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IT CAPABILITIES IN GLOBAL ENTERPRISES

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IT CAPABILTIES IN GLOBAL ENTERPRISES

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Abstract

Organizations are globalizing rapidly for growth. However, with globalization they constantly struggle with the often competing objectives of global scale and responsiveness to local conditions and global trends. Prior research suggests that IT capabilities are critical to achieving organizational goals; however there has been relatively little research that explicitly examines IT capabilities in the MNC context. This paper examines in-depth the IT capabilities in a global organization. Drawing on recent research that suggests a goal-oriented approach to IT capabilities, we identify MNC capabilities of Global Scale, Global-Local Responsiveness and Global Coordination. The paper also notes the distinction between resources and processes in the conceptualization of capabilities, and provides empirical support for the resources and associated processes that comprise each of the global IT capabilities.

Keywords: IT capabilities, global organizations, scale, responsiveness, coordination, governance, case study

1. INTRODUCTION

Organizations are globalizing, in order to tap new markets and new sources of labor and technology. The World Investment Report 2012 notes that from 1998 to 2011, the UN's top 100 multinational corporations (MNCs) grew their percentage of sales from outside their home countries from 58% to 71%: a 22.4% increase. A separate report[2] published by McKinsey Global Institute has similarly noted that global financial assets have increased several-fold from $56 billion in 1990 to $225 billion in 2012.

As they grow, MNCs constantly face the challenge of leveraging global scale economies, yet being locally responsive across boundaries (Edburg & etal, 2001; Rao, 2004). Studies have noted that IT capabilities are important to helping MNCs meet these challenges. Higher IT infrastructure capability has been found to be related to global integration because it facilitated the flow of exchange of knowledge and expertise across international units, and supported employees as they moved back and forth across countries in their work (King, 2006; King & Flor, 2006). IT capabilities have also been argued to enable organizations today to be "born global", operating internationally almost from their inception (Zhang & Tansuhaj, 2007).

However, while IT capabilities are considered to be critical to firms that are globalizing (Sia et al, 2013), there have been relatively few studies on IT capabilities in MNCs (King, 2006; King & Flor, 2006; Zhang & Tansuhaj, 2007), and these have examined IT capabilities at a high level. We therefore turned to the broader literature on IT capabilities. The research on IS capabilities draws on the strategic management literature, where an oft-cited definition of capabilities is the "capacity to deploy ***resources*** in combination with organizational ***processes*** to achieve a ***desired end***" (Amit & Schoemaker, 1993) p 35). We therefore defined **global IT capabilities** *as the capacity to deploy technology-related resources in combination with organizational processes to achieve the goals of global enterprises.* Surprisingly, we found that much of the IS research has not explicitly distinguished between the resources and processes that comprise the IT capabilities, nor with few exceptions (eg. Bhatt and Grover, 2005), linked the capabilities to the goals that they are meant to deliver.

This study therefore seeks to contribute to the dearth of literature on global IT capabilities, by empirically examining an MNC that has developed global IT capabilities. We chose to study global IT capabilities using the goal-oriented approach, and sought to identify both resources and processes, as this is more consistent with the definition of capabilities from the strategic management literature. More specifically, we sought to answer the following questions: 1) What global IT capabilities does the MNC seek to develop? 2) What key resources and processes comprise these global IT capabilities?

In the following sections, we first provide an overview of prior research in IT capabilities. We then describe our research methodology. Thereafter, we examine in-depth the case of Neptune Orient Lines (NOL), the sixth largest container shipping company in the world that currently operates in 194 locations across the globe and analyse global IT capabilities in the findings. This is followed by discussion and conclusion.

2. PRIOR RESEARCH ON IT CAPABILITIES

While there has been a substantial amount of research on IT capabilities, relatively few have explicitly addressed the MNC context (King, 2006; King & Flor, 2006; Zhang & Tansuhaj, 2007). Taking a resource exchange perspective, King & Flor, 2006 suggest that global organizations enact their global vision by developing global IT infrastructure capability which enables exchange of human and information resources. Global IT infrastructure capability comprised four elements - hardware platforms, shared services, human skills, and IT planning. These components together enable the reach and range of IT infrastructure in global organizations. Zhang & Tansuhaj, 2007 examined the relationship between IT capability and international firm performance. They defined the global IT capability construct as

consisting of four components - IT architecture, IT human resources, IT infrastructure and IT relationship resources. Their result suggested a positive link between IT capability and international firm performance. These studies suggest the importance of IT capabilities to MNCs, but the paucity of research in this area led us to examine the broader strategic management literature and IS capabilities literature to better develop our concepts of global IT capabilities for MNCs.

The strategic management capabilities literature built on the resource based view (Wernerfelt, 1984; Barney 1991; Grant 1991) where firm specific resources are a means of achieving competitive advantage. These resources can be physical, technological or human, and be both tangible and intangible in nature. Hence, one well established definition of capabilities from strategic management is that it is the "capacity to deploy ***resources*** in combination with organizational ***processes*** to achieve a ***desired end***" (Amit & Schoemaker, 1993) p 35). The desired end was usually some aspect of organizational performance.

