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Peter Ekman

Peter Thilenius

Steven M. Thompson

University of Richmond, sthomps3@richmond.edu

Jonathan W. Whitaker

University of Richmond, jwhitaker@richmond.edu

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Digital transformation of global business processes:

The role of dual embeddedness

Peter Ekman
Marketing Division
School of Business, Society and Engineering
Mälardalen University
Post Office Box 883
SE-721 23 Västerås, Sweden
peter.ekman@mdh.se

Peter Thilenius
Department of Business Studies
Uppsala University
Post Office Box 513
SE-751 20 Uppsala, Sweden
peter.thilenius@fek.uu.se

Steve Thompson
Management Department
Robins School of Business
University of Richmond
1 Gateway Road
Richmond, Virginia 23173
sthomps3@richmond.edu

Jonathan Whitaker
Management Department
Robins School of Business
University of Richmond
1 Gateway Road
Richmond, Virginia 23173
jwhitaker@richmond.edu

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**Digital transformation of global business processes:
The role of dual embeddedness**

Abstract

Purpose – While much existing research on MNC digital transformation has followed a linear design and implementation logic using cross-sectional data, the multiple and divergent needs of headquarters (HQ) and subsidiaries suggest that MNC digital transformation actually involves a more iterative journey. In this paper, we apply the theoretical perspective of embeddedness to better define the complexities of MNC digital transformation, and identify how HQ and subsidiaries can navigate the complexities.

Design/methodology/approach – This paper presents a longitudinal multi-case study of five *Forbes Global 2000* firms that are HQ in Europe with large subsidiaries in the U.S. We conducted in-depth interviews with 26 senior executives at HQ and subsidiaries over a 15-month period.

Findings – The process of digital transformation is significantly influenced by internal embeddedness (relationship of HQ with subsidiaries and across subsidiaries) and external embeddedness (relationship of subsidiaries with their local markets), and also by strategy, financial and technology considerations. While HQ and subsidiaries have different perspectives, an understanding of these influences can help HQ and subsidiaries navigate digital transformation.

Research limitations/implications – HQ and subsidiaries can apply insights from this research to navigate the complexities of digital transformation.

Originality/value – This paper demonstrates that embeddedness is a useful theory to understand the complexities of MNC digital transformation.

Keywords Digital, embeddedness, external, global, headquarters, internal, MNC, multinational, subsidiary, transformation

Paper type Case study

1. Introduction

Multinational corporations (MNCs) are embarking on a digital transformation of their global business processes to improve competitiveness and profitability (Mithas, Whitaker, & Tafti, 2017). In this digital transformation, MNCs are implementing and upgrading information technology (IT) and Internet-enabled applications to achieve operational efficiencies (Whitaker, Ekman, & Thompson, 2017), reshape relationships with customers, and integrate with suppliers (Kim, Jean, & Sinkovics, 2018), resulting in profound impacts to corporate strategy and financial performance (Mithas, Tafti, Bardhan, & Goh, 2012).

For IT and Internet-enabled applications, MNC headquarters (HQ) often choose commercial off-the-shelf solutions from vendors such as Microsoft, Oracle and SAP, that function as de facto global standards (Ekman, Thilenius, & Windahl, 2014). However, the standardization requirements of these solutions limits the ability of MNCs to make market-specific adaptations requested by subsidiaries, which then requires HQ to evaluate tradeoffs between global standardization and local adaptation (Vrontis, Thrassou, & Lamprianou, 2009). In this evaluation, HQ frequently prioritizes enhanced international efficiencies through standardization across subsidiaries, and a reduction of costly adaptations to local market conditions. This implies that *“IT implementation almost invariably results in some perceived or real loss of [subsidiary] autonomy vis-à-vis the head office”* (Verbeke, Bachor, & Nguyen, 2013, p. 547). Accordingly, subsidiaries can be expected to resist such standardization efforts to maintain their existing market orientation and focus on local customer needs (Ryans, Griffith, & White, 2003).

The heterogeneity of dispersed geographic markets and conflicting needs of various subsidiaries make it difficult for MNCs to achieve full-fledged integration and standardization through digital transformation efforts. Subsidiaries present HQ with heterogeneous requirements based on the product and geographic scope of their respective local operations (Lehmann & Gallupe, 2005), while HQ strives for homogeneity and common business processes, creating a challenge as MNCs attempt to manage the tension between global standardization and local adaptation (Thompson, Ekman, Selby, & Whitaker, 2014).

Digital transformation is the process of making information, business processes, and product offerings available in digital form through IT and Internet-based applications (Westerman, Bonnet, & McAfee, 2014), and is frequently depicted as a teleological journey moving toward an envisioned end state. Consistent with this depiction, most existing research on MNCs has followed a linear design and implementation logic (Forsgren, 2013), and most research on MNC implementation and use of IT has been cross-sectional in nature (Andersen & Foss, 2005). While this research is important and has provided valuable insights, the multiple and divergent needs of HQ and subsidiaries suggest that MNC digital transformation actually involves a more iterative and evolutionary journey, including emergent elements and self-reinforcing loops that can be episodic or continuous (Weick & Quinn, 1999). Digital transformation involves differing and converging initiatives from HQ and subsidiaries that influence the MNC strategy through various forces that may lead to unforeseeable outcomes. Ambos, Asakawa and Ambos (2011, p. 303) note: “*Static perspectives constrain our ability to conceptualize this process and account for the divergent views that the two partners often take: the subsidiary’s effort to increase its autonomy and the headquarters’ attempts to curb excess levels of subsidiary autonomy. In part, this neglect of a dynamic view is a result of the cross-sectional nature of most empirical studies*”, calling for alternate approaches to study MNC digital transformation.

In this paper, we argue that embeddedness is a theoretical perspective that can help us better understand the complexities associated with digital transformation (Granovetter, 1985; Uzzi, 1997). Embeddedness emphasizes that economic action is interlaced with the social bonds of business partners, and has been applied to MNC phenomena such as innovation and knowledge creation (Hallin, Holm, & Sharma, 2011). The embedded MNC is internationally dispersed through subsidiaries that are externally embedded in relationships with local customers, suppliers, and other actors (Hadjkhani & Thilenius, 2005), and internally embedded through relationships with HQ and other subsidiaries (Schleimer & Pedersen, 2013). The tension between such external and internal relationships is described as dual embeddedness (Ciabuschi, Holm, & Martin, 2014). These external market and internal organizational relationships are the mechanisms through which subsidiaries maneuver in the MNC, but also constitute a

strategic resource enabling subsidiaries to influence overall MNC strategy and performance (Cenamor, Parida, Oghazi, Pesamaa, & Wincent, 2018). IT is one form of technology that can impact the power balance between HQ and subsidiaries in MNCs (Mudambi, Pedersen, & Andersson, 2014).

This paper responds to calls for case research and contextual studies of the IT and HQ-subsidiary standardization vs. adaptation dilemma for MNCs (Yamin & Sinkovics, 2007). We use longitudinal data from five case studies to explore evolutionary aspects of MNC digital transformation, with findings that incorporate both the HQ and subsidiary perspectives. We use embeddedness as the theoretical foundation for the iterative nature of relationships between HQ and subsidiaries, and we apply embeddedness to generate new insights on MNC digital transformation. Specifically, we demonstrate the manner in which internal embeddedness and external embeddedness influence digital transformation, and we identify three empirical themes in our data (strategy, financial, and technology), and discuss the manner in which these empirical themes also influence digital transformation.

