MANAGING INFORMATION TECHNOLOGY IN TRANSNATIONAL ENTERPRISES

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Abstract

Multinational enterprises (MNEs) are increasingly shifting from global or multinational strategies towards a transnational strategy (Barlett & Ghoshal 1989), as intense competition drives MNEs to simultaneously pursue scale, responsiveness, and innovation. Such a shift has important implications for IT management. How can IT in MNEs be managed to enable all three objectives? We draw on ambidexterity literature, which suggests that separate structures and initiatives are needed for each objective, and that governance is critical in coordinating and integrating across these distinct initiatives. By analyzing a set of 15 published cases on global IT management, we found that these MNEs deployed distinct architectural and structural initiatives to achieve IT scale, responsiveness and innovation. We also noted the common global IT governance structures and processes instituted to knit these distinct initiatives together. Our theorizing and empirical findings led us to propose a framework for global IT management, as well as to identify the critical gaps for future research.

Keywords:Multinational Enterprises,Transnational Enterprises, Global IT Management.

1   INTRODUCTION

Globalization has been a major phenomenon since the 1980s as many established MNEs grow and expand their presence globally. A study of MNEs, for example, has shown a steady increase in the number of MNEs, up from 3,000 in 1990 to over 63,000 in 2003 (Gabel and Bruno, 2003). These geographical expansions came in various forms. Using Bartlett and Ghoshal's typology (1989), a *global* MNE focuses on achieving efficiency through world-wide scale, and is associated with standard product design and centralized operations and control; a *multinational* MNE focuses on responsiveness to local markets, with product differentiation to meet local needs, and decentralized operations and control; an *international* MNE focuses on innovation through learning, and is associated with knowledge and expertise transfer from HQ to overseas subsidiaries, and coordination through a federated structure; and a *transnational* MNE seeks to achieve scale efficiency, responsiveness, and learning for innovation, and is associated with coordination of operations while retaining responsiveness to national interests.

In the post-2000 era, the wave of globalization continues to intensify relentlessly. The UNCTAD (United Nations Conference on Trade and Development)'s compilation of the top 100 largest transnational corporations, for example, shows an increasing foreign-global sales ratio, averaging at about 66% in 2008 (UNCTAD, 14/4/2011). Driven by greater deregulation and opening up of economies, stiffer competition both from established and emerging MNEs, and more sophisticated demands from increasingly globalized customers, more MNEs are striving towards a transnational strategy (Karimi & Konsynski, 1991). Consequently, a greater number of MNEs are developing the 'capability of developing and introducing new products throughout its global base while achieving global economies of scale and remaining responsive to local market opportunities'(Jarvenpaa & Ives, 1993, p.551). Given the critical role of IT in enabling digitization, coordination, and control in transnational MNEs, managing the globally distributed IT resources poses a major challenge for CIOs. Specifically, how can IT be managed to align with the strategy of transnational MNEs in achieving scale, responsiveness, and innovation?

2   LITERATURE REVIEW

2.1   Aligning IT in Transnational MNEs

A basic tenet in global IT literature is that IT should be aligned to MNE strategy (Karimi & Konsynski, 1991; Jarvenpaa & Ives, 1993; Cheung & Burn, 1994; Ramarapu & Lado, 1995; King & Sethi, 1999; Peppard, 1999; Sambharya et al., 2005; King & Flor, 2008). For example, Karimi and Konsynski (1991) argued that global MNEs would have centralized IS, multinational MNEs would have decentralized IS, international MNEs would have linked databases and processes, and transnational MNEs would have integrated architecture, shared databases. Jarvenpaa and Ives (1993) similarly identified four IT configurations: *Headquarters driven(associated with global strategy),* where IT decisions are centralized at HQ; *Independent IT operations (multinational strategy),* where each subsidiary has independent IT initiatives; *Intellectual synergy(international strategy),* with global systems that are locally tailored; and *Global integrated IT (transnational strategy),* with worldwide integration of IT supporting core business and other business processes managed on domestic scale.

Some researchers have looked into various aspects of IT in Transnational MNEs (Cummings & Guynes, 1994; Cavaye, 1998; Boudreau et al., 1998; King and Sethi, 1999; Manwani & O'Keefe, 2003). However, while the prescriptions for Global and Multinational MNE IT have been more straightforward – for example, Global MNEs are to have centralized IT architectures, IT organization structure and IT governance, while Multinational MNEs' IT are decentralized on these dimensions – the characterization of transnational IT has been somewhat fragmented and less obvious.

The prescriptions for transnational IT appear to advocate a hybrid solution, where architectures are neither centralized nor decentralized, but integrated, shared, and interdependent (Karimi & Konsynski, 1991; Ramarapu and Lado, 1995; Boudreau et al. 1998; Peppard, 1999; Sambharya et. al.,

2005; Rangan & Sengul, 2009). Organization structures are neither dominated by corporate nor local units, but rely also on IT units at the sector or regional level (Manwani, 2002), and are more organic and flexible matrix or network structures (Sambharya et al., 2005). IT decision making is elevated to high levels in organizations (Sambharya et al., 2005), and made jointly by HQ and subsidiary (Jarvenpaa & Ives, 1993). However, it is hard to see how these "hybrid" prescriptions are related to the transnational objectives of scale, responsiveness, and innovation. For example, as we interpret the moves of many MNEs in consolidating their IT in recent years, it is not clear whether they are pursuing the hybrid transnational approaches indicated above, or centralizing their worldwide IT (Manwani & O'Keefe, 2003; Mohdzain & Ward, 2007). In addition, these prescriptions also do not address the IT's contribution to innovation. An alternative view is thus needed to understand how transnational MNEs seek to achieve the multiple strategic objectives of scale, responsiveness and innovation.