Within the IS domain, considerable research has also focused on understanding how IT capabilities enable firm level competitive advantage. IS capabilities have been defined at two levels – functional (where capabilities are linked to the various functions carried out by the IT department) and enterprise. A seminal example of the functional stream is the study by Feeny & Willcocks (1998) who proposed nine core functional IS capabilities within three broader categories of Business and IT vision (Business systems thinking, relationship building, leadership), Design of IT architecture (contract facilitation, informed buying, architecture planning), and Delivery of IS services (making technology work, vendor development, contract monitoring). Other studies followed with varying lists of functional IT capabilities (Doherty & Terry, 2009; Ravinchandran & Lertwongsatien, 2005; Wang & etal, 2012). For example, Ravichandran &Lertwongsatien, 2005 proposed four functional IS capabilities- IS planning sophistication, Systems development capability, IS support maturity and IS operations capability - and tested their relationship with firm performance. More recently, Wang, 2012 suggested four capabilities - IT strategy planning, IT management, IT development and IT use capability and explored their relationship with both resources and firm performance.

In contrast to the functional IT capabilities approach, is the conceptualization of IT capability as a single enterprise level capability. For example, Bharadwaj, 2000 explored the relationship between the enterprise level IT capability with firm performance. There have also been attempts to bridge the two levels. For example, Lu & Ramamurthy, 2011 propose enterprise wide IT capability as comprising of three dimensions - IT infrastructure capability, IT business spanning capability and IT proactive stance - and measure how it affects organizational agility.

Both the functional and enterprise-level IS capabilities literature do not explicitly distinguish between resources and processes. For example, the functional capability of contract facilitation (Feeny & Willcocks, 1998) is described in terms of the activities of managing conflicts and handling service agreement between vendors and users. However, what resources are important to achieve contract facilitation is implicitly assumed within the process itself. More commonly, studies focus on the IT resources that underlie the capabilities, without explicating the processes that are needed to leverage the resources. For example, Ravichandran& Lertwongsatien,2005 focus on three types of IT resources - IS human capital (personal skills, firm specific knowledge), IS infrastructure flexibility (network and platforms, data applications) and quality of partnership (internal and external) that underpin their four functional IS capabilities, and less on the processes that deploy these resources. Bharadwaj,2000 also drew more on the resource based view to suggest how firms create competitive advantage by assembling firm specific resources such as IT infrastructure, human IT and IT enabled tangibles such as product quality, branding to create an enterprise-level wide IT capability. Wade & Hulland, 2004a provided an important development to the developing functional IT capabilities field by noting that the capabilities could be categorized as internal, external or spanning, thus encouraging researchers to look more broadly beyond organizational boundaries (eg. Rai et al, 2010). However, they described the capabilities in terms of resources. For example, internal capabilities comprise resources that are internally focused and

deployed inside the firm in response to the market requirements and opportunities, external capabilities are externally oriented and anticipating market requirements and understanding competitors, while spanning capabilities are focused on integrating the firm's inside out and outside in resources. Finally, other studies define capabilities in a way that intertwines resources and processes. For example, Lu & Ramamurthy, 2011 define IT infrastructure capability as the ability to build shareable platforms which include resources such as architectures, applications, networks, without explicating what the critical processes for leveraging the resources are.

More recently, some IS researchers have also noted the need to link capabilities to the organizational goals they are meant to help achieve. Bhatt & Grover, 2005 noted that different IT capabilities have varying effects on the organizational performance. They divided IT capabilities into three types based on the goal they serve in the organizations - value, competitive and dynamic. Value capabilities are aimed at providing value from the IT investments leading to better business performance. IT infrastructure is critical to the value capability as it allows the firms to share information across functions and explore opportunities with flexible architectures. Competitive capabilities are aimed at providing the heterogeneity necessary for competitive advantage. IT business experience and relationship infrastructure are key components, as they as they are developed over time and hence difficult to imitate. Dynamic capabilities help organizations to deal with threats and be more responsive to the changing markets. This includes the intensity of organization learning as it helps organizations leverage on their accumulated knowledge and past experiences to deal effectively with dynamism.

Prior research suggests that global scale and responsiveness are critical to MNCs (Edburg & etal, 2001; Rao, 2004). King & Flor, 2008 note that global IT infrastructure capabilities enable global scale through the deployment of IT resources that are both shareable and usable across countries. They emphasise how the extent of planning, reach of communication networks enable global organizations to integrate the businesses across regions. Similarly, along with scale, agility as a capability has been found critical for organizations which seek to respond quickly to the changing customer needs(Lu & Ramamurthy, 2011). Studies have noted that IT enables agility through development of digital options(digitized process, digitized knowledge) which facilitates quick response to changing environments (Overby, Bharadwaj, & Sambamurthy, 2006; Sambamurthy, Bharadwaj, & Grover, 2003). For MNCs, agility would require not only responsiveness to local needs but also to global trends. Achieving the goals of global scale, as well as responsiveness may sometimes result in conflicts. For example, increased enterprise standardization is often a requirement for global scale, and this may be perceived by country business units as restricting their responsiveness to local conditions(Sia, Soh, & Weill, 2010). This conundrum of achieving both scale and responsiveness has often been balanced through building coordination mechanisms and establishing IT governance structures.(Williams & Karahanna, 2013).

