BEST LEADERSHIP PRACTICES OF MULTINATIONAL CORPORATIONS IN THE USE OF AUTOMATED MIGRATION TOOLS IN ADOPTION OF COMMERCIAL CLOUD COMPUTING PLATFORMS: A META-ANALYSIS

by

Ethan M. Sneider

A Dissertation

Submitted to the Faculty of Purdue University

In Partial Fulfillment of the Requirements for the degree of

Doctor of Technology

Department of Technology Leadership & Innovation

West Lafayette, Indiana

May 2021

THE PURDUE UNIVERSITY GRADUATE SCHOOL
STATEMENT OF COMMITTEE APPROVAL

Dr. Linda L. Naimi, Chair

Department of Technology, Leadership and Innovation

Dr. Patrick Edward Connolly

Department of Computer Graphics Technology

Dr. Jon Padfield

Department of Technology, Leadership and Innovation

Dr. Kathryne A. Newton

Department of Technology, Leadership and Innovation

Approved by:

Dr. Kathryne A. Newton

Dedication

This dissertation is dedicated to my Grandma and Grandpa- their intrinsic motivation rubbed off on me and led me to where I am today. Thank you.

ACKNOWLEDGMENTS

My father, Dr. Richard Sneider, my mother, Diane Sneider, my sister Allie Sneider and my brother, Brandon Sneider all helped tremendously. Having a support-network and readily available minds and ears was paramount to my success.

To my sister, through all the drafts and feedback, and constructive pointers (even if some I didn't want to hear) you are the reason I have made it this far. Thank you.

Uniquely positioned due to having the privilege and honor of serving my country while completing this degree, the adaptability, flexibility, understanding and immense care and consideration, as displayed by, offered by and enacted by my committee was truly amazing and sincerely heart-felt. Without stewards such as my committee members- facilitators in guiding my progress throughout this degree program in general and during this dissertation process in particular- this journey may have been a much *rockier road* indeed (a food reference, to harken back to our oral defenses)! Though I may not always be where the palm trees are (yet another reference, this time, as you guessed, to palm trees), know that, unlike fleeting scenery or tropical waystations, my loyalty to and fond remembrance of Purdue will last eternal. A direct and sincere thank you to Dr. Linda L. Naimi, Dr. Patrick Edward Connolly, Dr. Jon Padfield and Dr. Kathryne A. Newton.

To surprise encounters and people met along the way, a huge debt of gratitude is due to Chris Wilson. Though it may seem innocuous or a mere second-thought, your encouragement and understanding- exhortations to 'clack that keyboard' (the saying may have been) and interior design help to configure our shared quarters to maximize ergonomic functionality of my standing desk over our shared mini-fridge- was top class. You may not have realized, that, I looked (and continue to do so) to you to learn from your undying devotion to teamwork and as an exemplar of the type of soldier I strive to be.

To Demetri S. Ruiz, enough said. You're next!

P.s. Pops, I finally made it!

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

GLOSSARY

Leadership Practices- Actions taken by executives at the parent country headquarters, an executive level employee within the multinational corporation, or an integral person involved with the organization cloud transition within the multinational corporation being either at the headquarters or subsidiary.

Best Leadership Practices- Actions that resulted in the accomplishment of cost reduction, speed to migration, minimized migration cost or business defined objectives.

Multinational Corporation- A company that has at least two locations and these locations are separated transnationally.

Automated Cloud Migration Tools- The suite of tools that is identified as the most advanced as utilized by a multinational corporation for a cloud migration.

Case Studies- Relate to existing interviews, discourse analysis and textual analysis of multinational corporations using the most advanced cloud migration tools, as identified.

LIST OF ABBREVIATIONS

ACMT-	Automated Cloud Migration Tool
AI-	Artificial Intelligence
CAPEX-	Capital Expenditure
CCoE-	Cloud Center of Excellence
CSP-	Cloud Service Provider
IaaS-	Infrastructure as a Service
KPIs-	Key Performance Indicators
ML-	Machine Learning
MNC-	Multinational Corporation
MVC-	Minimum Viable Cloud
NIST-	National Institute of Standards and Technology
OPEX-	Operational Expenditure
PaaS-	Platform as a Service
SaaS-	Software as a Service

ABSTRACT

Transitioning to cloud computing is a complex and major effort for large multinational corporations (MNCs). Automated cloud migration tools (ACMTs) have been developed and are evolving to streamline this process. The potential benefits of their use are reported to be significant in terms of cost, time, and business innovation. Academic research on ACMTs and the best leadership practices for their use has been limited.