2.2 Unpacking "Hybridness" to Achieve Multi-Dexterity

Drawing on the organizational theory of ambidexterity (O'Reilly & Tushman, 2004), we believe that organizations can only achieve multiple objectives by having separate and distinctive units focused on each of these objectives. The ambidexterity literature, for example, has noted that organizations that are primarily focused on efficiency are likely to experience a decline in innovation (Benner, 2003). This is because organization structures, processes and culture associated with efficiency are very different from those associated with innovation. Efficiency-focused subunits are large, centralized, with a culture of variance reduction and productivity, while innovation subunits are small, decentralized, with a culture of exploration (O'Reilly and Tushman, 2004). Critical to ensuring that there are synergies among these disparate units is to have integrating mechanisms (e.g., senior management team) that enable innovation subunits to leverage on the vast resources of the efficiency units, while ensuring that the culture of the efficiency units does not "contaminate" culture of experimentation within innovation units.

Extending the ambidextrous theory to MNE IT, we argue that MNEs pursuing a transnational strategy would need to undertake distinct initiatives with separate IT subunits that address scale, responsiveness, and innovation. IT governance will be critical to ensuring that the various scale, innovation and responsiveness initiatives and subunits work synergistically together. Recent research provides support for this notion of distinct IT subunits. Sia et al. (2010) identified four structural units that appeared in all the MNEs they examined across a variety of industries: IT shared services unit (for scale), IT centers of excellence (innovation), IT value managers (responsiveness), and corporate IT governance unit. However, these findings were based on the study of 4 MNEs, and may not represent the range of initiatives that transnational MNEs employ. Our review of the global IT literature suggests that beyond structural initiatives, there are also architectural and governance initiatives that can be deployed to orchestrate IT for a transnational strategy. For example, Jarvenpaa and Ives (2003) noted that scale efficiency can be achieved through architectural initiatives, i.e., putting in place *common systems* and ensuring that there are *standards* that are being globally implemented. Similarly, governance initiatives that define who decides on what decisions, as well as who provides inputs to which decisions (Weill & Ross, 2004) can be deployed to allocate different IT decisions to specific groups to enable specific strategic objectives such as responsiveness.

Taking the multi (ambi)-dexterity perspective, we thus seek to uncover not just the various initiatives deployed to achieve each distinct IT objectives of scale, responsiveness, and innovation but also the initiatives that integrate these objectives together.

3 METHODS

In this paper, as a preliminary investigation to a larger empirical study planned, we carefully reviewed published cases of global IT post-2000 to explore the plausibility of the multi-dexterity perspective. We conducted the case search using the Harvard Business School (HBS) database. The HBS database has the most comprehensive case collection, covering cases published from top business schools such as HBS, INSEAD, Kellogg, Ivey, Stanford, IMD, and others. The following key words were used:

Global IT, Global Information Technology, Global IT Organization, and Transnational IT. Only cases published or revised post 2000 were selected. A total of 187 unique cases were retrieved. The large number of cases was partly due to the more "inclusive" search results of the HBS search engine that pulled as many related publications or cases as possible. Many of the cases that appeared in the later half of the search results were irrelevant or only remotely related to the key words used. Each of these cases was evaluated independently by two authors for suitability in terms of (i) its globalized business with its IT resources distributed in different regions, and (ii) its substantive focus on the management of global IT organization. Disagreements were discussed and resolved to focus on the key theme of global IT management or organization. Cases that describe other peripheral matters, for example, business strategies for global IT firms, IT as a competitive advantage & enabler of business growth, IT management or organizations in a single country context, and IT in mergers and acquisitions are excluded. Appendix A lists the final 15 cases of MNEs selected and the brief descriptions of their global businesses.

Each case was reviewed to surface IT initiatives taken to achieve (1) scale, (2) responsiveness, and (3) innovation. Scale refers the efficiency arising from industrial economics of systems rationalization, standardization, and specialization on a global basis. Responsiveness refers to the objective of tailoring to differences in national market structures and consumer preferences (Bartlett & Ghoshal 1998), i.e., being able to deal with the varying needs of many different markets, products, suppliers, and customers (Jarvenpaa & Ives, 1993). Innovation is the development, combination, or synthesis of business and IT knowledge to introduce new products, processes, or technologies.