In summary, as we consider the objectives of global organizations, we find that first, relatively little work has been done in the global IT capability context. Second, the IS capability literature also has not clearly distinguished between the resources and processes that comprise a capability, oftentimes focusing on one and little on the other. Third, recent work has proposed a goal-oriented approach to conceptualizing IT capabilities and we suggest that the goals of global scale and global-local responsiveness are critical for MNCs. Hence, this study provides an empirical analysis of global IT capabilities in an MNC, using the goal oriented approach and being careful to distinguish between resources and processes that comprise each capability.

3. RESEARCH METHODOLOGY

3.1 Research Design

As our research question seeks to explore global IT capabilities in a global context, we adopted a case study approach. Case studies are suitable to answer 'how', 'what' and 'why' questions (Yin, 2003).

Given the paucity of research in the global IT capability context, we seek to explore in some depth, a single organization, to surface the goals, processes and resources that comprise its global IT capability.

3.2 Case Selection

We selected a case which was theoretically relevant to the research question that we intend to study (Dube & Pare,2003). To investigate what are the IT capabilities in global organizations, the selected case site had to meet two major criteria – it had to be global in its strategy and operations, and information technology should be critical to the business.

We chose Neptune Orient Lines (NOL), a 50 year old organization, which is one of the leaders in global container shipping and logistics services. The company employs more than 11,000 employees with total revenues of 9.5 bn USD as of 2012. The company is publicly listed on the Singapore stock exchange with operations spread over 194 offices in 112 countries across 6 continents. NOL has three major lines of business - container shipping, terminals and logistics and operates through its key brands of APL (American President Lines) shipping and APL logistics. APL, is world's seventh largest container carrier with 129 vessels providing shipping and cargo solutions across the globe.

The strategic imperative for IT is very strong in NOL. IT is critical not only for managing global information and processes in providing international shipping and logistics services to its global customers, but also critical to offering customers innovative solutions. Also, shipping is a highly cost competitive business, and IT is important in managing costs through effective load and route planning. With a history of successes and a recognized leader in the shipping industry, NOL has maintained its competitive advantage through its state of the art information systems and customer centricity. For example, NOL offers its customers a highly customized website for greater visibility to shipment information and transactions. Further through use of electronic data exchange (EDI), it also provides seamless exchange of business information for improved data integrity.

Moreover, NOL had transitioned within the past decade, from being a national organization to a global one, through the acquisition of the much larger APL Shipping. The case therefore provided data on processes and resources that NOL developed specifically to achieve the global vision.

3.3 Data Collection

Data was collected from multiple sources (Eisenhardt, 1989). Collecting data from multiple sources allows for triangulation and provides support to reliability and validity in qualitative research.

Semi-structured interviews were conducted to encompass both the business and IT leadership to help gather a holistic view of procedures and practices. A total of 9 interviews were conducted. This included the CIO, and IT managers in charge of governance, infrastructure, and transformation and lines of business, as well as the Vice President of the main line of business and a senior business manager. Each interview was for one to one and a half hours, and was undertaken by at least two researchers and audio recorded. The recordings were transcribed and checked by the researchers.

Secondly, the interviews data was complemented by secondary data collected from various sources. These included archival and publically available documents including annual reports, management reports, analyst reports, financial statements, organization charts, newspaper articles, case studies on shipping and logistics industry and information on company website. This helped in developing a better business contextual understanding. See **Table 1** for data sources.

Interview Sources	Description	Non- Interview Sources	Description
Semi structured interviews	CIO	Annual Reports	Available for years 2008- 2012
	IT Governance Director	Management reports	
	Remodel director	Analyst reports	
	Global Infrastructure VP	Newspaper articles	Archival articles retrieved for years 2008-2012
	IT Director, Liner portfolio	Case studies	Shipping and logistics industry
	IT Director, Logistics portfolio	Website information	Company official website
	Enterprise VP		
	Vice president, Liner		
	Business Application Suit Owner		

Table1: Data Sources

3.4 Data Analysis

Firstly, the authors read extensively all the publically available information about the company and industry such as annual reports, management reports, analyst reports, case studies on shipping and logistic industry and newspaper articles. This was crucial to a strong contextual understanding.

The interview data and complementary information from the above sources were then synthesized, and a descriptive case study was written which was read and commented on by the CIO. This helped to validate our understanding of the case, in particular that the strategic goals of the organization, and the key management actions taken to develop IT capabilities to meet the goals (Miles & Huberman, 1994). Key goals that IT sought to achieve included achieving scale economies, business responsiveness, and coordination across the many stakeholder groups.

We then reread the interviews, with the authors independently identifying key processes and resources that had been developed to enable IT to achieve scale, responsiveness or coordination (Eisenhardt, 1989). There were multiple rounds of iteration between the data and concept, as the authors discussed, reread, and converged on analysis of the data. The result was a set of processes and resources that were critical for each of the three global IT capabilities.

4. COMPANY BACKGROUND

NOL has three major lines of business (LOB) - container shipping, terminals, and logistics. Container shipping is the major revenue generating business for NOL and operates through its APL brand. As of 2012, it constitutes nearly 84% of the group business. APL is the world's seventh largest container carrier with 129 vessels providing shipping and cargo solutions across Asia, Europe, Middle East and Latin America. The container shipping business includes transporting goods primarily through containers in ocean going ships on international routes as well as special cargo solutions across different regions. APL accomplishes this through a network combining high quality intermodal operations with latest IT.