The purpose of the research was to identify the best leadership practices of MNCs in the use of automated migration tools for the adoption of commercial cloud computing platforms. Adoption of cloud computing is a major technological shift occurring globally, and is still in early stages of growth. Major providers of commercial cloud computing platforms include technological giants such as Microsoft, Amazon Web Services, Google, Oracle and IBM.

A meta-analysis designed research approach focusing on the triangulation of case studies, cloud computing industry data and trends from cloud service providers (CSP) revealed that best practices of leaders within MNCs fall under three main categories: awareness, impact and actions. Further, it was determined that the ACMTs with the most advanced capabilities do not necessarily equate to faster realization of cloud value for the MNC.

With the continued development of ACMTs and their growing adoption, further study on the role of automation in cloud migration solution deployment will be critical, as ACMT capabilities will continue to mature. No longer the sole domain of becoming a market leader alone, organizations that utilize ACMTs are increasingly doing so just to maintain competitive parity, as the true differentiator in organizational excellence is now in cloud optimization and not simply just getting to the cloud.

CHAPTER 1. INTRODUCTION

1.1 Background

The global economy demands organizations possess a measure of business agility (Maitland & Sammartino, 2012; Manek, 2020) through responsiveness to customer demands and due to increasing market pressures. Cloud computing shifts fundamental business expenditures and growth capabilities through the re-allocation of finances (Ramkhelawan et al., 2015; Zhang, 2020) allowing for much needed organizational flexibility (Cloud Industry Forum, 2020) to deal with the mounting pressures (Sultan & Van de Bunt-Kokhuis, 2012). The paradigm shift is one from capital expenditures on physical hardware and defined computing resources to one of operational expenditures (Erl et al., 2013; Raisinghani, 2018) based off only paying for the capacity that is needed (Hu et al., 2011), when it is needed, and enabling rapid expansion (Fatima & Ahmad, 2019; I. Lee, 2019). Cost reductions are not the only change that cloud computing brings, as businesses must redefine processes (Makhlouf, 2020), technology, and how employees (people) interact with the new way of doing business (He & Wang, 2015; Hickman & Swisher, 2020). An integral part of the cloud transition is that of the cloud migration process. Cloud migration is further being innovated through the increasing adoption of automated migration tools (Balobaid & Debnath, 2018; Ellison et al., 2018; Wu et al., 2017) for the cloud transition.

Cloud computing is an innovative technology (Lin & Chen, 2012; Low et al., 2011; Singh et al., 2013) that leaders are racing to implement within their organizations. The perceived competitive advantages of cloud computing for an organization are widely understood and debated (Chiriatti et al., 2020; Fitch Solutions, 2020b; He & Wang, 2015; I. Lee, 2019; Sultan & Van de Bunt-Kokhuis, 2012; Yoo, 2011). From a strategic management perspective on innovative technology, cloud computing is recognized to be a maturing platform (Khandelwal, 2019; Shaw, 2020) that, according to market analysts as being on a slope of enlightenment (Anderson & Smith, 2018), means cloud computing has reached peak saturation for information diffusion (Schilling, 2017). Though determinants for cloud computing adoption (Alkhater et al., 2018; Alshamaila et al., 2013; Carcary et al., 2014; Low et al., 2011; Raut et al., 2017; Repschlaeger et al., 2013) and perceived risks for cloud computing adoption (Aleem & Sprott, 2013; Dutta et al., 2013; Y. Lee, 2019;

Stavinoha, 2013; Thompson, 2017; Trigueros-Preciado et al., 2013) are thoroughly researched, less focus is directed towards the actual cloud migration process- specifically the tools which enable cloud migrations (Balobaid & Debnath, 2018; Wu et al., 2017). Cloud migration roadmaps too, while helpful for guiding an organization, only consider the specifics of the actual migration tools when reaching that certain phase of the migration. This disconnect can lead to such drastic consequences of unrealistic expectations from leaders about realized benefits accruing to the organization, on what timeframe a cloud transformation will occur and how the organizational cloud presence should be structured. As the pace of cloud adoption rapidly increases, signifying technological diffusion racing to keep up and meet information diffusion (Schilling, 2017) parity, an organization's true capability for cloud adoption and digital transformation rests within the hands of leaders that utilize ACMTs to their advantage. ACMTs allow for specifically tailored cloud capabilities for an organization and help navigate organizational inertia and unforeseen market obstacles often tackled too late in the cloud migration process.