Deriving from prior literature, we also paid attention to the various IT initiatives in three broad categories:
- Architectural initiatives, i.e., "the organizing logic for data, applications, and infrastructure, captured in a set of policies, relationships, and technical choices to achieve desired business and technical standardization and integration" (Weill & Ross, 2004). It encompasses three main components, i.e., data, applications, and infrastructure (Gibson, 1994, Ramarapu & Lado, 1995, King & Sethi, 1999; Peppard, 1999; King & Flor, 2009)
- Structural initiatives, where research has largely focused on the organizational groupings of IT activities, IT subunits, and IT resources and the management relationships with each other. Jarvenpaa and Ives (1993) noted the reporting structure between HQ and subsidiary on the centralization and decentralization continuum. Others such as Manwani (2002) noted the presence of sector/regional IT units in addition to corporate (HQ) and local business unit IT.
- Governance initiatives, which has been articulated as the structures and processes that "specify the decision rights and accountability framework to encourage desirable behaviors in using IT (Weill & Ross, 2004), the locus of decision making (Jarvenpaa and Ives, 1993;), and in terms of planning and control (Cummings & Guynes, 1994; Manwani, 2002; Mohdzain & Ward, 2007)

The matrix of strategic IT objectives (i.e., scale, responsiveness, and innovation) and IT initiatives (i.e., architectural, structural, governance) constituted the coding template for each case. Relevant quotes and case evidence were extracted and placed into a coding table. Where appropriate, other published information relating to these 15 MNEs was also gathered to provide more details for our analysis. The eventual set of IT initiatives was derived iteratively, after at least two coders agreed that the specific IT initiatives were sufficiently unique and that they were sufficient common, i.e., deployed by at least one other organization. The final full coding table across all cases is 12-pages in length (can be provided upon request). Appendix B presents the summarized findings across the 15 MNEs.

4   FINDINGS

In line with the differentiated perspective of multi (ambi)-dexterity, we found that MNEs in these published cases pursued separate IT initiatives for scale, responsiveness, and innovation. Most initiatives are associated with enabling scale efficiency, some initiatives are targeted at enabling responsiveness, and relatively few for enabling innovation. We describe below the initiatives we

found across the cases for each of the three strategic objectives, as well as the governance mechanisms for coordinating the various IT activities.

4.1 Initiatives for IT Scale

All the MNE cases we examined documented IT initiatives for achieving scale efficiency. The frequent instances of architectural and structural initiatives suggest a trend towards IT consolidation and standardization.

Architectural initiatives in MNEs to achieve scale often deals with the consolidation, standardization and integration of data, applications, and infrastructure. *Data consolidation, standardization, and integration* are achieved in a number of ways. For example, Xerox redesigned its data architecture to be consistent and integrated, and harmonized data codes in a data warehouse, to enable common management and performance reporting. Wyeth implemented a global data warehouse to create the "global glass pipeline". Cisco created the single source of truth for customer database by standardizing enterprise reporting, replacing at least 15 business intelligence tools. UCB even tried to standardize the corporate data access interface with a 3R portal project to bring the Right information to the Right person at the Right time. *Applications consolidation, standardization and integration* are often conducted enterprise-wide, accompanied by enterprise process management and the implementation of global enterprise systems. For example, Cisco launched an amnesty program to uncover "shadow" applications, and implemented global ERP as its mission-critical systems. Similarly, Accenture moved from more than 200 finance applications to a single global instance of SAP financial solutions. CEMEX introduced the CEMEX Way globally – an enterprise-wide process standardization program for each core function such as finance, operations, procurement, etc., as a precursor to its enterprise system implementation. *Infrastructure consolidation, standardization and integration* focuses on establishing global IT platforms such as telecom networks, servers, and operating systems. An example is UCB, which created a global communication network and installed Exchange in 65 countries within 4 months, giving users a single username and logon to access all network applications. Its various data centers were also consolidated, with close to 300 servers running production applications from all sectors and regions.

Structural initiatives focus on the *centralization of IT operations*, increasingly accompanied by a move to shared services, and on leveraging the scale efficiency of external providers through consolidation of procurement and outsourcing. CEMEX's centralization of 6 IT centers in America into one mega-center in Venezuela is a good example of centralization of IT operations. More mature IT organizations also *establish IT shared services* to better manage IT service delivery. These shared services are typically separate divisions committed to meet pre-agreed service levels. P&G's IT shared services are often cited for their user-friendliness. They provided a set of 70 IT services, with three shared services centers in San Jose, Costa Rica; in Newcastle, UK; and in Manila, Philippines. Business units could choose from a single-page catalog in two "shopping aisles" – employee services and business services. Users could influence their costs by choosing a tier of service and the total units consumed. Pricing was also region-dependent.