The remainder of this paper is organized as follows. We first review the literature, and then provide an overview of our research sites, data collection processes, and data analysis methodology. We present our results, followed by a discussion of how our results fill some gaps in the literature, and then conclude with research and managerial implications and future research opportunities.

2. Literature Review

In this section, we review two sets of literature that are relevant to this paper – the literature on embedded MNCs and the literature on MNC digital transformation. For each set of literature, we summarize what is known, and discuss how this paper can build on existing knowledge to generate new insights.

2.1 The Embedded MNC

In the embedded MNC, subsidiaries conduct business under various degrees of interdependency and coordination (Forsgren, Holm, & Johanson, 2005). Each subsidiary is a node that simultaneously manages and utilizes some MNC resources, and each local market unit is “*embedded in a unique context in which each has connections to various units outside the multinational*” (Nohria & Ghoshal, 1997, p.

195). The MNC network is based on various relationships, and each subsidiary's embeddedness in its relationships constitutes a strategic resource that can influence developments for the MNC (Andersson, Dellestrand, & Pedersen, 2014). MNC strategic decisions such as standardization vs. adaption are open for negotiation between HQ and subsidiaries and among subsidiaries (Theodosiou & Leonidou, 2003), which creates the setting for a perpetual power struggle between HQ and subsidiaries as they exchange information and compete for resources (Mudambi et al., 2014).

The wider MNC network, in which each subsidiary is embedded via its external business relationships in its local market, can support and/or hinder the subsidiary's local actions. The subsidiary will be able to act more or less autonomously depending on the resources and mandate the subsidiary has within the MNC (Ambos et al., 2011). The distribution of roles and responsibilities across HQ and subsidiaries can be grounded within and/or outside the firm, and subsidiary coherence is based on trust developed in inter-organizational relationships (Kostova & Roth, 2002).

Relationships between HQ and subsidiaries are shaped by different factors (Kostova, Marano, & Tallman, 2016). While HQ has formal authority, the ability of HQ to influence a subsidiary is also a function of the knowledge that HQ has about the local market (Mudambi & Navarra, 2004). When HQ has limited knowledge of the subsidiary's local market, HQ must rely on information provided by the subsidiary. In these situations, the subsidiaries can use business relationships in their local markets to influence HQ decision-making and increase their own status in the MNC (Yamin & Andersson, 2011), which can reinforce the cycle of high subsidiary interactions with local actors, focus on local markets, strong performance and innovativeness, and increasing influence in the MNC (Figueiredo, 2011). Sometimes "*the tail can wag the dog*" (Forsgren, 2013, p. 107). Other times, however, a subsidiary that performs well due to external embeddedness may attract more HQ attention leading to increased HQ control which then limits the subsidiary's voice and influence within the MNC (Ambos & Birkinshaw, 2010).

External embeddedness also impacts the subsidiary's bargaining power with other subsidiaries, as different subsidiaries may have conflicting agendas. Consistent with the discussion above, a subsidiary

can increase its bargaining power with other subsidiaries when it performs well financially and controls access to critical resources through embeddedness in local customer and supplier relationships (Andersson & Forsgren, 2000). Internal embeddedness from intra-organizational relationships formed between subsidiaries is a means of resource exchange (Yamin & Andersson, 2011), and high-performing subsidiaries can make it difficult for HQ to undertake strategic change which needs to be anchored in the resource base that resides across subsidiaries (Johanson & Vahlne, 2009). The role a subsidiary plays in these internally-embedded inter-organizational relationships can also impact its perceived strategic and operational importance in the eyes of other subsidiaries (Garcia-Pont, Ignacio, & Noboa, 2009). Internal and external embeddedness are complimentary, and a subsidiary can exploit either dimension of dual embeddedness to an advantage in its relationships with HQ and other subsidiaries (Ciabuschi et al., 2014).

This review of prior literature on MNC embeddedness suggests that an HQ initiative such as digital transformation can be supported or resisted by a subsidiary, depending on whether the subsidiary expects to benefit from the initiative. If a subsidiary is willing to support the digital transformation, our review suggests that each subsidiary would advocate for the IT functionality and digitized business processes that would be most advantageous for their local market. If a subsidiary deems digital transformation unnecessary or intrusive to their local market, then they will resist the initiative. Such resistance is likely to be most effective in cases where HQ has limited knowledge of the local market. While we are able to offer these suggestions based on prior research, we are not aware that these suggestions have actually been demonstrated, we are not aware of the relative influence of internal and external embeddedness in MNC digital transformation, and we do not yet know what other factors in addition to internal and external embeddedness drive or inhibit MNC digital transformation.

2.2 *MNC Digital Transformation*

While the literature on digital transformation offers some clarity, we will see that it does not provide all of the details needed to understand digital transformation in the context of embedded MNCs. Large global firms pursue digital transformation in an effort to reduce costs and become more responsive to market demands (Kohli & Johnson, 2011). While the cognitive limitations of HQ managers may

motivate MNCs to delegate authority (such as decisions related to IT) to subsidiaries to maximize efficiency (Decreton, Dellestrand, Kappen, & Nell, 2017), the possibility for HQ managers to gain insights on subsidiary actions through improved communication and information flow provide the opposite motivation for MNCs to maintain systems decision-making authority at HQ (Zhao & Priporis, 2017). Digital transformation through IT-enabled applications is a mechanism for MNCs to adjust the level of centralization and decentralization between HQ and subsidiaries (Bloom, Garciano, Sadun, & Van Reenen, 2014).

The process of digital transformation and its relationship to business strategy has been critiqued as difficult to operationalize and measure, due to the inherent differences between strategy inputs and business and technology outcomes (Coltman, Tallon, Sharma, & Queiroz, 2015). It is difficult for MNCs to achieve alignment between strategy and IT because *“there are too many variables. The technology and business environments are too dynamic”* (Luftman, 2003, p. 25). Either due to or in spite of the difficulty in achieving strategy-IT alignment, MNCs are increasingly abandoning in-house custom software in favor of vendor solutions that are faster to install and easier to maintain, offer greater functionality and reliability, and increasingly Internet-based and hosted in the cloud. When selecting vendor solutions, MNCs generally prioritize low cost over other factors such as conformance with existing business processes (Keil & Tiwana, 2005). Because mergers and acquisitions in the software industry have resulted in a relatively small number of vendors that serve as global standards, the software market has driven MNCs toward standardization motivated by economies of scale, improved planning and control, and enhanced coordination over geographic distance (Rangan & Sengul, 2009).

Even as digital transformation becomes increasingly important for HQ (Tallman & Koza, 2010), subsidiaries may prefer to avoid standardization due to real or perceived unique needs in their local markets (Kim, Park, & Prescott, 2003). Subsidiaries recognize the important role that IT solutions play in their daily business processes and economic activities (Boudreau & Robey, 2005), which motivates the subsidiaries to actively negotiate any digital transformation decisions that could impact these processes and activities. While digital transformation decisions related to data management and location of servers

can be resolved, application-specific issues rooted in data quality and integration are more difficult to resolve (Manwani & O'Keefe, 2003). For example, different subsidiaries can have different definitions and specifications for a fundamental term such as customer. This means that data and applications could become objects of argument and negotiation that could produce suboptimal outcomes, such as forcing some subsidiaries to use an IT system that does not fit their market operations and/or requiring HQ to maintain multiple IT systems and divergent business processes across various subsidiaries.