Multinational companies (MNCs) face unique difficulties in transitioning to the cloud due to their organizational, political, and geographical complexity. There was a current lack of research regarding how leaders in an MNC should act in order to ensure cloud adoption success. With the continually changing cloud adoption strategies, cloud offerings and migration tools, a leader must take knowledgeable action in order to see the full benefits of the cloud. Best leadership practices allow for MNCs to utilize the latest migration tools to adopt the cloud in a sustainable manner that provides real business value.

1.2 Statement of the Problem

The process of transitioning to the cloud is complex (Alexander et al., 2020; Makhlouf, 2020), highly contextual (Chiriatti et al., 2020; F. Zhao et al., 2014), and central to strategic positioning (BSA, 2018; Fitch Solutions, 2020b) for long-term success. Growing data requirements from customers and the rise in consumption of and creation of data mean that companies need to be positioned to capitalize on this new currency in a cost-effective and value driven manner. Consequences of a cloud adoption gone wrong include duplicate capacity, loss of control of the Information Technology department over the corporate network, and fragmentation of adopted cloud services (Coghlan, 2019) leading to the loss of cloud computing power for dynamic change.

Multinational corporations (MNCs) lack specific insight into the use of automated cloud migration tools (ACMTs) within the migration process. MNCs are complex in nature due to their organizational architecture (Dzedek, 2018; Rakthin, 2015; Soltani & Wilkinson, 2011), cultural differences (Levy et al., 2014; Wang et al., 2014; Schmidt et al., 2013) and local market pressures (Ahworegba, 2017). With the cloud services industry estimated by Gartner (Costello, 2019) to grow exponentially through 2022, public cloud service revenue is estimated to reach $331.2B in that same year. For leaders of MNCs, this means that understanding the needs of their organization, their industry and the external factors (Aarestrup et al., 2020; Blau, 2020) affecting their company are pivotal in order to make the correct cloud decisions at the right time and with the right focus on preparing for the future. The increasing innovation and automation within cloud migration tools and the scale and complexity with which define MNCs presented unique circumstances to understand how MNC leaders are able to harness and derive benefit from the use of the latest cloud migration tools. Best practice insights were gleaned from first identifying and categorizing cloud migration tools, and then analyzing case studies wherein MNCs used the most advanced migration tool.

1.3 Statement of the Purpose

The purpose was to, through analysis of case studies of MNCs utilizing the most advanced ACMT, determine best leadership practices based on measurable goals such as cost reduction, speed to migration, minimized migration cost and business defined objectives. First, there was an identification of the commercial cloud computing platforms utilized by MNCs. Second, from those identified cloud computing platforms, cloud migration tools were identified and categorized. Third, through case studies of MNCs utilizing the most advanced migration tool, leadership practices were categorized. After the leadership categories were categorized, there proceeded an analysis of these practices by various goals as outlined in the first sentence in this section.

1.4 Significance of the Problem

Despite a percent year over year growth and projected cloud computing industry size of $249.8 B in 2022 (Costello, 2019), estimates have placed enterprise cloud adoption at only 20% (Bommadevara et al., 2018; Magoulas & Swoyer, 2020). Organizations like MNCs may be even

slower to migrate to the cloud due to their heavy investment in existing infrastructure. The growth of commercial cloud computing platforms means leaders have been adopting the cloud. How fast or how successful the cloud migrations have been is uncertain. What is certain, is that successful cloud migration involve leadership support and clear roadmap for cloud adoption (Alharbi et al., 2017; AWS, n.d.; Azure, n.d.; IBM Cloud, n.d.b; Warren, 2018). The huge wave of cloud migrations to come, facilitated by lower barriers to entry and increasing cloud migration automation, make it imperative for leaders to be equipped with best practices to navigate the cloud transition. Creation of a guide for MNC leadership to understand best practices allows them to gain maximum value from the most current cloud adoption tools in realizing value for their company.