The *centralization of procurement,* sometimes with the creation of a new centralized procurement unit, is often a first step towards taking a more global approach to outsourcing. Contract managers in UCB's Group IT, for example, consolidated smaller, individual purchases by sectors and negotiated them at the group level, saving a $5.5m one-time saving, and a further $2.7m saving annually. The legal processing and documentation of purchasing contracts were standardized and formalized as part of the process. Accenture also consolidated procurement by adopting a single-vendor approach in sourcing for IT equipment, e.g., HP for computers and Cisco for network equipment. Even outsourcing contracts are consolidated globally and farmed out to a handful of vendors. We observed two models with regard to *consolidated outsourcing* – one where the majority of the outsourced IT services are farmed out to a separate but related company. For example, 86% of Accenture's outsourcing went to its Global Delivery Network and Infrastructure Outsourcing group. CEMEX even set up a new entity Cemtec to provide IT service delivery. Cemtec subsequently merged with other IT solution providers as it tapped new capabilities in e-business solution development. The consolidated

outsourcing can also be contracted out to external IT service providers. These are typically large IT consulting firms with global presence. For example, Cathay Pacific outsourced its data center, network, and desktop to IBM Sydney while application services were outsourced to Sabre Airline Solution. Through a global information management strategy, Xerox also consolidated its outsourcing to EDS through a $3.2 billion, 10-year deal. It was able to create a single global contract that could be implemented locally in each of the 130 countries in which it operated.

4.2 Initiatives for IT Responsiveness

As MNEs organize their IT functions for global scale, they also implement various initiatives to improve their responsiveness to the business. Some initiatives are built into the IT architecture while others are mostly structural initiatives that seek to better align IT to business.

Architectural initiatives involve *tailoring the design of IT architecture by accommodating sectoral, regional or other specificity*. This is particularly prominent in MNEs with multiple (distinct) business lines and regional markets. The architectural specificity of the key business dimensions is built into the core IT systems. For example, UCB operated an IT architecture that accommodated both global applications (e.g., Peoplesoft for HR applications across all sectors and regions) and sectoral applications for each of its business sectors i.e., Chemicals, Films, and Pharmacy. Given the sector-specific requirements, each sector had its own variation of SAP configuration. Chemicals as an example, needed transactional support for material safety data sheets which were mandatory requirements in US and Europe. It even had two different versions of SAP – one in US and one in Europe.

Structural initiatives form the majority of the initiatives for increasing IT responsiveness to the business. These structural initiatives seek to better *align the IT organization structure to enterprise structure* in terms of key business dimensions such as products, markets, functions and processes. For example, Cisco and Xerox both realigned their IT organizations to better cater to the requirements of core business processes. In Cisco, the IT group was organized into groups such as idea to product, lead to order, order to cash, and so on. Another common initiative was the *formalizing of interfacing roles* between business and IT. These boundary spanners are sometimes from the business lines, but mostly from IT. Cathay Pacific, for instance, had 25 business professionals reporting to the Director of Information Management. They were the main liaison persons between business and IT. On the other hand, Wyeth had its IT people as business relationship managers in regional shared services to better serve the business lines. IBM also had integration executives – representing geographic regions and business units to enhance business visibility in IT. Structurally, MNEs also try to balance their architectural and structural consolidation by *establishing IT support at the regional (rather than global) level*. For example, UCB had a group of technology consultants to man regional helpdesk support so that there was "someone to complain to, to liaison with, in Asia". Others such as Alcan set up regional IT groups in Montreal, Shanghai, and 3 other places to "better meet local needs". In some MNEs such as Wyeth, where the business units in some countries are large, *small IT groups are established within the business units* to manage the IT resources such as PC, applications, and LAN support locally. Such initiatives are less common. Most MNEs appear to consolidate IT services at least at the regional level.

4.3 Initiatives for IT Innovation

IT innovation include both technological innovation (the adoption of technologies that are new to the MNEs), as well as IT-enabled business innovation (which leverages existing or new technology for new business products, services, or processes). We found that while IT innovation is recognized as important, it is relatively less emphasized in global IT management. Only 7 out of the 15 cases made specific references to IT innovation initiatives.

Architectural initiatives in support of IT innovation require the *accommodation of many small, loosely coupled, and even differentiated IT environments* (e.g., mobile applications, social media, cloud computing) around the peripheral of core IT platforms to facilitate experimentation, incubation, or innovation. Successful innovations are then diffused more systematically throughout the MNEs.

The development of Documentum by the Pharmacy Sector in UCB is a good example. The media-rich and intelligent knowledge management platform was conceptualized to support new drug discovery, a highly strategic process for the pharmaceutical R&D. The need to access huge bio-informatics database and genelogic gene expression database, and to ensure meticulous research data handling, demanded heavy computing requirements that had to be catered to separately by UCB. Coupled with other computational-intensive requirements of pharmaceutical research (e.g., molecular modeling, 3D visualization), a separate IT architecture that enabled such innovation was necessary. The Documentum idea was subsequently expanded into the electronic document management system for UCB as the "enterprise content management solutions … to intelligently create and manage all types of content – documents, webpages, XML files, and rich media using one common content platform and repository."

Structural initiatives for innovation most commonly include *formal IT innovation roles or units*, such as having a VP for innovation, or a CTO office tasked with innovation. For example, in addition to the CIO, BP created the role of Chief Technology Officer. The CTO office was in charge of exploring innovation and introducing leading edge IT to BP's businesses worldwide. It consisted of a dozen technically strong members, well-informed about BP's business needs and highly networked with external companies and experts. They coordinated hundreds of BP technology groups, main stream IT, and business units. They "connect people who might otherwise not connect." They initiated annual "game changer" initiatives – innovative programs that exploit new technologies such as sensory networks, location intelligence, predictive analytics, etc. These programs had significant transformative potential and were expected to have at least $50-$100 million of bottom line impact. P&G, similarly, also had a VP for innovation and architecture who was responsible for innovation with internal and external customers.