At this point, we note convergence of the literature on MNC embeddedness with the literature on MNC digital transformation. Both sets of literature point to potential conflicts between HQ and subsidiaries, as a result of perception gaps and different perspectives (Birkinshaw, Holm, Thilenius, & Arvidsson, 2000). Both sets of literature identify tradeoffs MNCs may need to make to accommodate the divergent interests and perspectives. However, as far as we know, neither set of literature has given a precise view of the manner in which internal and external embeddedness drives and inhibits MNC digital transformation, neither set of literature has described the factors that accompany negotiations between HQ and subsidiary to also drive and inhibit digital transformation, and neither set of literature has offered a set of prescriptions for how HQ and subsidiaries can navigate complexities of the digital transformation process. Thus the research objective of this paper to resolve this gap in the literature.

3. Case Study Methodology and Data

3.1 Methodology and firms

We designed this research project as a multi-case study to capture a contemporary phenomenon (Yin, 2014). Case studies involve a holistic, in-depth investigation of phenomena that cannot be studied independently from the context in which they occur (Pare, 2004). The use of multiple case studies enables cross-analysis of a phenomenon in diverse settings, which increases the volume of evidence and robustness of findings (Eisenhardt & Graebner, 2007). It is desirable to have a common context across cases, to provide a degree of consistency for comparison and contrast, and some control factors that allow for generalization (Eisenhardt, 1989). Multi-case studies focus on analytical generalization rather than statistical generalization to the full population (Keutel, Michalik, & Richter, 2014).

Our selection of five cases for this paper is consistent with the recommendation of four to five cases for multi-case study research (Creswell, 2012), and with the guidance that fewer than four cases may lack empirical grounding (Eisenhardt, 1989). We agreed to provide confidentiality to our case study firms, and we do not disclose the identity of the firms in this paper. One firm manufactures and sells components to industrial customers, and we call this ‘Components firm’ in this paper. The second firm manufactures and sells consumer products, and we call this firm ‘Consumer Products firm.’ The third firm manufactures and sells finished equipment to industrial customers, and we call this ‘Equipment firm.’ The fourth firm manufactures and sells durable household goods, and we call this ‘Household Goods firm.’ The fifth firm manufactures and sells parts (which are distinguished from components as being less systemic in nature) to industrial customers, and we call this ‘Parts firm.’

The five firms in this study have a common context. All five firms are included on the 2011 *Forbes Global 2000* list of the world’s largest publicly-traded firms, and have annual revenues over US\$1 billion. All five firms are headquartered in Northern Europe, and were founded approximately 100 years ago or longer. All five firms have over 50% of sales outside the home country and have been operating in global markets for many decades, with Europe and North America as two of their top three sales markets. The equities of all five firms are traded on European and U.S. exchanges. Our unit of analysis is the firm, with the European HQ and North American subsidiary of each firm as subunits of analysis. Table 1 shows a profile of our case study firms.

While our case study firms have a common context to allow for comparison and contrast, they represent diverse settings to explore the manner in which MNCs engage in digital transformation of global business processes. Components firm, Equipment firm and Household Goods firm manufacture durable products, and Consumer Products firm and Parts firm manufacture non-durable products. Components firm, Equipment firm and Parts firm products are used by industrial customers, and Consumer Products firm and Household Goods firm products are used by individual consumers. The five firms include all four possible combinations of products (durable vs. non-durable) and customers (industrial vs. individual).

We adopted a positivist approach for this study, because we believe the manner in which MNCs pursue digital transformation is an objective phenomenon that can be identified by deductive logic, and that can be accurately described by senior executives in our case study firms with limited room for interviewers to construct their own meaning (Pare, 2004). Based on the positivist approach, our goal was to combine underlying embeddedness theory with data sources from European HQ and U.S. subsidiaries of our case study firms to develop additional insights about the manner in which MNCs pursue digital transformation (Ketokivi & Choi, 2014).

Table 1. Corporate profile of case study firms

Firm	Components	Consumer Products	Equipment	Household Goods	Parts
2011 <i>Forbes</i> Global 2000 rank	Top 2000	Top 2000	Top 1000	Top 1000	Top 1000
Annual revenue	US\$1+ billion	US\$1+ billion	US\$5+ billion	US\$10+ billion	US\$5+ billion
Founded	1800s	Early 1900s	1800s	Early 1900s	Early 1900s
Employees	10,000+	3,000+	10,000+	50,000+	30,000+
Countries with operations	50+	20+	10+	50+	25+
Countries with mfg. facilities	20+	5+	10+	15+	15+
Main product type	Durable	Non-durable	Durable	Durable	Non-durable
Main customer type	Industrial	Consumer	Industrial	Consumer	Industrial
Largest market	Europe	Europe	Asia	North America	Europe
2nd largest market	Asia	North America	Europe	Europe	Asia
3rd largest market	North America	Rest of world	North America	Latin America	North America

Similar to the majority of published case studies, we used face-to-face, in-depth, semi-structured interviews as our primary source of data. In-depth interviews enable researchers to understand participant descriptions and accounts of actions and events (Walsham, 1995). We conducted a total of 26 interviews with 26 interviewees, at the level of three to five interviews per case and threshold of 20 total interviews recommended by (Creswell, 2012). Even more important than meeting the recommended threshold is our belief that the number of interviews enabled us to receive a complete picture of digital transformation at the European HQ and North American subsidiaries for our case study firms (Marshall, Cardon, Poddar, & Fontenot, 2013). An important element that strengthens the validity of our data is that we interviewed senior executives that have the most accurate and comprehensive understanding of IT and business strategy of their respective firms (Tallon, Kraemer, & Gurbaxani, 2000). For example, we interviewed the Chief Information Officer (CIO) for all five firms, and also conducted interviews with other senior

executives with titles such as Chief Technology Officer (CTO), Deputy CIO, Regional CIO, Regional IT Vice President (VP), Regional Director, and Regional Controller. Table 2 provides a list of interviewees for our case study firms. In addition to the interviews, members of the research team reviewed information in annual reports, news coverage, and websites to learn more about the firms and to provide context for the case study material.

Table 2. Interviews

Firm	Location	Interviewees	Number of interviewees (interviews)^a
Components	HQ (Europe)	CIO E-Business Manager	2 (2)
	U.S. subsidiary	VP Manager IT Operations	2 (2)
Consumer Products ^a	HQ (Europe)	Interim CIO Global CIO	2 (2)
	U.S. subsidiary	CIO Director Sales and Marketing Director	3 (2)
	European subsidiary	Europe IS Director	1 (1)
Equipment	HQ (Europe)	Global CIO Program Director	2 (2)
	U.S. subsidiary	CIO VP Processes VP Systems	3 (2)
	European subsidiary	Program Director Innovation	1 (1)
Household Goods	HQ (Europe)	CIO CTO Head of Applications Communications Manager	4 (5)
	U.S. subsidiary	Senior IT Director CFO	2 (2)
Parts ^a	HQ (Europe)	CIO1 CIO2	2 (3)
	U.S. subsidiary	Business Unit Controller Sales Unit Controller	2 (2)
Total			26 (26)

Notes: a. Number of interviewees and interviews (in parentheses), excluding phone conversations and online communication. Some interviewees were interviewed more than once, and other interviewees were interviewed jointly.
b. Consumer Products firm moved from an interim CIO to a permanent CIO during the timeframe of this study, and Parts firm changed CIOs during the timeframe of this study.