The logistics LOB operates across regions of Asia, Middle East and America catering to customers from auto, consumer, retail and electronics, and high tech industry. In 2012, it accounted for 16% of total revenue. It provides customers with innovative supply chain services, contract logistics, warehouse

management, land transportation and international/ domestic freight services. More than half the revenue for logistics is from the Americas region, particularly from the auto industrial customer segment.

The terminals business supports the container terminal network operations. It's primarily focused on providing hinterland connectivity, berthing, trans-shipment and feeder services. Hence it helps customers build speed and predictability in their supply chains.

In 1997, NOL acquired a much larger US based global player, APL. Prior to this acquisition, NOL's business was not very international since it was formed as Singapore's national shipping line. Strategically, however, NOL realized that in order to thrive in international markets they needed access to scale and have more international trade routes and customers. To successfully drive this strategy, they acquired APL. Based in the U.S., APL was the industry leader in container shipping business. Its fleet was amongst the most modern and largest in the world. APL was a larger entity and had bigger volumes with very sophisticated information systems as compared to NOL. With acquisition, NOL not only got access to Asia and USA terminal hubs in transport network but also APL's state-of-the-art IT system.

The APL acquisition was unusual, given that a smaller shipping company was acquiring a larger one. It was also very challenging since NOL had acquired a larger global player headquartered in entirely different location. For several years after the acquisition operations were run in parallel from both Singapore and the U.S. While NOL now had access to APL routes and technology, the two sets of operations, systems and human resources were not integrated. The decision was made around 2005 to fully integrate the company's operations, and fully locate all HQ functions in Singapore, in order to reap the potential for global scale.

In 2006, NOL it hired a new CIO to facilitate the building of global IT infrastructure and processes to enable NOL to operate in a more integrated manner from the Singapore HQ. A number of offices were closed in U.S. and functions were centralized to achieve cost effectiveness and scalability. Also, to ensure responsiveness to customer services and operations, the company embarked on major IT projects to leverage and update IT systems. Under an ambitious IT project called Remodel, NOL embarked on integrating and developing its global IT infrastructure processes, information management, and optimization and customer relationships.

5. FINDINGS

As NOL built its global IT capabilities, it sought to balance two strategic goals – providing scale economies for global operations and enabling responsiveness to the business. Global scale was needed because shipping is a network business. Most of the business processes have to be standardized as similar processes are involved across borders. For example, if waste paper is moved from Asia to America and then to Indonesia, then container movements follow a standard format or the way bookings are undertaken follows a standard process.

> "If you look at the shipping business, it is a global, network business. The way you take bookings in the Netherlands has to be exactly the same way you take bookings in America, as the containers all end up on the same ship" (CIO)

Global responsiveness to the business included both meeting the business' global needs, such as getting quick information on the operations of cargo, and meeting local business needs at the county level such as customized applications or interacting with customers and gathering their requirements.

> "Especially in Asia, where it is very local in nature, so the needs will be addressed by the local team. In the same basket of activity are things to do with EDI or with local customs. So the field IT is the front man on the ground that deals with Customs Australia or Customs China. "(Director, Liner)

These strategic goals were complimented by development of a coordination capability to balance scale and responsiveness. We next elaborate on the resources and processes associated with each global IT capability.

5.1 Global Scale IT Capability

A key IT resource required for global scale IT capability is the global infrastructure group. The group consists of three distinct teams - infrastructure planning team, infrastructure technology team and infrastructure contract team. The infrastructure planning team was created and located at the Singapore headquarters. The infrastructure technology team consists of technical experts who are deployed to work with region specific outsourced teams. The infrastructure contract team comprise contract knowledge experts who are trained to understand working of contracts and who are geographically distributed.

As a part of laying the foundation for achieving scale, a major restructuring of IT infrastructure was initiated. This involved consolidating Oakland and Singapore operations. The restructuring created new global IT infrastructure resources such as a consolidated data centre located in Singapore. The consolidation helped to reduced operating costs. As importantly, it also co-located critical IT functions with the Heads of business functions located in Singapore HQ. A key process in the successful consolidation of data centre operations was the knowledge transfer from Oakland to Singapore. The time zone difference made it difficult to run the data centre from Singapore. Knowledge transfer was initiated from experienced people in Oakland to newly hired people in Singapore. The new team worked firstly as a shadow team for 2-3 weeks. Thereafter, roles were swapped and the current incumbent was moved to a supporting role. This transition period lasted for 3-4 months with Oakland team shadowing the new team till they were adept to work independently.

The global infrastructure thus created, is then evolved through a set of annual and day-to-day infrastructure planning processes. Major business infrastructure requirements (e.g. a line of business needs some servers), are discussed in an annual meeting forum which include line of business heads, IT business analysts, IT infrastructure director and IT LOB Directors. The infrastructure director then prioritizes the infrastructure projects requirements. The design needs are formulated by infrastructure planning experts. These experts work on day to day global infrastructure design requirements.

> "They figure out - should we go to IT capacity, should we standardize, which hardware needs replacement, which platform should we upgrade. These are the infrastructure planning people. They are experts". (CIO)

Infrastructure operations like data networking, data centres and application maintenance and support, once rationalized were globally managed by the infrastructure group at HQ and outsourced to three strategic global partners. Three key processes enabled NOL to effectively manage global outsourcing - vendor selection, vendor monitoring, and cross vendor coordination workshop.