Another structural initiative is establishing *Centers of Excellence (CoEs)*. They are also called centers of expertise or competency centers. These are units that consolidated innovation resources, concentrating on strategic capabilities in a particular technology, application, or use of IT in a business sector. Such in-depth expertise is often identified as an important source of value creation and service innovation for the MNEs. These units often do not have operational responsibilities, but they serve as strategic resources that focus on designing and developing new solutions. P&G, for example, located its CoE for mobile marketing in the Philippines to tap into the high usage of mobile phones in Asia. Similarly, Wyeth had a few regional CoEs for applications. These CoEs might also be virtual, as specialized expertise is often distributed worldwide.

Another set of IT innovation initiatives is related to efforts to *enhance the IT interaction with innovative business units*. Such BUs tend to be directly customer-facing, with a customer advocacy role, or involve R&D and product development. For example, Accenture's internal IT organization worked closely with its professional IT consulting groups, e.g., in trying out innovative customer solutions internally. Similarly, IBM's IT organization interacted closely with the IBM Technology Group which has 61 technology research and development laboratories in 15 countries to tap new technological innovation. Other MNEs such as UCB positioned IT personnel in the business R&D groups. 29 people from IT Project were transferred to work with research scientists in Pharmacy R&D. The IT research software manager even reported to VP for Research & Discovery. In a more extreme case of enhancing IT interaction with innovative business units, Cisco changed the reporting line of corporate CIO from Finance to the Customer Advocacy group to push for more customer-oriented IT innovation.

Finally, creating structures for *open innovation* to leverage on the external community of IT vendors and partners is another initiative that some MNEs had deployed to bring in emerging technological innovation. Cisco often relied on external contractors to jumpstart innovative ideas that did not meet its internal ROI and risk hurdles (which tended to favor mature technologies). BP's CTO team, similarly, actively engaged external players like VCs and suppliers to identify emerging technology trends industry-wide. They held "blue chalk" events where suppliers would present applications of emerging technologies as new value propositions to senior business executives to "pull them out of the comfort zone to envision what might be possible."

4.4   Initiatives for IT Governance

Across the MNE cases, we also observed many initiatives seeking to improve the MNEs' IT *governance structure* and *processes*. These initiatives reflect the complexity in balancing scale, responsiveness and innovation for synergies in the transnational MNE context.

A common initiative to improve **IT governance structure** is the streamlining and clarifying of the allocation of decision rights for strategic IT decisions among the diverse business and IT stakeholders. Amidst the global complexity, many MNEs adopt a simple governance structure by having a *single formal IT decision making body at the highest level*, for investment prioritization, issues escalation and resolution. Business stakeholders often play key roles in these strategic IT decisions. For example, in Royal DSM, the ICT governance board was heavily weighted towards business oversight, consisting of two managing board members, the CIO, and four business group directors who rotated periodically. Accenture, similarly, operated with an IT steering committee comprising senior IT management and the COOs of every business line. In addition, MNEs also seek to broaden the solicitation of inputs to include representation from all key business dimensions. Accordingly, MNEs often have *enterprise IT committees with wide representation*. Cisco, for example, had an enterprise-wide business process operating committee for cross-functional decision making, while Xerox had several enterprise level committees for business process and information management, technology, and architecture that helped to establish and develop consensus on enterprise IT policies. In combination, these forums help to ensure that sufficient breadth of voices are heard and yet key decisions are not unduly delayed or burdened by excessive bureaucracy in MNEs.

We also observed that many MNEs have moved to strengthen the enterprise IT orientation to ensure that enterprise-wide initiatives are not undermined by local and sectoral interest. Many have *converged IT reporting lines* into corporate IT (e.g., from decentralized IT units in BUs or regions into corporate IT, in direct, dotted, or matrix reporting lines). For example, in 2009, IBM centralized all IT authority to the corporate CIO. The entire IT budget and 5,000 IT staff were placed under the CIO. Moving more gradually in the same direction is Alcan, which moved from a decentralized IT setup reporting 100% to business group heads, to having IT directors at the business groups now report to both business group heads (75%) and CIO (25%). A new position - VP Corporate IT (i.e., CIO) - was created to take charge of global IT management and coordination of shared service activities. In a similar vein, Cisco and Xerox also restructured to move up to a higher level of IT grouping, removing regional sub-divisions or country level reporting lines.

There are also initiatives to improve **IT governance processes**. One most frequently observed initiative is the crafting of a common and well-defined *strategic IT planning, budgeting, and prioritization process*. The standard process channels all inputs systematically through a series of filtering and deliberation forums to arrive at the enterprise-level strategic IT plans, while ensuring adequate voice to the various geographies and sectors in the business. Reflecting the enterprise IT focus, these planning processes are often geared towards giving Corporate IT a bigger say in the use of funds. For example, Wyeth required that project, headcount, application budgets in BUs to be approved by corporate IT. Similarly, Cisco consolidated its IT budget and redistributed it such that more of IT budget for applications moved into central control, and that the infrastructure budget was entirely under control of corporate IT.