In most cases, the research team initially contacted the CIO, and the CIO provided access and introduction to other IT and business executives in Europe and the U.S. Most interviews were conducted in person at the executive's office in Europe and the U.S., most interviews lasted between one and two hours, and most interviews involved more than one member of the research team. While most executives

were interviewed once on an individual basis, some interviews were conducted with multiple interviewees at once and some executives were interviewed multiple times. The research team followed a consistent interview pattern across firms by first meeting with European HQ personnel, then meeting with U.S. subsidiary personnel, and then meeting again with European personnel. Interviews were conducted over a period of 15 months.

We used semi-structured interviews because we were familiar with the questions to be asked but unable to predict the answers, and semi-structured interviews enable researchers to obtain the required information while giving participants freedom to respond and illustrate concepts (Pare, 2004). Before the interviews, the research team prepared structured interview guides to ensure that all important issues were covered during the interviews and to increase comparability across firms. Consistent with research that identifies differences between HQ and subsidiaries, the research team formulated different research questions for European HQ and U.S. subsidiary personnel to capture their respective perspectives on global business processes and IT operations. The main questionnaire items shown in Appendix A are consistent with prior research on the role of headquarters in the MNC (Collis, Young, & Goold, 2007), relationship between HQ and subsidiaries (Luo, 2003), information exchanged between HQ and subsidiaries (Kim et al., 2003), the role of business processes and IT in an MNC (Andersen & Foss, 2005), and the types of IT applications in an MNC (Kettinger, Marchand, & Davis, 2010).

Shortly after each interview, a research team member prepared detailed notes from the interview. Other team member(s) who attended the interview reviewed, refined, and added to the interview notes as necessary. The detailed notes for each interview were then finalized and maintained in a case collection. We added some background material to the first set of interview notes for each firm, including items such as company and financial information, news coverage, and professional background on the interviewees. Total notes across the five firms included approximately 120 pages containing 55,000 words. Table 3 provides an overview of the digital transformation projects underway at each case study firm.

Table 3. Digital transformation at case study firms

Firm	Description of digital transformation
Components	Components firm was centralizing its operations to pursue an international strategy, spurred in part by rapid growth in Asia. The CIO succeeded in global implementations of a common enterprise resource planning (ERP) system (Lawson), customer relationship management (CRM) system, and Intranet (Microsoft SharePoint). While manufacturing and sales business processes were standardized through the enterprise-wide ERP system, the CRM system was not used for all sales and was not used by newly-acquired business units. The CIO described how the digital transformation included an analysis of subsidiary business processes, and identified some local practices that were not in line with the corporate values. Global IT systems increased the possibility of HQ control, both during the implementation (when reviewing subsidiary business processes) and during continuing operations (through centralized data collection). Components firm experienced some challenges in the standardization process. Some countries had a high level of IT maturity and could apply most ERP functionality, while some smaller markets had low IT maturity and were not able to apply ERP functionality. The U.S. VP critiqued the IT standardization, describing it as a political process in which U.S. subsidiary representatives were outnumbered and their voice was not heard. The U.S. VP described that HQ and European managers drove many of the initiatives, and had limited insight into non-European regions. The U.S. VP expected the IT standardization to have negative implications for the U.S. subsidiary.
Consumer Products	Consumer Products firm had a long history of autonomous regional business units, but wanted to become more global. The firm was burdened by several legacy IT systems. During the timeframe of this study, the firm hired a new CIO, and his assignment was to advance the firm's technological abilities by upgrading and standardizing global IT systems. For example, the firm wanted to investigate whether it could use iPads to support sales representatives with wireless real-time customer data. The CIO described a situation in which the company missed business development opportunities because of its legacy systems, and he advocated a global migration toward a Microsoft Axapta ERP system. The U.S. CIO had a different view of the effort toward enterprise-wide IT. The U.S. CIO described that HQ, the Northern Europe division, and the U.S. division have different market positions that would influence the role of IT. For example, while Consumer Products firm was a dominant player in Northern Europe, it was a relatively small player in the U.S. market. Therefore, while the firm could maintain a dominant position in Northern Europe with standardized IT, the U.S. subsidiary would require more customized and flexible solutions to increase its market share.
Equipment	Out of our case study firms, Equipment firm had made the most progress to toward a common ERP, with the CIO estimating that 70% of business units were utilizing a common SAP ERP. In parallel with the ERP implementation, the company was also moving toward a common IT infrastructure including a corporate Intranet to provide a common global view. Corporate objectives were to expand the product portfolio, offer turnkey solutions (requiring cooperation across business units and geographies), and maintain healthy cash flow. Equipment firm was gradually centralizing its organizational structure, and the ERP system was designed to support this shift in control. The CIO's major challenge was to ensure that the enterprise-wide ERP system could handle a large increase in demand and/or a redistribution in production across locations. While U.S. IT managers offered a similar view on the ERP project, they noted some differences between Europe and the U.S. that would impact the standardization. For example, while Europe operates a build-to-order process, the U.S. operates a build-to-stock process. Despite the fact that Equipment firm made so much progress on a common ERP, there was still some difference in perspectives related to global IT. For example, while the U.S. subsidiary wanted to adhere to common global IT, a European director suggested that the U.S. subsidiary may be better off implementing different solutions than the European subsidiary.
Household Goods	Household Goods firm had a strong financial focus, and had been downsizing and streamlining business processes since the Great Recession of the late 2000s. For example, one initiative was to consolidate 900 ERP applications used by different business units into one global ERP system (SAP). Another initiative was to consolidate a large number of data centers into two data centers. The firm also standardized personal computers and software to achieve a harmonized and efficient workplace IT environment. The CIO stated that the IT function was moving toward a more global orientation, and in some respects was more global than the rest of the company. The firm's efforts to become more global would require further consolidation of data and systems, and this effort would continue over the next few years through the introduction of standard systems on a region-by-region basis. During this transition, regional units would be allowed to use some proprietary systems with CIO approval, but after several years the goal was to have the same IT systems around the world. While the U.S. subsidiary manager confirmed the ongoing standardization effort, the U.S. Senior IT Director offered a more nuanced picture by noting some differences in the U.S. market. For example, while Household Goods' main product line was considered a commodity in Europe, it was considered a high-end product in the U.S. For this reason, the company maintained acquired brands as mid-range products for the U.S. market, and therefore had to operate a broader brand portfolio than Europe.
Parts	While Parts firm historically had three autonomous product divisions, it was now embarking on a strategy to become more international with 'one face to the customer.' The firm was in process of reducing local (national) databases and standardizing workplace hardware and software. The CIO stated the company avoided large ERP suites and instead focused on a 'best of breed' strategy, using ERP modules from various vendors that allowed the firm to customize IT, and then connected the modules through an integration engine. The firm also implemented a Siebel CRM system to consolidate sales force and customer data. To this point, the three autonomous product

divisions have had their own sales function, which meant that customers would need to interact with various salespeople from different business units, depending on what product they needed. To avoid confusion for the customer, Parts firm required salespeople to use the CRM system to store customer data, which allowed the firm to better coordinate sales activities and have a global view of each customer. However, Parts firm knew that similar progress on an ERP system would be a significant challenge, because the three product divisions had different products and different business processes. For example, some business units sold products in batches, while other business units offered systems solutions. While the U.S. subsidiary Controller understood the need for more integrated and standardized IT, the company's history of fully autonomous business units and separate systems would make such a transition difficult. Discrepancies in business processes, data formats, and batch sizes across subsidiaries would need to be resolved before the firm could make further progress on an enterprise-wide ERP system.