The global aspect of the vendor selection process required that the vendor be able to serve NOL's operations around the globe. This was a critical consideration as NOL's vendor review committee engaged with potential vendors in the request for proposal, evaluation and contracting. The vendor review committee comprised people who had global oversight of their respective areas - i.e. the CIO, LOB IT Directors, and the group financial controller). Contracts are typically renewed after 5-7 years which are also handled through the vendor review committee. NOL also has in place pricing and budgeting processes for outsourcing. Prices are benchmarked globally. These influence the base contract with the vendor, as well as the pay per user component.

To incentivise their global vendors, vendor-oriented budgeting is done, where achieving reduced costs increases vendor's margin. This provides a win - win solution for both the parties. Beyond pricing, contract management specialists also monitor other aspects of vendor performance. They use tools such as metrics (KPIs, time for root cause analysis, number of zero error days) to measure the effectiveness of

infrastructure and operations. Surveys of user satisfaction are conducted and reviewed by the LOB IT Directors. There are also internal technical specialists who shadow the vendor teams. Lower severity issues at level are handled at the vendor's end. Higher severity critical issues are handled by the shadow team. Lastly, a daily operations meeting is conducted with key stakeholders (service provider, infrastructure manager and SME). This includes discussion on tickets, severity level, daily report on critical issues, monthly report of severity trend, response time for solution and root cause analysis.

The assignment of data centre, networking, and applications development to three strategic global vendors also raises significant issues of vendor coordination. A key process that was created is the cross vendor coordination workshop is conducted annually at global level with all the vendors. This workshop is a part of the visioning plan where goals of all the stakeholders are driven to achieve zero error days.

5.2 Global-Local Responsiveness IT Capability

We noted that the goal of responsiveness required both responsiveness to global business needs, as well as responsiveness to local business needs. Distinct IT resources and processes were developed to enable global and local responsiveness. For global responsiveness, two important resource categories were deployed. Firstly, within each line of business, 8-12 application suite owners (ASO) were appointed to act as liaisons between business and IT. ASOs are senior business executives who are assigned to own global applications, such as the global cargo booking system. They understand business strategy and look into how IT can deliver it. Secondly, there are IT business analysts (IT BA) who understand how IT can be used to support a business. IT BAs are knowledgeable of the capability of the system and how changes can be optimally incorporated.

Key processes for global responsiveness include having ASOs channel the global business requirements at the start of every year, measuring the returns vs investments of doing the change. They decide the IT needs of the business domain. Thereafter, they engage with global IT BAs who have thorough systems knowledge. IT BAs in turn articulate the business needs to the technical specialists within and ensure delivery of IT projects. ASOs are also critical to the process of changing global applications. They prioritize the changes keeping stakeholder's interests in mind, and take decisions on behalf of business. The prioritization is based on ratings along agreed criteria parameters ranging from customer centricity to operational efficiency. If an application change affects other applications, then it's a multiple ASO issue. This prioritization is then referred to formal discussion forum IT working committee (consisting of ASOs, CIO, and business heads) for consensus building.

> *"ASO will decide on the IT needs of the business domain that he or she represents. So, this person will determine, ok, this particular year, what are the IT focus, what are the type of enhancements or projects that I would like to undertake. Because this person is with the business, this person knows the business's needs very well, and will translate to the IT needs, and then this will be then articulated to us, and we'll look at the list that she give us, and then we will plan accordingly" (VP, Enterprise)*

The responsiveness to local business needs is managed through two resources. First are the region specific Field IT teams to support local application support and cater to customer needs. Field IT is a total of 400 IT personnel (about 30%) which are geographically dispersed to different countries of Asia, Europe and America. They are a decentralized structure and report to the region business head. (Refer to Figure 1). Second are the ITBAs. Although they are global resources but they are deployed closer to local end users and work closely with Field IT.

Key processes that leverage the Field IT resource for local responsiveness includes having them manage and troubleshoot local systems and services.

> "Field IT is more on the regional IT needs, networking, setting up notebooks, regional office." Director, Enterprise

While scale requires the use of standardized global applications, local enhancements are sometimes needed. For example, large scale of operations in a region might necessitate language conversion or local invoicing requirements. Such local enhancements are also handled by Field IT. They draw on the global IT budget within their line of business. This ensures control over their customizations as well. Local responsiveness is also addressed without unduly undermining global scale by having applications that are amenable to modular solutioning. Modular solutioning allows for separate local customer codes which can be attached and discarded without touching the core. Hence the generic code remains the same and the added functionality can be modified or discarded when local conditions change.

While IT BAs are a global resource, some IT BAs are geographically distributed. Some lines of business, particularly logistics, have highly IT dependent products. Hence, a key process is the deployment of ITBAs along with regional sales representatives under customer implementation teams. Region specific IT resources are technically adept and support customer sales by often getting initial customer requirements or showcasing IT product demos to customers. If a customer specification becomes a project it is then taken over by global IT team.