Another governance process initiative that we noted is the increased attention (and resources) to the *tracking of enterprise IT metrics*, e.g., distribution of IT budget, IT resources, IT spending, and performance KPIs. These performance KPIs reflect objectives for scale (e.g., productivity and cost improvements), responsiveness (e.g., cycle time, user satisfaction), and innovation (e.g., number of new projects and revenue impacts). For example, Accenture measured their IT transformation initiatives using metrics for % of satisfied sponsors, IT spend (in terms of $, %, per person), global applications, local applications, technology platforms, and benefits realized. Similarly, MDCM had clear visibility of its global IT resources through an IT audit that showed the inventory of systems, standards, projects, investments, and budgets across all IT groups.
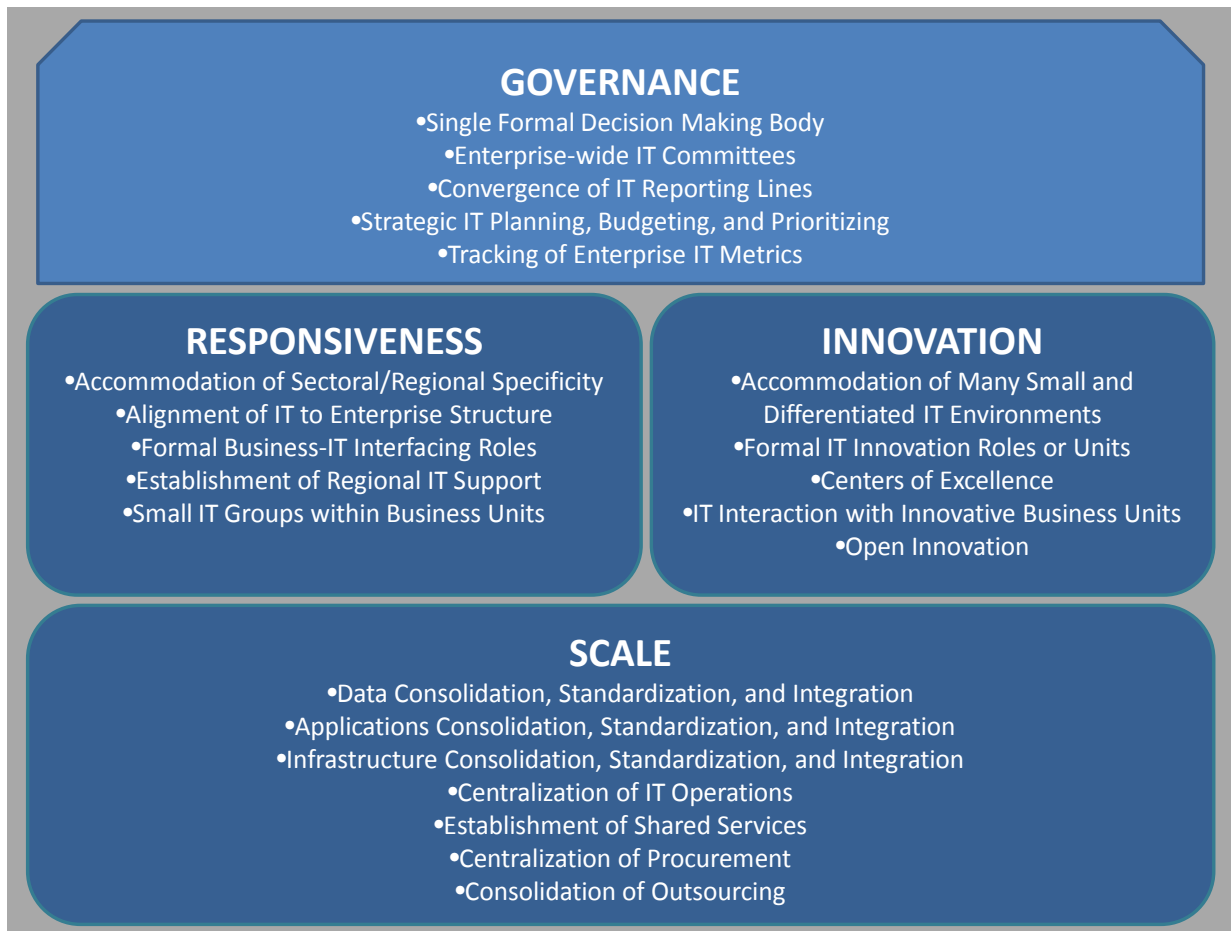
5   DISCUSSION AND CONTRIBUTION

Our review of these global IT case studies gives us a more updated picture of IT management practices in MNEs. The findings suggest a few interesting insights. First, we identify what transnational MNEs are doing in terms of IT architecture, structure, and governance, as they strive to achieve scale, responsiveness, and innovation. There is strong empirical consistency with the principles underpinning the ambidexterity theory - that distinct architectural and structural initiatives are required to achieve each distinct goal, and that governance is key to integrating and balancing the tensions. For example, shared services IT units are focused on driving down costs, business-facing IT units and interface managers are focused on ensuring business responsiveness, while designated IT innovation units or IT personnel embedded in the business innovation units are focused on incubating and developing new innovation opportunities. The challenging task of integrating and coordinating across the diverse initiatives and subunits is facilitated through various initiatives that enhance the global IT governance structure and processes to ensure coherence and effective execution.