3.2 *Data and coding*

Two members of the research team coded data from the interview notes, and began by marking text and paragraphs into clusters of coherent empirical descriptions (Miles & Huberman, 1994). The two researchers, based on a common picture of the MNC digital transformation process, conducted a second round of coding and developed short descriptions to elevate the empirical data toward conceptual items. This process resulted in 75 items that were checked and refined by the coders, who clustered items into the theoretical themes of internal embeddedness and external embeddedness, along with three empirical themes of strategy, finance, and technology (empirical themes discussed in more detail below). The two researchers then condensed items that had a similar meaning and dropped some items that had an unclear conceptual foundation, ending up with a total of 55 items spanning the five theoretical and empirical themes and the HQ and subsidiary perspectives. The researchers reached a 0.92 proportional reduction in loss (PRL) for the categories, above the recommended threshold of 0.70 threshold for explorative research (Rust & Cooil, 1994). Differences were resolved through a consensus approach (Gibbert & Ruigrok, 2010). The researchers then performed a final round of coding to categorize the items as teleological vs. evolutionary processes (Van de Ven, 1992), which resulted in a PRL ranging from 0.79 – 1.00.

The results of coding for the main theoretical themes of internal embeddedness and external embeddedness are shown in Table 4. Column 2 separates the data by HQ vs. subsidiary perspective, and column 3 separates the data by evolution vs. teleology based on the temporal nature of the process (Van de Ven, 1992). Column 4 shows the driving influences of MNC digital transformation that were identified in our data, and column 5 shows the inhibiting influences of MNC digital transformation that

were identified in our data. Column 6 provides some comments on the data, with a more complete discussion of findings and implications in the next section. As shown in Table 4, a large proportion of the influences from internal embeddedness (12 out of 14) and external embeddedness (6 out of 9) on MNC digital transformation are evolutionary in nature.

Table 4 also shows that the majority of evolutionary influences for internal embeddedness (9 out of 12) and external embeddedness (4 out of 6) are from the subsidiary perspective, confirming findings from our literature review that the relationship of subsidiaries with HQ and with their respective local markets exert a strong influence on MNC digital transformation (vom Brocke et al., 2016). And of the 13 evolutionary internal and external embeddedness influences from the subsidiary perspective, 11 inhibit digital transformation. So not only do subsidiaries play an important role in digital transformation, but the theory and data suggest that subsidiaries can generally be expected to have an adverse reaction to changes proposed by HQ. We discuss this in further detail in the next section.

In addition to the theoretical themes of internal embeddedness and external embeddedness that are the grounding of this paper, we also identified three empirical themes as we coded the data. The three empirical themes are strategy, financial, and technology, and the coding for these three empirical themes is shown in Table 5. As expected, because these are empirical themes from the data rather than the foundational theoretical items for the study, the PRL measure for these themes ranges from 0.79 – 0.86, slightly lower than the range for the theoretical items (0.92 – 1.00) though still well above the 0.70 threshold for exploratory research.

Table 5 has the same columnar format as Table 4. Our first insight from Table 5 is that strategy is the only theme out of all theoretical and empirical themes in our data that has a reasonably equal distribution of influences between HQ-subsidiary, evolution-teleology, and driving-inhibiting. To the extent that there are imbalances in influences for the other theoretical and empirical themes, this suggests that strategy could be a starting point for MNCs to achieve some balance in the influences for digital transformation. In the financial theme, the driving and inhibiting influences are almost all teleological rather than evolutionary (7 out of 8), which is consistent with the ability to make and evaluate financial

Table 4. Theoretical influences on digital transformation

Theoretical theme	Perspective	Temporal process	Driving influence	Inhibiting influence	Comments
Internal embeddedness	HQ	Evolution	Reduce ‘not invented here’ syndrome	Low organizational acceptance Distrust in the organization	In the theme of internal embeddedness, evolutionary processes that inhibit digital transformation outnumber evolutionary processes that drive digital transformation (9 to 3)
		Teleology	Common picture of global market	No common concepts	
<i>12 evolution</i> <i>2 teleology</i> <i>0.92^{PRL}</i>	Subsidiary	Evolution	Strong subsidiaries that ‘outnumber’ less influential subsidiaries Newly-acquired subsidiary who wants to be included in MNE decision-making	Different business practices and habits Subsidiary optimization Soft ‘people issues’ Low trust toward sister subsidiaries Organizational resistance Business opportunities are compromised Enterprise-wide IT requires workarounds	Of the nine evolutionary processes that inhibit digital transformation, seven are from the subsidiary viewpoint. These seven processes fall into three general categories: a.) organizational trust, b.) business processes, and c.) organizational performance
		Teleology	—	—	
External embeddedness	HQ	Evolution	—	Belief that too much control can harm the market Business is considered local	In the theme of external embeddedness, our data does not show any evolutionary processes that operate as driving influences for MNC digital transformation. All six evolutionary processes are inhibiting influences
		Teleology	—	—	
<i>6 evolution</i> <i>3 teleology</i> <i>1.00^{PRL}</i>	Subsidiary	Evolution	—	Total solution offerings to customers Customer adaptation requirements Regional laws and regulations Strong local market performance	When subsidiaries are highly embedded in their local markets, subsidiaries will prioritize their local relationships and will only support digital transformation efforts that directly benefit their markets and customers
		Teleology	IT solutions to make sales process easier Prioritize end customers before internal warehouses End customer warranty activated by MNC IT	—	

^{PRL} Proportional reduction in loss reliability measure (Rust and Cooil, 1994) for coding of temporal process character