Since NOL dealt with a lot of information, there was a constant need to be quicker to respond to the market. To achieve greater system flexibility, NOL embarked on an ambitious program called Remodel to incrementally renew its IT infrastructure. Under this new IT initiative, key technologies were updated and SAP was embraced enterprise-wide. Transitions to a service-oriented architecture (SOA) and Master Data Management were also undertaken as it provided modular solutioning to applications.

> "Different information and different departments had different uses for different parts of it. There was also missing source data…we embraced SOA, the beauty is that there are common services, and for the rest to integrate, it'll be easier", Director, Remodel

5.3 Global Coordination IT Capability

Achieving local responsiveness and scale benefits were both strategic yet potentially sometimes competing objectives for NOL. In order to balance scale and responsiveness and ensuring strategic alignment between business and IT, NOL developed processes and resources to build coordination.

A key resource was the global IT governance unit that was setup in 2006 (see Figure 1), to oversee reporting structures and create policies for information security management, contract and vendor management and monitoring IT investments through performance metrics.

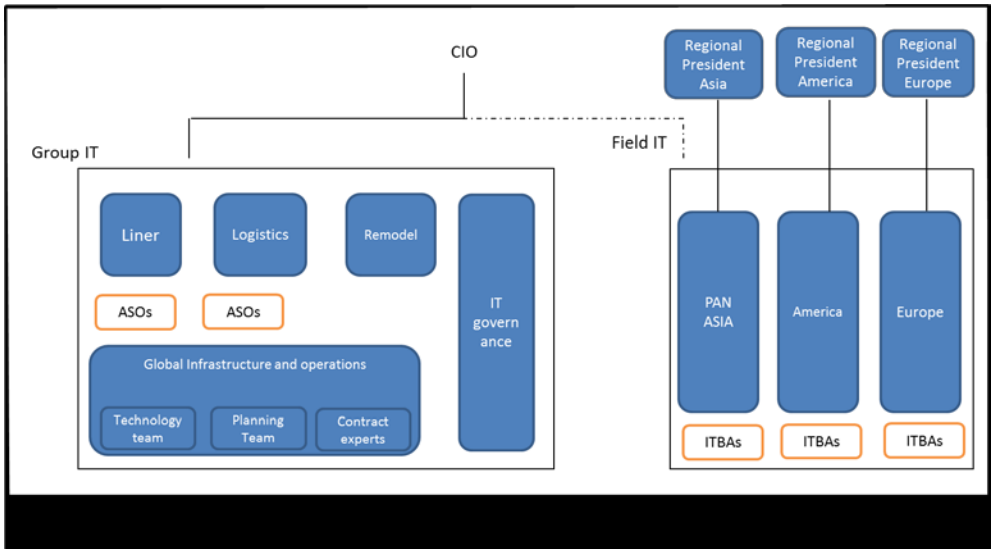

Figure 1: NOL IT structure

"Because the way we are organized, the business has a single point of contact so if you look at the org chart of each of the portfolio, every process, you know who the manager in charge is". (CIO)

This structure was complemented with global coordinating forums which managed business-IT governance as well as within-IT governance. For business IT governance, at the highest level was IT steering committee consisted of Group CEO, CFO, CIO and regional presidents. This forum discusses business strategy and investment issues. Second, was the IT working committee (15 members from both business and IT) consisting of CIO ASOs, heads of IT governance, enterprise architecture and lines of business. This forum develops alignment between business and IT. IT budgeting process is a key process in coordinating business and IT. The budget is held globally by CIO but allocated to businesses at start of every year. Projects are listed by business who determines their priorities and IT provides the cost estimate. Although budget is held by CIO, every business has its separate P&L. Within each line of business, ASOs negotiate with business heads for budgets for IT enhancements.

This is really a conversation between IT and business. Business determines where their priorities are and IT will do the cost estimate and do the budget. So when we go to the IT Steering committee, business will know exactly how much they spend on manpower, hardware etc. And then there is an items listed as projects. Projects are actually listed by business – terminals business, shipping business etc . All the business unit heads know how much they are spending on IT and they have to personally sign off.(CIO)

Within-IT governance is managed by two coordinating forums. Firstly, all IT projects require a separate project sponsor who analyses the business needs, provides cost benefit analysis, time required and ROI estimates. The investments are monitored through on time performance metrics. Every project is monitored for planned vs actual completions and incidents and resolution time. All IT people log their time to projects and costs on a tool Primavera which allows time logging and project costing. However, one common project review committee chaired by CIO and Group IT signs off all project which is then approved by finance and finally by the business. Second, all proposals undergo to an architecture review committee, chaired by EA director, who ensure that security compliance is not breached. If any recommendations are needed they are discussed with project review committee.

The IT governance unit, at the global level, IT prepares a report card for business on quarterly basis to show IT spending and outcomes. Mission critical systems are identified by lines of business and detailed root cause analysis is provided on the projects within these systems. This overall report prepared by IT reporting team which shows the total enhancements and projects undertaken for a line of business.

"A hard copy is provided to our senior management and our IT working comm. A soft copy is actually published on the website. Anyone can go in and take a look and they know exactly what we delivered in 2008…for effective IT governance, transparency with the business is needed. Providing visibility of where investments are – performance metrics of on-time, on budget" Director, IT Governance

6. DISCUSSION AND CONCLUSION

Our analysis of the NOL case suggests that the development of IT capabilities in global enterprises, like many large enterprises, seems to be driven towards the desired ends of achieving ***global scale*** and ***global-local*** responsiveness, and the need to balance the tensions between them through careful ***global coordination***. However, achieving scale, responsiveness, and coordination in global enterprises is complex, as the underlying resources and routines for these IT capabilities must necessarily be global in nature.