Issues have arisen on two fronts: the business perspective and the cloud service provider (CSP) perspective. From the business or consumer perspective (the entity adopting cloud computing), there has been implications for cloud computing on people, process, technology and business functions (Ghaffari et al., 2019; F. Zhao et al., 2014). These aspects haved stemmed from transitioning legacy systems to the cloud (He & Wang, 2015), eliminating or redefining job scope (Sultan & Van de Bunt-Kokhuis, 2012) for people (employees), reallocation of operations budgets (Chiriatti et al., 2020), the necessity for training for functionality in the cloud on operations (Y. Lee, 2019), features and new customer engagement approaches (Fitch Solutions, 2020b), compliance review for industry and governmental regulations (Makhlouf, 2020), cloud service selection and offerings (Dimitri, 2020; Stieninger & Nedbal, 2014), expected growth/vision realignment in remaining competitive (Gellweiler, 2020), and remaining dominant in the market. Now, overlaying these considerations on top of the organizational framework of an MNC adds further complexity. A leader within an MNC must take into account the aspects of cultural and geographic differences (Levy et al., 2014; Wang et al., 2014) between the headquarters and subsidiaries, nuanced political and governmental landscape of host countries (Jean et al., 2018) and the impact of the cloud transition on different functions/departments of the MNC wherein there may be resistance to change (Sultan & Van de Bunt-Kokhuis, 2012) or other local contextual factors which inhibit a companywide rollout (Gaur et al., 2019).

From the perspective of the CSP, growth has been tied to adoption of cloud computing and has been made easier and timelier through the usage of cloud migration tools (Google Cloud, n.d.). Due to the compendium of options available to organizations looking to transition to the cloud, whether it is directly from a CSP, cloud service broker, or consultant, further consideration for the ease of migration and mapping of available cloud computing platforms for the specific business is important. A CSP needs to not only provide for a faster cloud migration, but also for a specific and beneficial mapping of available cloud service offerings to the unique profile of the organization. This specialization and individualization has further been made possible by automation technologies (CAST, n.d.; txture, n.d.; Wu et al., 2017). Automation reduces manual consulting hours (Micro Focus, 2018). ACMTs have also been shown to provide an improved technical answer with more extensive scanning protocols (Tidal Migrations, n.d.) to identify the particulars of the services/software/applications a company uses, provide historical precedence matched insights into the value gained from the migration of a certain system, and likelihood of success of migration (Houle, 2018). This quantitative based integrative insight, amongst other benefits of cloud service matching for industry requirements shows the power of the increasing cloud migration automation push.

Furthermore, a focus on perceived cloud computing benefits alone ignores the crucial nexus of idealized versus realized impact of cloud computing due to structural impediments involved in the actual cloud migration process. A skilled leader starts from the end- looking at specific cloud migration tools and the specific application to their organizational structure and application architecture and then sets a course anchored to the present possibilities as opposed to only on future capabilities. This distinction of ‘what is possible’ in lieu of ‘what could be possible’ highlights an understanding of cloud computing at present, and therefore allows for a greater chance at a successful cloud adoption and migration from the target organization. A focus on ACMTs builds a credible foundation for cloud adoption and successful cloud growth unaffixed to advertising hyperbole or unobtainable organizational transformation goals via its customization to each specific organization.

1.5 Research Question

There was one main research question with five subparts.

1. What are the best leadership practices of MNCs in the use of automated migration tools for adoption of commercial cloud computing platforms?
    - 1a. Identify leading commercial cloud computing platforms utilized by large MNCs.
    - 1b. Identify and develop a taxonomy to categorize the cloud migration tools utilized in their adoption.
    - 1c. Analyze case studies where the most advanced migration tools have been employed.
    - 1d. Categorize the leadership best practices in the most successful migrations.
    - 1e. Analyze and present the best practices by goal for adoption including business innovation, market leadership, cost reduction and speed to migration.