— Our data set did not specify this phenomenon

Table 5. Empirical influences on digital transformation

Empirical theme	Perspective	Temporal process	Driving influence	Inhibiting influence	Comments
Strategy	HQ	Evolution	Digitization as a change agent	Historically decentralized organization Limited executive commitment Unclear functions / responsibilities	Strategy is the only theme out of all theoretical and empirical themes in our data to have a reasonably equal distribution of influences between HQ-subsidiary, evolution-teleology, and driving-inhibiting
		Teleology	Coordination and control Global organizational functions	—	
<i>6 evolution</i> <i>5 teleology</i> <i>0.79^{PRL}</i>	Subsidiary	Evolution	Re-organization	Oscillating business strategy	This may suggest that strategy could be a starting point for MNCs to balance the influences of internal and external embeddedness that inhibit digital transformation (see Table 4)
		Teleology	Legacy IT	Main (regional market) knowledge in subsidiary Legacies from mergers and acquisitions	
Financial	HQ	Evolution	—	—	In the financial theme, driving and inhibiting influences are almost all teleological, consistent with the ability to evaluate financial decisions based on measurable outcomes
		Teleology	Reduce total IT costs Financial control Downsizing / outsourcing	Quick payoff / return on investment IT costs are local	
<i>1 evolution</i> <i>7 teleology</i> <i>0.86^{PRL}</i>	Subsidiary	Evolution	Digital transformation results in lower IT costs	—	The one exception is a situation where digital transformation can reduce IT costs for subsidiaries, which can then motivate subsidiary support for more digital transformation
		Teleology	Get rid of IT license management	Lower IT costs than other subsidiaries	
Technology	HQ	Evolution	—	IT has no organizational mandate Lack of IT competence or knowledge Outsourcing provider uses prior company staff	In the technology theme, the proportion of evolution-teleology influences (4 to 9) is almost exactly the inverse of the proportion of evolution-teleology influences in the external embeddedness theme (6 to 3, see Table 4), which may help explain the challenges of digital transformation for MNCs when subsidiaries are highly embedded in their local markets
		Teleology	Global IT platform Global IT helpdesk and services Global IT audits	Ad hoc IT organization (no central IT support) Various software packages at subsidiaries	
<i>4 evolution</i> <i>9 teleology</i> <i>0.82^{PRL}</i>	Subsidiary	Evolution	Technological leapfrog	—	All three evolutionary inhibiting forces have a strong reputational component, which suggests that there could be a lagged effect between any changes in the underlying state and a resulting change in perceptions
		Teleology	Reduce manual work	Local data with idiosyncratic definitions and measurements Local ownership of data and applications IT specialists in the subsidiary	

^{PRL} Proportional reduction in loss reliability measure (Rust and Cooil, 1994) for coding of temporal process character

— Our data set did not specify this phenomenon

decisions based on measurable outcomes. In the technology theme, the proportion of evolution-teleology influences (4 to 9) is almost exactly the inverse of the proportion of evolution-teleology influences in the external embeddedness them (6 to 3, see Table 4), which may help illustrate the challenges of digital transformation for MNCs when subsidiaries are highly embedded in their local markets.

4. Findings and Implications

In this section, we build on the data and coding described above to provide findings and identify implications of those findings. We begin with a discussion of the HQ perspective as a starting point for digital transformation, then discuss the complexities and challenges that arise as HQ and subsidiaries engage in digital transformation, and then discuss how researchers and managers can apply our findings to navigate digital transformation efforts.

4.1 HQ starting point for digital transformation

The five MNCs in our study all had a history with a relatively limited role for HQ and relatively high autonomy (and external embeddedness) for subsidiaries. As a result, the MNCs in our study had legacy strategies that featured a strong adaptation component and a weak standardization component. From an IT perspective, the subsidiaries used a range of IT systems and outsourcing arrangements to cater to their local markets. For example, before digital transformation Consumer Products firm used 250 IT applications across the firm, and Household Goods firm used 900 ERP applications across the firm. As shown in Table 3, one motivation for HQ to pursue digital transformation was to receive financial information on the global business and the capacity to control subsidiaries through a common picture of the global market. Cost reduction was another important motivation.

For the MNCs in our study, digital transformation efforts typically began by appointing (or changing the mandate for) a CIO at HQ with global IT responsibility, followed by consolidating hardware and infrastructure because legacy infrastructures were too expensive or difficult to maintain. The CIOs emphasized the importance of financial control, and digital transformation initiatives were evaluated from a cost-efficiency standpoint. From an implementation standpoint, MNCs generally began with a global financial IT system that would hold aggregated financial data, then standardized hardware and

infrastructure, and then added software solutions to globalize business processes such as customer relationship management (CRM). As MNCs globalized each business process, they simultaneously restructured the organization to add a global leader for functional business processes, such as a global marketing manager.

Because financial control was important for both the firm and the IT function, MNCs were also developing global IT helpdesks, services and audits, in parallel with downsizing IT services and staff at the subsidiary level. Household Goods CIO said, *“IT shall be a bit ahead of the others [MNC functions], so you are set...”* While the MNCs were at various stages of implementation during the timeframe of our study (for example, Consumer Products firm was in an earlier stage and Household Goods firm was moving toward completion), they had a common goal to achieve a complete digital transformation with globally-standardized processes and full information integration. The CIOs depicted using digital transformation with IT as a change agent to achieve a new strategy with a more global orientation. For example, Components firm CIO described that the firm’s digital transformation project introduced a *“code of conduct”* for business processes and practices in line with the strategic direction, and emphasized that the firm has an *“aim for coordination between the [subsidiaries] and a unification of processes.”* Digital transformation projects were intended to sustain the HQ strategic direction, which would alter existing internal relationships, spur the development of global organizational functions, and impact the local responsiveness of subsidiaries.

4.2 Complexities of digital transformation

While MNCs may prefer a goal-oriented and linear selection, implementation, and maintenance logic in which HQ selects the optimal IT system and the CIO supervises the global implementation and use of that system, embeddedness theory described in this paper suggests that global implementation and use are counterbalanced by the idiosyncratic needs of subsidiaries which makes the digital transformation process and outcomes more uncertain. Components firm CIO used a dancing metaphor to describe digital transformation *“If two [people] dance well [together], you can’t put the one before the other – and it is the same with IT.”* This tension between HQ standardization and subsidiary adaptation means that digital

transformation is not a linear process. Instead, digital transformation follows an iterative process based on the conflicting needs of HQ and subsidiaries.

For example, the U.S. subsidiary of Components firm used highly trained sales representatives to sell their products, while the European subsidiary employed sales representatives with less training. U.S. sales representatives were compensated based on commission and enjoyed high status in the subsidiary, while European sales representatives were placed on fixed salary and perceived to be less important to the success of the European subsidiary. This difference in business processes and practices became a problem when Components firm discussed adopting a common CRM system. The U.S. subsidiary did not like the proposed solution because it could disrupt incentives for its sales representatives, while the European subsidiaries thought it was a good solution to maximize sales representative productivity in the absence of compensation incentives.

Subsidiary personnel for MNCs in our study described that HQ's lack of local market knowledge resulted in additional IT costs as applications selected by HQ needed to be reprogrammed to support subsidiary business processes with local partners. Such cases included total solution offerings that could not be handled in current systems, specific products in certain markets, build-to-order vs. build-to-stock, standard orders versus customized orders, diverse local or regional product requirements, special service levels, and other needs for local adaptation and local responsiveness. For example, Parts firm's U.S. subsidiary had established customized electronic data interchange (EDI) interfaces with numerous *Fortune 500* customers. These interorganizational systems were not easy to replace, because the powerful and important customers preferred the existing arrangement and had little incentive to comply with the standardization request from Parts firm HQ. In this case, the changes associated with digital transformation would make it harder for the subsidiary to do business with its customers. A U.S. subsidiary manager for Parts firm said "*We used to jump over backward to accommodate customers*" and the changes associated with digital transformation would make that level of service impossible. The CIO for Household Goods firm shared a similar experience, where HQ failed to consider laws and regulations (such as Brazil's Nota Fiscal) that affected some subsidiaries.

