisms are more appropriate in achieving integration in MNEs, but also have practical implications in other situations. In the complex multiunit organization, we also see the coopetition within the organization. The insights from this analysis (such as how different coordination mechanisms influence knowledge transfer) are also applicable to the multiunit organization, as in Tsai (2002).

We need to point out most data in meta-analyzed articles are self-reported data from single sources and the majority of integration studies have been cross-sectional. This not only illustrates a weakness in existing research on MNE integration, but also result in the possibility that endogeneity issues exist for some of the variables. A butterfly meta-analysis should therefore be conducted, which incorporates both antecedents and outcomes. This could provide clarification of the variables' roles as either antecedents or outcomes.

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TABLES AND FIGURES

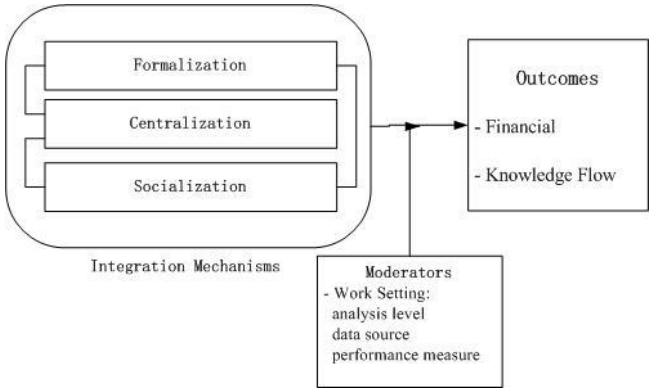

Figure 1 Conceptual Framework

Table 1 Meta-Analysis Summary of the Outcomes of Different Integration Mechanisms

							90% Credibility Int.		95% Confidence Int.		Fail-safe N
Variable	*k*	*N*	*r*	*ρ*	*SD ρ*	*Q*	Lower	Upper	Lower	Upper	
Performance as the Outcome											
Centralization	9	2,128	-0.07	-0.08	0.20	61.85***	-0.38	0.23	-0.21	0.04	n.a.
Formalization	7	1,713	0.17	0.19	0.12	21.22***	0.02	0.35	0.10	0.28	6
Socialization	8	1,770	0.30	0.34	0.18	54.38***	0.07	0.61	0.21	0.47	21
Knowledge Transfer as the Outcome											
Centralization	9	1,755	-0.15	-0.17	0.23	70.51***	-0.52	0.18	-0.32	-0.03	24
Formalization	7	1,150	0.17	0.21	0.16	20.69***	0.00	0.42	0.09	0.32	8
Socialization	14	2,386	0.30	0.35	0.22	96.71***	0.02	0.68	0.24	0.46	38
Correlations Between Different Integration Mechanisms											
Centralization - Formalization	12	2,622	0.02	0.04	0.40	267.54***	-0.60	0.68	-0.21	0.25	n.a.
Formalization – Socialization	19	3,619	0.34	0.42	0.19	107.68***	0.13	0.70	0.34	0.51	68
Centralization - Socialization	12	3,108	-0.09	-0.14	0.49	249.77***	-0.93	0.64	-1.15	0.29	20

*** if $p < 0.01$, ** if $p < 0.05$, * if $p < 0.10$.

Table 2 Moderator Analysis for data source: from headquarters (HQ); from subsidiaries (sub); from both HQ and sub (mixed).

								90% Credibility Interval		95% Confidence Interval	
Variable	*k*	*N*	*r*	*ρ*	SD_{ρ}	R^2	*F*	Lower	Upper	Lower	Upper
Performance as the Outcome											
Centralization mixed	1	82	0.09	0.10	n.a.	0.214	2.96*	n.a.	n.a.	0.01	0.16
Centralization HQ	4	1,366	-0.13	-0.15	0.17			-0.37	0.08	-0.29	-0.01
Centralization sub	4	679	0.02	0.03	0.21			-0.28	0.34	-0.17	0.21
Knowledge Transfer as the Outcome											
Socialization mixed	4	344	0.35	0.41	0.13	0.698	256.18***	0.31	0.51	0.28	0.54
Socialization HQ	3	982	0.27	0.39	0.03			0.39	0.39	0.37	0.41
Socialization sub	7	1,060	0.32	0.38	0.32			-0.12	0.88	0.14	0.61
Inter-correlation Between Integration Mechanisms											
Formalization – Socialization mixed	2	406	0.33	0.43	0.06	0.057	1.03	0.43	0.43	0.33	0.52
Formalization - Socialization HQ	7	1,866	0.36	0.45	0.14			0.27	0.63	0.36	0.54
Formalization - Socialization sub	10	1,347	0.30	0.37	0.27			-0.04	0.78	0.23	0.53
Formalization – Centralization mixed	1	82	0.08	0.11	n.a.	0.756	72.17***	n.a.	n.a.		
Formalization - Centralization HQ	6	1,792	-0.10	-0.14	-0.22			-0.48	0.20	-0.29	0.03
Formalization - Centralization sub	5	748	0.30	0.41	0.45			-0.32	1.00	-0.08	0.79

HQ: headquarters; sub: subsidiaries; mixed: from both HQ and sub. Mixed is coded as the base. *** if $p < 0.01$, ** if $p < 0.05$, * if $p < 0.10$.