Table 2 provides a summary of the processes and resources that were critical to these three strategic goals of global scale, global-local responsiveness and global coordination.

Global IT Capability	Processes	Resources
Global Scale	Consolidating the global infrastructure	Global Infrastructure Planning Team Technological resources(Data centers, networking and messaging)
	Infrastructure planning	Global Infrastructure Planning Team
	Managing outsourcing - Vendor selection - Vendor Monitoring - Cross-vendor coordination workshop	Infrastructure Technology team (shadow team) Infrastructure contract experts (distributed by vendor)
Global - Local Responsiveness	Managing global business needs	Application Suite Owners Global IT business analysts Global applications
	Managing local business needs	Field IT Global IT business analysts (geographically distributed) Local enhancements
	Incremental Modular solutioning	Remodel Team Parameterized applications
Global Coordination	Business IT Governance (Co-locating IT business HQ)	Steering committee, Working Committee (CIO and LOB/ business counterparts)
	Within IT governance	CIO and direct reports (IT governance, enterprise architecture, liner portfolio, logistics portfolio), Project review committee, architecture review committee
	IT management reporting through IT health reports	IT management team within Group IT

Table 2: Global IT capabilities- Goals, Resources and Processes

The global scale capability in NOL, for example, is enabled by resources that span across regions such as the global infrastructure group and the global IT infrastructure together with a set of related processes that span across region, such as infrastructure planning, infrastructure operation, and vendor management. The development of resources and processes that span across regions requires a vision for global scale and sustained effort given the complexity and potential resistance from local business units, For example, NOL took more than the years before gradually shifting its data centre from Oakland to Singapore for closer proximity to HQ and greater cost efficiency. Global selection and appointment of vendor by the Corporate IT group, has to dovetail with daily operations meetings in different regions with vendor organizations. Periodic workshops for all vendors are also important for global outsourcing management to ensure different vendors around the globe (e.g., for networks, messaging and application development) work seamlessly with each other.

The global-local responsiveness capability in NOL relies on a careful mix of global resources such as the ASOs and IT-BAs, who are responsible for specific business processes and associated applications across the globe, together with local resources such as field IT personnel who focus on meeting local needs. These resources alone however are not sufficient, but enable global-local responsiveness only when enmeshed with a highly modularized IT infrastructure, supported by a set of organizational processes that facilitate regional staff deployment, demand management, and project prioritization. The clear delineation of what are considered as Field IT projects (e.g., language conversion) and Group IT projects (i.e. those that have global implications such as local requests applicable to others), for example, helps to expedite the channelling and the prioritization of new requests, enabling quick response to business needs.

The global coordination capability of NOL requires a set of global resources (e.g., global IT governance unit, IT steering committee, IT working committee) and related global processes (e.g., IT

budgeting, performance reporting, architecture planning). Such global coordination is not limited to the units within IT, but also between IT and business. Forums such as steering committee and IT working committee, for example, provide IT visibility to the business at the global level. The IT budgeting process that treats IT as a "zero cost centre" and charges out all IT costs to the business is also instrumental in managing the tension between global scale and global-local responsiveness. Being able to track all IT costs to the respective line of business or region provides transparency, facilitating the arbitration of resource disputes.

While these global resources and the related global processes can take years to be developed internally, NOL illustrates how such global IT capabilities can be more readily acquired. Part of it can be attained through acquisition. NOL's bold acquisition of APL gave it ready access to a (then) more superior global IT capability in terms of the industry IT expertise and the global IT infrastructure. Part of it is also in leveraging the global capabilities of external IT vendors. These vendors have already invested in their global IT capabilities, e.g., 24x7 work shifts, distributed contract professionals, and mature IT service standards. They are better positioned to scale up or down the resources around the globe and be more responsive to specific needs when necessary. Finally, part of the global IT capabilities is also in leveraging the global business capabilities, i.e., the resources and related processes that have been established by the business in running the global business operation. For example, the IT steering committee is not a new committee, but simply piggybacks on the current global executive management committee. Similarly, the ASOs (application suite owners) are not newly created roles, but tap on existing global business heads to wear an additional hat as system owners. Hence, the global resources and the related global processes need not be built from scratch. However, such leveraging is not without risks. NOL, for example, exercised great sensitivity in migrating global IT infrastructure from Oakland to Singapore and in planning the knowledge transfer processes. With its extensive outsourcing, it has also actively retained the infrastructure planning function in-house with significant attention on architecting the global IT infrastructure. Finally, with its close business partnership, we have also noted that the Group IT has intentionally adopted a "light" control strategy on the management of its Field IT structure, to avoid straining the good working relationship with regional business.