Challenges and iterations with digital transformation also occur due to trust issues between HQ and subsidiaries. For example, Parts firm CIO did not want a new CRM system to be used by sales representatives in a large country in Asia, because sales representatives in that country were poorly compensated and data security was a potential issue. The CIO was concerned about the risk that the firm's sales representatives could move to a competitor to obtain an increase in pay, and take the firm's customer data with them. One example of a mistrust between subsidiaries occurred in Components firm, where sales representatives in one market would specify artificially-early delivery dates because they did not trust the other subsidiaries to deliver on time. This resulted in unnecessary inventory in the supply chain and a misallocation of working capital for Components firm.

In some cases, trust issues developed based on prior suboptimal experiences or a subsidiary's perception of HQ competence. A U.S. subsidiary manager for Consumer Products firm described the firm's 'oscillating' business strategy over the past decade, which made the manager hesitant to support HQ's current digital transformation initiative. In another case, a U.S. subsidiary manager for Components firm discussed the potential for Voice over Internet Protocol (VoIP) to save on telephone costs and allow integration with the customer service system by displaying customer information as soon as the customer makes contact with a service representative. However, HQ was not aware of these potential VoIP benefits. In another case, Parts firm outsourced the IT function but allowed the service provider to staff the engagement almost entirely with former Parts firm staff, which merely protected existing solutions and inhibited Parts firm from needed innovations and advancement in the IT function.

4.3 Insights to navigate digital transformation

Based on the theoretical and empirical themes identified in our data, and on the findings and examples described above, we are able to identify insights to help HQ and subsidiaries navigate the complex process of digital transformation. Each insight is anchored to one theme in our data, and the first insight relates to internal embeddedness. In Equipment firm, the U.S. subsidiary was willing to accept some HQ-dictated solutions, because the subsidiary recognized that this acceptance would enable the subsidiary to be included in the discussion for subsequent IT decisions. This example suggests that the

level of subsidiary acceptance of digital transformation may increase if the change in internal embeddedness would give the subsidiary a stronger voice at HQ or more bargaining power compared with other subsidiaries. HQ can apply this insight by thinking in advance about the sequencing of IT-related decisions, to sequence some decisions where HQ can achieve subsidiary buy-in earlier in the process with the knowledge that subsidiaries will have an incentive to agree on these early decisions to play a more influential role in later decisions. A subsidiary can apply this insight by clarifying its priorities upfront, so the subsidiary understands the tradeoffs it would be making across a sequence of IT-related decisions.

The second insight relates to external embeddedness, if HQ can recognize the need to accommodate local requirements and reduce the risk of disturbing high-performing subsidiaries through inflexible systems and processes. One CIO stated “*At the end of the day, all sales are local [which means that] too much control can harm the market*”, and another CIO echoed the same sentiment by saying “*business is domestic.*” One example from our study is a Component firm system that prioritized local end-customer orders before central warehouse orders. Another example is a potential Equipment firm system that included digital business processes desired by HQ, but would allow a customer to access the system to activate their warranty as desired by subsidiaries. This insight suggests that it is worthwhile for HQ to invest in learning about local market conditions, and equally worthwhile for subsidiaries to educate HQ about local market conditions and customer needs.

Financial incentives can also be harnessed to support digital transformation, which Parts firm CIO illustrated by noting that subsidiaries are interested in “*who’s going to pay the bill?*” Subsidiaries are more willing to cover the cost of digital transformation if new applications would be useful in the local market, and subsidiaries may also be willing to support digital transformation initiatives that would reduce their ongoing IT costs or relieve them from ongoing administrative burdens such as IT licenses. However, HQ may need to increase its sponsorship of digital transformation initiatives that do not directly benefit the local markets, in order to secure support from subsidiaries. Such sponsorship may better align the HQ interest to standardize functionality with the subsidiary initiative to maintain control

over its cost structure. HQ can apply this insight to structure the financial arrangements for digital transformation in such a manner that HQ would bear more of the cost for initiatives that are relatively more beneficial for HQ, and subsidiaries can apply this insight in financial negotiations with HQ over the cost allocation for digital transformation initiatives.

From a technology perspective, subsidiaries are more likely to support digital transformation initiatives that enable the subsidiaries to reduce manual work and improve productivity, or allow them to meet requirements from local business partners that are not possible with current systems. HQ can apply this insight to look for opportunities to reduce subsidiary cost or administrative responsibilities even as it reduces overall enterprise costs, and subsidiaries can apply this insight by developing an understanding of total process requirements to also identify opportunities where the enterprise can benefit from digital transformation. For example, a European subsidiary for Components firm considered the former IT system to be more effective than the newer enterprise-wide system because the former system could create an order in 10 minutes vs. 20 minutes for the new system. However, the subsidiary did not recognize that the newer system significantly reduced the overall time to fulfill an order, which includes many steps beyond order creation.

These insights suggest that if HQ understands the theoretical and empirical influences described in this paper, they can leverage those influences to accomplish their objectives in digital transformation. This notion also applies for subsidiaries. For example, the U.S. subsidiary of Consumer Products firm calculated that its local IT costs were about 80% of a European subsidiary's IT cost. The subsidiary was able to use its lower cost as a justification to counter-balance HQ's desire for a globally-integrated structure that followed the European standard, and in this case the entire company would benefit from a lower cost structure.

5. Contributions and Conclusion

Consistent with the theory of embeddedness, our data shows that MNC digital transformation is a struggle between HQ desires and subsidiary needs, and a process of continuous negotiation between HQ and subsidiaries where subsidiaries holding important local markets or strong internal positions strive for

influence. CIOs at HQ offered an understanding of why MNC digital transformation colored by global IT-business alignment is attractive in theory but difficult to achieve in practice.

HQ digital transformation attempts are inhibited by the influences of internal embeddedness of subsidiaries seeking autonomy. This inhibiting influence was reinforced at the subsidiary level where MNCs had a legacy of autonomous business divisions, which meant that most business knowledge resided in the subsidiaries. While HQ may have wanted to take a straight-line approach to digital transformation, influences from internal and external embeddedness that are not directly under HQ control made the digital transformation process more evolutionary.

5.1 Research and managerial contributions

This study complements and extends prior research on MNC digital transformation by offering a more complete understanding of the underlying influences and resulting impacts on MNC strategy. Our theory and data reveal five influences that affect MNC digital transformation – internal embeddedness, external embeddedness, strategy, financial, and technology. These influences have non-linear and evolutionary characteristics that are not fully captured by existing cross-sectional research on MNC digital transformation.

Our multi-case study incorporated the perspective of both HQ and subsidiaries. Digital transformation can be viewed in a context where the HQ drive for global orientation and economies of scale is counterbalanced by the internal and external embeddedness of subsidiaries, and by legacies from former MNC strategies and technologies. Our findings add an important dimension to prior research that depicts digital transformation as a teleological process driven by HQ. Instead, our study suggests that the process of digital transformation can be likened to a seesaw, where influences emanate from HQ and subsidiaries, applying weight to either end of the seesaw and pushing down for the desired direction. Simultaneously, HQ and subsidiaries strive to counteract weight from the other party by pushing up on the seesaw, seeking to avoid unwanted developments and inconsistencies between the standardization and adaptation ends of the continuum. The varying strength and intensity of HQ and subsidiary influences continues the seesaw motion, rendering a balanced MNC strategy harder to reach.