Second, we also contribute to IT management of the under-studied MNE type- transnational MNEs. Despite the general talk about the transnational objectives of achieving scale, responsiveness, and innovation in managing MNE IT, our findings reveal an unequal emphasis on scale, responsiveness, and innovation, at least in terms of the architectural and structural initiatives deployed. IT scale seems to be the most actively pursued objective among the MNEs, followed by IT responsiveness. IT innovation seems to receive the least attention. The CTO office in charge of driving IT innovation in BP, for example, only had a modest budget of US$10 million, out of its US$2.5 billion total IT budget. Hence, the notion of "transnational IT" and the proportion of IT resources allocated to the different IT objectives and the related implications beg further exploration. The challenge would then be - how to achieve the transnational objectives of IT scale, responsiveness, and innovation with a disproportionate amount of IT resources?

Third, while ambidexterity theory focuses on the tensions inherent in multiple goals, we find that IT scale, responsiveness, and innovation are not always in opposition to each other. Scale can enable responsiveness and innovation. For example, the successful building of a scalable IT platform by Royal DSM through IT standardization and business process simplification facilitated its external acquisition by enabling faster and smoother integration of newly acquired companies into the DSM organization. The "one-jump" transition capability set the stage for the next level of ICT enablement to support business innovation by giving new ventures a leg up. Royal DSM called it the "IT greenhouse for innovation", i.e., an IT system backbone on which you can place new start-ups, easily scaling up and down, not just for IT infrastructure, but also business processes and organizational capabilities. Building IT scale thus also feeds into the objectives of enabling IT responsiveness and innovation. There are possible synergies across the three strategic goals.

Our theorizing and findings suggest a conceptual framework (as shown in Figure 1) which should be useful in furthering understanding of how MNEs manage their IT resources to achieve scale, responsiveness and innovation in the transnational context. The conceptual framework, based on the ambidexterity theory, and analysis of 15 well documented recent cases of IT management in MNEs, highlights several important issues for research. First, we need more in-depth empirical investigation of the question of how IT governance manages the tensions that would inevitably arise from having distinct initiatives for scale, responsiveness and innovation. Second, while our study suggest to us that responsiveness and innovation initiatives may draw upon the foundation that has been built for scale, the interaction and interdependence among these three streams of initiatives needs to be better understood. Third, research needs to address the under-studied area of IT and innovation in MNEs. Finally, further research should examine the link between the set of IT initiatives for scale, responsiveness and innovation and the performance on these objectives.

GOVERNANCE
- Single Formal Decision Making Body
- Enterprise-wide IT Committees
- Convergence of IT Reporting Lines
- Strategic IT Planning, Budgeting, and Prioritizing
- Tracking of Enterprise IT Metrics

RESPONSIVENESS
- Accommodation of Sectoral/Regional Specificity
- Alignment of IT to Enterprise Structure
- Formal Business-IT Interfacing Roles
- Establishment of Regional IT Support
- Small IT Groups within Business Units

INNOVATION
- Accommodation of Many Small and Differentiated IT Environments
- Formal IT Innovation Roles or Units
- Centers of Excellence
- IT Interaction with Innovative Business Units
- Open Innovation

SCALE
- Data Consolidation, Standardization, and Integration
- Applications Consolidation, Standardization, and Integration
- Infrastructure Consolidation, Standardization, and Integration
- Centralization of IT Operations
- Establishment of Shared Services
- Centralization of Procurement
- Consolidation of Outsourcing

Figure 1.   IT Management in Transnational MNEs

Going forward, we hope to deepen our theoretical anchor in ambidexterity literature and extend its application into global IT management. Gibson and Birkinshaw (2004), for example, noted the distinction between structural and contextual ambidexterity. Others such as Raisch, et al (2009) further noted the need to understand the evolutionary dynamics of ambidexterity over time, its span across multiple level of analysis, and the conditions under which ambidexterity leads to success. We are also conducting a few actual global IT case studies to illuminate the dynamic complexity of ambidexterity in managing the challenges of simultaneous nurturing of capabilities that are often contradictory within the same organization.