Our findings suggest that the goal-resource-process based framework is not only a theoretically anchored approach, but also a useful approach way of analysing IT capabilities. It is more comprehensive as it systematically explicates the underlying resources and the related processes of IT capabilities in the pursuit of specific goals. Existing literature in IT capabilities tend to emphasize one dimension over the other, or simply fail to unpack the differences among these dimensions, causing confusion on the understanding of IT capabilities. The goal-resource-process based framework ensures a more balanced approach in analysing IT capabilities. Moreover, the goal-based framework also helps to contextualize the understanding of IT capabilities, i.e., the concept of IT capabilities is only meaningful in the pursuit of specific goals. Hence, driven by the "bundle" of goals an enterprise seeks, the ability to achieve each goal is enabled by the establishment of a specific set of IT resources and the related processes. The new framework thus provides a more dynamic approach to conceptualize IT capabilities, not as a fixed set of IT resources and related processes, but as a portfolio of goal-based capabilities. The portfolio of IT capabilities is not static but is shifting dynamically depending on the changing mix of goals in an enterprise.

References

Amit, R., & Schoemaker, P. J. H. (1993). Strategic Assets and Organizational rent[Article]. Strategic Management Journal, 14(1), 33-46.

Barney, J. .Firm Resources and Sustained Competitive Advantage,. Journal of Management (17:1), 1991, pp. 99-120.

Bharadwaj, A. S. (2000). A Resource-Based Perspective on Information Technology Capability and Firm Performance: An Empirical Investigation. Management Information Systems Quaterly, 24, 169-196.

Bhatt, G. D., & Grover, V. (2005). Types of Information Technology Capabilities and Their Role in Competitive Advantage: An Empirical Study. [Article]. Journal of Management Information Systems, 22(2), 253-277.

Doherty, N. F., & Terry, M. (2009). The role of IS capabilities in delivering sustainable improvements to competitive positioning. The Journal of Strategic Information Systems, 18(2), 100-116.

Dubé, L., and Paré, G. 2003. "Rigor in Information Systems Positivist Case Research: Current Practices, Trends, and Recommendations," MIS Quarterly (27:4), pp. 597-635.

Edberg, D., Grupe, F. H., & Kuechler, W. (2001). Practical issues in global IT management. Information systems management, 18(1), 34-46.

Eisenhardt, K. M. 1989b. "Building Theories from Case Study Research," Academy of Management Review (14:4), pp. 532-550.

Feeny, & Willcocks. (1998). Core IS Capabilities for Exploiting Information Technology. [Article]. Sloan Management Review, 39(3), 9-21.

Grant, R. M. .The Resource-Based Theory of Competitive Advantage: Implications for Strategy Formulation,. California Management Review (33:1), 1991, pp. 114-135.

King, W. R., & Flor, P. R. (2008). The development of global IT infrastructure. Omega, 36(3), 486-504.

King, W. R. (2006). Developing global IT capabilities. Information Systems Management, 23(4), 78.

Lu, Y., & Ramamurthy, K. (2011). Understanding the link between Information technology capability and organizational agility: An emperical examination. [Article]. MIS Quarterly, 35(4), 931-954.

Miles, M. B., and Huberman, A. M. 1994. Qualitative Data Analysis: An Expanded Sourcebook, Thousand Oaks, CA: Sage Publications.

Overby, E., Bharadwaj, A., & Sambamurthy, V. (2006). Enterprise agility and the enabling role of information technology. European Journal of Information Systems, 15(2), 120-131.

Rai, A., & Tang, X. (2010). Leveraging IT capabilities and competitive process capabilities for the management of interorganizational relationship portfolios. Information Systems Research, 21(3), 516-542.

Rao, M. T. (2004). Key issues for global IT sourcing: country and individual factors. Information Systems Management, 21(3), 16-21.

Ravinchandran, T., & Lertwongsatien, C. (2005). Effect of Information Systems Resources and Capabilities on Firm Performance: A Resource-Based Perspective. [Article]. Journal of Management Information Systems, 21(4), 237-276.

Sambamurthy, V., Bharadwaj, A., & Grover, V. (2003). Shaping agility through digital options: Reconceptualizing the role of information technology in contemporary firms. MIS Quarterly, 237-263.

Sia, S. K., Soh, C., & Weill, P. (2010). Global IT management: structuring for scale, responsiveness, and innovation. Communications of the ACM, 53(3), 59-64.

Sia, S.K.,Weill, P., Soh, C.(2013) "How Enterprises Exploit Five Digital Capabilities to Globalise", The European Business Review, Sept-Oct 2013

Wade, M., & Hulland, J. (2004). The Resource-based view and Information systems research: Review,extension and suggestions for future research. [Article]. MIS Quarterly, 28(1), 107-142.

Wang, N., Liang, H., Zhong, W., Xue, Y., & Xiao, J. (2012). Resource structuring or capability building? An empirical study of the business value of information technology. Journal of Management Information Systems, 29(2), 325-367.

Williams, C. K., & Karahanna, E. (2013). Causal explanation in the coordinating process: A Critical realisitic case study of federated IT governance strucutures MIS Quarterly, 37(3).

Wernerfelt, B.A Resource-Based View of the Firm,. Strategic Management Journal (5), 1984, pp. 171-180.

Yin, R. K. 2003. Case Study Research: Design and Methods, Beverly Hills, CA: Sage Publications.

Zhang, M., & Tansuhaj, P. S. (2007). Organizational culture, information technology capability, and performance: the case of born global firms. Multinational Business Review, 15(3), 43-78.