We introduce the theory of dual embeddedness to the digital transformation context, which emphasizes the contrasting influences for standardization at HQ and adaptation at subsidiaries. While HQ has the formal mandate, high-performing subsidiaries can have significant influence on the process characteristics and outcomes of digital transformation. Dual embeddedness demonstrates that MNC digital transformation is much less linear and teleological than characterized in prior research, with much less predictable outcomes. This finding can help to explain the variance in results of prior cross-sectional research on digital transformation. Extending the dual embeddedness perspective, this study offers complementary understanding on the relationship between MNC digital transformation and strategy, which is vital to understand the pan-geography nature of technology and process implementation. We develop this additional understanding through a detailed description and categorization of influences, which indicates that most driving influences for digital transformation are teleological and from the HQ perspective, and most inhibiting influences are evolutionary and from the subsidiary perspective.

For managerial insights, we complement (Zhao & Priporis, 2017) by highlighting that in addition to the horizontal visibility and data-sharing enabled by IT systems, the process of digital transformation also enables HQ and subsidiaries to develop knowledge about each other. Handled properly, MNCs can strengthen the external embeddedness of HQ with subsidiaries, and harness the external embeddedness of subsidiaries as an asset. However, if not handled properly, there is a risk that the different perspectives of HQ and subsidiaries can drive inconsistencies and conflicts that disrupt the digital transformation process (Van de Ven, 1992).

While it is possible that constantly changing conditions and varying needs across local markets may prevent MNC digital transformation and strategy from reaching an equilibrium state of fit, the lack of equilibrium may not be entirely negative. Changing business needs can lead MNCs to update their solutions on a regular basis, which means that as markets become more attractive, HQ can reengage with subsidiaries in those markets to negotiate the next steps for digital transformation. It is critical for HQ to maintain knowledge of business conditions, so it can effectively coordinate digital transformation efforts to achieve the MNC's business strategy.

5.2 *Limitations and future research*

We acknowledge three limitations of this study, and suggest opportunities for future research to address these limitations and extend the line of inquiry on MNC digital transformation. Our first limitation applies to all case study research, in which empirical results on any small number of case study firms may not apply to the full population of firms. The goal of this study is to perform an in-depth exploration of the manner in which internal and external embeddedness impact MNC digital transformation, and the multi-case study format enabled us to conduct informative and substantive interviews with key decision-makers at HQ and subsidiaries to achieve our goal. One idea for future research would be to extend the study of embeddedness in an empirical study across a large number of firms, either through a custom survey or by coding global and subsidiary from financial regulatory filings as in (Mithas et al., 2017). A larger data set would also lend itself to a broader range of empirical data analysis methodologies.¹

Our second limitation is that, while the theoretical themes of internal and external embeddedness were a purposeful part of the research and questionnaire design, the empirical themes of strategy, financial and technology arose organically through our data. While we believe our data is robust enough to capture and reflect these empirical themes, it is possible that we would have designed different questions and/or gathered different data if we had explicitly incorporated these themes into the upfront research design. Now that this paper has placed these empirical themes alongside the theoretical themes of internal and external embeddedness, one idea for future research would be to account for these empirical themes in the research design. Building on the research idea expressed above, it is definitely possible to code financial data from regulatory reports, and it should also be possible to code strategy and technology data from regulatory reports and perform analysis such as crisp-set Qualitative Comparative Analysis (csQCA) and/or fuzzy-set Qualitative Comparative Analysis (fsQCA).

¹ We thank an anonymous reviewer for this suggestion.

Our third limitation is that while we pursued a longitudinal study by conducting interviews with European HQ, then conducting interviews with U.S. subsidiaries, then returning for more interviews with European HQ over a 15-month period, digital transformation efforts for large MNCs are multi-year affairs and even 15 months (while a reasonably long period for an academic study) is not enough time to capture full digital transformation efforts from beginning to end. Empirical studies from third-party data, which are less intrusive than the case study methodology we employed for this project, may be one way to capture a longer timeframe. Another way to capture longer timeframes would be to inform the case study firms of the extended timeframe (e.g., 3-5 years) upfront, to set expectations appropriately and establish the types of research relationships that would facilitate a medium- to long-term case study.

To conclude, this paper develops insights on MNC digital transformation using a multi-case study of five MNCs that belong to the *Forbes Global 2000*, are headquartered in Northern Europe with a large subsidiary in the U.S., and represent a range of industries, product types and customer types. We use theory on MNC embeddedness to show that internal and external embeddedness create a digital transformation process that is much more iterative and evolutionary than previously recognized. We discuss the manner in which embeddedness, along with strategy, financial and technology considerations, influences digital transformation, and we offer guidance for researchers and firms to navigate the complexities of digital transformation. This research is important as MNCs navigate the increasingly global and competitive business landscape.

Appendix. Main Questionnaire Items for Semi-Structured Interviews

Headquarters	<ol style="list-style-type: none"> 1. What are the strategy and goals for the company as a multi-national corporation (MNC)? 2. What challenges does the company face in achieving its strategy and goals? 3. How does the company work to address these challenges [using organizational structure, IT systems, business process changes]? 4. How does the company evaluate the success/failure of its initiatives [organizational, IT, business process] and with what kind of metrics? 5. From the perspective of the firm, what is the desired relationship between headquarters and subsidiaries? 6. What type of information needs to be exchanged between headquarters and subsidiaries to establish and maintain this relationship? 7. Do headquarters and subsidiaries share a common view on the desired relationship and the need for information exchange? 8. Are there barriers to a common view and/or information exchange? If so, what are the barriers? How is the company working to overcome the barriers?
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Subsidiaries	<ol style="list-style-type: none"> 1. Which of the functions listed below are performed at the subsidiary level? Are the associated business processes unique to the subsidiary, or are the processes based on headquarters directives? (a) R&D/product design, (b) Procurement, (c) Production/manufacturing, (d) Marketing/advertising, (e) Sales/service, (f) IT/IS, (g) Finance/accounting, (h) HR, (i) Other. 2. Please briefly describe the current IT/IS at the subsidiary level. (a) Network/intranet, (b) Data center, (c) ERP, (d) Procurement, (e) Supply chain management, (f) Warehousing/distribution, (g) CRM, (h) Electronic commerce, (i) Major initiatives underway, and (j) Other. 3. What are the general strategy and goals for the subsidiary? How are these related to the firm's global strategy? How does the IT/IS function support the subsidiary's goals? 4. From the subsidiary's perspective, what is the desired relationship between the subsidiary and headquarters? 5. What type of information is exchanged with headquarters? What type of information is exchanged with other subsidiaries? Are there any barriers to information exchange, and if so, how does the subsidiary work to overcome these barriers? 6. Are there any local market aspects that have had a great impact on the current IT/IS state? Are there any corporate functions (see list under subsidiary question 1 above) that present unique requirements for the current IT/IS state? 7. Where are the major of high-level IT/IS decisions made – at the subsidiary or at headquarters? What role does your position play to define the information and application architecture? To what extent do IT/IS and executive leadership in other areas collaborate to define architecture and application strategy and implementation?
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