1.6 Scope

The focus of this dissertation was to understand the process of leadership (Pettigrew, 2013) to derive best practices in cloud computing for MNCs. Determining the best leadership practices of MNCs in the use of automated migration tools for adoption of commercial cloud computing platforms was a qualitative research question (Agee, 2009) that invited discovery through finding meaning across various data sources (Barrett, 2007; Hesse et al., 2018; Travers, 2001). Using case studies followed Plato's arch of knowledge (Sale & Thielke, 2018), wherein inductive reasoning from the case studies provided the basis for the creation of best practices that could, through deductive reasoning, be applied to other organizations. An interpretivist approach to the qualitative research (Travers, 2001) with a more comprehensive focus on a few MNCs following various methods of research- through published interviews, discourse analysis or textual analysis- was prudent to the exploration of the research question as written. Where a few in-depth actors were not available for in-depth research, the positivism approach (Travers, 2001) of analyzing existing focused surveys to collect many data points was necessary. The different structures of MNCs related to leadership styles and organizational architecture further informed how context and action shape the MNCs adoption of the commercial cloud computing platforms, ascribing to a mediativist (Pettigrew, 2013) qualitative lens.

1.7 Limitations

1. MNCs may not utilize the most advanced cloud migration tools.
2. MNCs may not be open to sharing their cloud transition process/journey.
3. Business metrics regarding benefits from a cloud transition may be confidential and therefore prove difficult to link leadership best practices to potentially hidden/non-viewable business metrics.

1.8 Delimitations

1. This study will only encompass available MNC case studies regarding adoption of the most advanced cloud migration tool via commercial cloud computing platform.
2. Interviews may take place if an MNC is open to being interviewed.

1.9 Assumptions

1. Not all MNCs have transitioned to the cloud or completed their cloud transition.
2. There can be determined to be a more advanced cloud migration tools suite.
3. MNCs are utilizing the most advanced cloud migration tools suite for their cloud transition.
4. MNCs and CSPs will be open and available to discuss their cloud transition journey and share their process/setbacks/leadership styles.

1.10 Summary

Cloud computing is a growing industry that affects all organizations. Optimizing business processes through a transition to the cloud is essential if an organization wants to remain competitive and able to harness new developing innovations such as incorporating artificial intelligence (AI) or machine learning (ML) into products or services. Companies looking at transitioning to the cloud will be faced with increasingly advanced cloud migration tools to aid in the cloud journey. A central component to MNC cloud adoption has been buy-in and support from top level leadership (Carreiro & Oliveira, 2019; McKendrick, 2013; Muller, 2015). Best leadership practices for the use of ACMTs in the adoption of commercial cloud computing platforms within MNCs was an under-explored field that necessitated further consideration.

A classification of existing cloud migration tools used by MNCs brings further clarity to the most advanced existing cloud migration tools available. Cost savings, new technological capabilities and business agility were all readily available and attainable through capturing and uncovering existing leadership best practices for cloud computing adoption in MNCs. Yet, knowing how to utilize ACMTs and transition to the cloud was only one piece of a very rich tapestry. Understanding the connections between cloud offerings, business interests, and future market innovations made it clear that a networked view (Ramo, 2016) of actionable steps that can be taken now as a steward to prepare for the future took also foresight, a risk appetite and conviction.

Organizational value is derived from responsiveness to changes, and leaders at the helm informed with the best information and the best tools have a greater chance of making market dominating decisions. Extensively realized nine years ago (Hugos & Hulitzky, 2011) and at cloud computing's birth with virtual memory in the 1950s (Sultan & Van de Bunt-Kokhuis, 2012), the concepts of cloud computing have revolutionized how people interact with the world (Van Hove et al., 2018). Cloud computing has even been positioned as the 'fifth utility' (Dimitri, 2020). For organizations and leaders of MNCs the impact of cloud computing means that understanding the macro societal trends, translating a vision and actionable goals into their organizations, and doing so with expeditious clarity is paramount. Action begins with knowledge that the cloud is the new pioneering frontier, and leadership best practices for cloud adoption in MNCs utilizing the most advanced ACMT is the small step in the inertia needed for the next giant leap for industry and society in this new always-on digital normal.

CHAPTER 2. REVIEW OF LITERATURE

2.1 Literature Review

A review of the literature was conducted which involved searching more than 120 online sources for information and documentation on cloud computing use by MNCs. The list of sources used in this study is present in the Appendices.