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Appendix A: List of Cases

Companies (Source)	Business Organization	IT Organization
Accenture (Jeffrey et. al., 2010)	Consulting and technology outsourcing company, with 50 offices globally, 180,000 employees, and $21.6 billion in annual revenue.	As of 2010, 14% are in-house staff, with the remaining are outsourced. There are 2,900 outsourced IT staff.
Wyeth (Mandviwalla and Palmer, 2008)	Global healthcare company, with presence in 140 countries. The company has annual sales of S14.2billion and employee size of 60,000.	Less than 1800 IT staff, with an annual budget of $0.5 billion. The central IT function comprises 22 people with an annual budget of S3million.
Alcan (Dub et. al., 2009)	The company processes metals, particularly aluminum. It has presence in 61 countries, with 68,000 employees and $23.6 billion in revenues.	IN 2006, Alcan IT had an annual budget of $295 million, and employed 900 IT staff.
Royal DSM N.V. (Applegate et. al., 2007)	Based in Netherlands, the company is involved in coal mining, and expanded into chemicals and petrochemicals. Annual revenue is €8 billion.	The ICT unit had undergone an IT transformation in the early-2000s, from decentralized, to standardized and service-oriented.
Cisco (McAfee et. al., 2007)	One of the largest computer networking and technology companies globally, with 10,000 employees in 60 countries.	Globally, 1800 IT staff and 1000 contractors, with 75% based in the US. IT budget is 5% of the company revenue.
Cathay Pacific (McFarlan et. al., 2007)	The airline, Hong Kong's flag carrier, flies 1.28 million passengers monthly to 92 cities, with 15,447 employees and $423 million in profits.	Most of Cathay's IT is outsourced, but it retains an in-house staff of 300 and supports 3,200 outport workstations all over the world.
BP (Wolcott and Lippitz, 2007)	One of the leading oil companies in the world, with $160billion in revenues. It is also the world's 3rd largest publicly-traded company.	The IT budget of the company amounted to $2.5billion. The CTO team, the IT innovation arm, heads innovations initiatives in BP.
MDCM (Jeffery et. al., 2006)	The company is a contract manufacturer for medical devices, with revenues of $1.12 billion in 2002.	In 2001, MDCM IT had an annual budget of $56.5 million, with 195 IT professionals worldwide
COSCO (McFarlan et. al., 2005)	Second-largest shipping line in the world by fleet capacity, with 637 ships sailing to 1,300 ports in 160 countries.	By 2004-05, there were 432 IT specialist, and an annual IT budget of RMB20 million. RMB1 billion was mobilized for near-term IT spending.
Procter & Gamble (Delong et. al., 2005)	The company is one of the world's largest consumer products conglomerate, with 250 brands (of a wide variety of products) in 180 countries, and annual revenue of $70 billion.	The IT unit is part of the Global Business Solutions (GBS) unit formed by Procter & Gamble to consolidate corporate functions.
UCB (McFarlan and Delacey, 2005)	Belgium-based pharmaceutical company, with 3 mainsectors – chemical, films, and pharmaceuticals. The company has 130 subsidiaries and 10,000 employees worldwide.	In 2002, the IT staff headcount was 368, half of which were contractors. The central IT function was created after 1996.
World Bank (McFarlan, 2003)	Tasked to provide development assistance, World Bank is jointly operated by 184 countries. In 2003, it had 240 projects in 92 countries.	The IT branch (Information Solutions Group) has 415 staff members by 2003.
CEMEX (Marchand et. al., 2003)	World's 3rd largest cement producer, operating in 30 countries in 5 continents, with headquarters in Mexico.	Considered one of the world's leading digital re-inventors. CEMEX is also an 'early adopter and heavy investor' in IT. It formed Cemtec, an in-house IT provider.
IBM (McAfee and Herman, 2003)	Computer systems (hardware/software) company with S99billion in revenue and 33,000 companies in its global supply chain.	IBM IT has around 5,000 staff members around the world.
Xerox (Applegate and Davis, 2002)	The company produces document processing products and services. It has presence in 130 countries.	The Xerox IM accounted for 3.7% of the company revenue. It underwent a transformation that outsourced most IT services and staff.

Appendix B: Summary of Findings

			Accenture	Wyeth	Alcan	R. DSM	Cisco	Cathay P.	BP	MDCM	COSCO	P&G	UCB	W. Bank	CEMEX	IBM	Xerox
Scale																	
Architecture		Data Consolidation, Standardization, and Integration		●			●			●			●				●
		Applications Consolidation, Standardization, and Integration	●	●	●	●	●		●	●	●		●	●	●	●	●
		Infrastructure Consolidation, Standardization, and Integration	●		●	●	●			●	●		●	●			●
Structure		Centralization of IT Operations			●										●		
		Establishment of Shared Services					●					●	●	●	●	●	●
		Centralization of Procurement						●		●			●	●	●		
		Consolidation of Outsourcing	●	●	●		●	●	●	●		●	●		●		●
Responsiveness																	
Arch.		Accommodation of Sectorial/Regional Specificity		●									●				
Structure		Alignment of IT to Enterprise Structure			●	●	●										●
		Formal Business-IT Interfacing Roles	●	●				●								●	
		Establishment of Regional IT Support		●	●						●	●	●				
		Small IT Groups within Business Units		●										●			
Innovation																	
Arch.		Accommodation of Many Small and Differentiated IT Environments							●				●				
Structure		Formal IT Innovation Roles or Units	●						●			●					
		Centers of Excellence					●										
		IT Interaction with Innovative Business Units					●						●			●	
		Open Innovation					●	●							●		
Governance																	
Structure		Single Formal IT Decision Making Body	●		●	●							●				
		Enterprise-wide IT Committees			●					●					●		
		Convergence of IT Reporting Lines		●	●		●				●		●			●	●
Process		Strategic IT Planning, Budgeting, and Prioritizing					●							●			
		Tracking of Enterprise IT Metrics	●		●					●							