2.2 A Focus on ACMTs

Cloud computing itself has been considered to be an emerging and innovative technology (Lin & Chen, 2012; Low et al., 2011; Singh et al., 2013) and the tools organizations use to transition to the cloud are constantly evolving along with the cloud computing market. Cloud computing can be viewed as a maturing platform (Khandelwal, 2019; Shaw, 2020) due to various factors such as IT spend or Gartner's assessment of cloud computing being on the slope of enlightenment (Anderson & Smith, 2018). Gartner's slope reference can be applied to an s-curve ideology (Schilling, 2017) for information diffusion, wherein cloud computing could be placed reaching the top curve portion meaning the benefits of cloud computing are well known. Information diffusion preceding that of technology diffusion in the s-curve is well understood (Schilling, 2017), and that is the case for cloud computing adoption, wherein the technology diffusion placement for cloud computing is experiencing an acceleration of adoption. Organizations are migrating to the cloud, and in order to have a successful cloud journey, increasing options exist for which tools to use in order to migrate to the cloud. Understanding the impact of the most advanced cloud migration tools on organizational change and leadership initiative per cloud strategy and cloud adoption has been under-researched.

For the easiest realization of cloud value adoption- cost optimization- a complete transformation of the target organization has been necessary (Cloud Industry Forum, 2020; Saita, 2020; Thompson, 2017). Simply moving legacy applications to the cloud (Zhao & Zhou, 2014) has not been enough, and, in-fact, counter-productive to secondary cloud business objectives of business agility, business innovation and utilization of emerging technologies based off of the cloud computing platform (such as AI, ML, big data, internet of things, edge computing, and artificial and virtual

reality). Thus, how does a leader manage the most advanced cloud migration tools in order to overcome such obstacles as a failed cloud migration, slowed/non-existent organizational cloud migration, lack of competent cloud skilled professionals (Cloud Industry Forum, 2020; Koehring, 2015), lack of cloud native and cloud first organizational structuring, inability to find cost optimization opportunities, option/ability to pursue a multi-cloud strategy and industry specific technical assistance best practices?

The pace of change in cloud computing coupled with its business necessity for organizations to remain competitive and be market leaders, means that adopting the cloud is essential. How do leaders utilize the latest tools in navigating the cloud migration landscape? The advanced cloud migration tools are in themselves a rapidly changing field addressing market needs for the rapidly changing cloud environment (Balobaid & Debnath, 2018; Wu et al., 2017). How a leader manages this intricate and fast-paced industry provides real value to leaders and organizations for their incoming or in-progress cloud migration.

2.2.1 Loss of Control

A cloud migration was often cited as meaning a shift from on-premise infrastructure and hardware (capital expenditures (CAPEX)) to one of operational expenditures (OPEX) characterized by utilizing a pay-as-you-go service offering in contrast to having to own physical resources to enable compute processing/storage and business functions (Aleem & Sprott, 2013; Yoo, 2011; Zhao & Zhou, 2014). This shift, from CAPEX to OPEX, signifies a loss of control of ownership. The ownership can be related to data (where it is stored) and depending on the type of cloud service utilized (software as a service (SaaS), platform as a service (PaaS) and infrastructure as a service (IaaS)) a varying degree of hardware, security, privacy, configurations and accessibility. A shift from physical resources under possession of an organization to virtual ones has many corollary effects a leader must be prepared for- to include a change in job roles, organizational responsibility and process changes for an organization for internal (employees, subsidiaries) and external (suppliers, consumers) (Arutyunov, 2012; McCrea, 2013) interactions. Most likely, when an organization has determined that they want to harness the cloud (Koehring, 2015), conversations have been held centered around this change in business structure.

A loss of control additionally means that there may be less flexibility in a company's journey to the cloud. Customization options or the ability to shift certain processes or applications central to the organization may not be cloud compatible or even optimized for running in the cloud (Zhao & Zhou, 2014). Structural impediments such as who will provide support, and in what capacity, and how are these obstacles overcome are additional examples of uncertainty that can arise from a cloud migration. The next section will explore this topic further by discussing the need for increased specificity on behalf of a leader in understanding a cloud migration- an understanding that goes beyond typical surface analysis and seemingly broad frameworks that are centered on benefits of the cloud and not on the actual implementation side of the cloud transition. ACMTs address this gap as seen below.

2.2.2 Technical Insights

When considering migrating to the cloud, or in analyzing factors of cloud migrations, theoretical frameworks exist to help structure thought processes and areas of consideration. Examples include applications such as the people, process and technology (Ghafarri et al., 2019) model; technology, organization and environment (Low et al., 2011; Raut et al., 2017) framework; and the diffusion of innovation and technology acceptance models (Raut et al., 2017). Though these models and frameworks provide helpful information and allow for focus in relevant areas certainly to be affected by the cloud, these approaches are incomplete. Inadequacy in solely focusing on these approaches fails to fully understand specific technical insights into the cloud service provider (CSP) side or migration tools that would fulfill the initial projections from the frameworks. ACMTs are found in and a product of organizations providing cloud services, whether it be from a consultant, cloud service broker, CSP or other cloud services player. Even well laid out plans from one of the aforementioned frameworks above may prove hollow due to a deficit of absorptive capacity (Schilling, 2017) in skills within the organization or the CSP pertaining to the specific cloud migration intricacies and in how to handle them. The specifics and technicalities of each organizational cloud migration are different and necessitate further consideration.

Cloud migrations occur on various axes, the most common frameworks being based off of cloud service offerings (SaaS, IaaS, PaaS) and in deployment models (private, hybrid, public). Rani (2017) describes the differences of the various service models and deployment options and how

each layer (when referring to the service models) has unique characteristics. The unique characteristics of each layer is further compounded by unique cloud operating environments that have specific programming interfaces (Cloud Industry Forum, 2020; Yoo, 2011) that may not be compatible with other cloud providers. Early stage cloud migration tools relied heavily on manual processes (Wu et al., 2017) of checking for compatibilities with cloud migration infrastructure, determining dependent processes of applications and therefore had more unknowns relative to a successful migration of a specific platform or application to the cloud.

A snapshot of an analysis of cloud migration tools (Balobaid & Debnath, 2018) showed that now there exist capabilities for cloud migration tools to automatically discover application and process dependencies, estimate time to migration, seamlessly migrate applications without interruption and also to validate migrations through testing before completely switching to the cloud. Various levels of architecture, coding languages and business critical applications can now be benchmarked for likelihood of success of migration, how to prioritize application migration and the fit for a specific application to a specific cloud or cloud vendor environment. Even now, recommendations can be given for how the application should be migrated, showing greater nuance than simply putting an entire application in the cloud without ensuring the application is cloud optimized (Balobaid & Debnath, 2018; Zhao & Zhou, 2014). Leaders must be aware in their initial planning stages (when utilizing adoption frameworks as mentioned above) to think to the end first, of what tools are available to utilize in order to migrate the organization? How does going with a CSP differ from utilizing a cloud agnostic ACMT regarding best insights and recommendations for optimization for a cloud? What are the differences with costs for the ACMTs, the support and future proofing of the chosen decision for the cloud migration? Makhlouf (2020) touched on the hidden costs of a cloud migration and, in the scope of ACMTs, this reality became easier to realize from the standpoint of a leader charged with the cloud migration journey. An incomplete operating picture or a focus on the wrong factors in a management plan for dealing with innovative technology can lead to drastic consequences such as failed cloud migrations.

2.2.3 Why IT Projects Fail

Not unsurprisingly, one study has concluded that one third of information technology projects go over budget or do not get completed on time (Cloud Industry Forum, 2020). As a leader, strategic

management of innovative technology has little room for failure due to competitive pressures and new global dynamics (Schilling, 2017). This failure can be attributed to many factors, with Schilling's (2017) assertion that without a deep understanding of innovation, a well-honed strategy or well-designed implementation process, failure can easily take root. Applied to cloud computing and cloud migrations, a lack of understanding in the specific technical aspects of a cloud migration- of the options available (incomplete information) or of how a specific CSP will migrate the organization and its processes is catastrophic. This, coupled with organizational and market shortages for skilled cloud technicians means that harnessing the cloud to its full potential (i.e. the cloud as a gateway to ML, AI, big data and internet of things) (Cloud Industry Forum, 2020) can be thwarted by lack of support and proper migration decisions of organizational applications.

In fact, the decentralization of information technology decisions within a company (Coghlan, 2019) has lead to the prevalence of shadow information technology and fragmented cloud portfolios. Coghlan (2019) referenced a survey where some companies admit to having 17 total cloud services that are being used internally. With a large exposure to cloud services and improper cloud migrations, cost optimizations sought from moving to the cloud turn into cost drains and information technology failures. The technical aspects of the cloud migration, then, are as important as ever for a successful cloud migration and impactful leadership stewarding of the cloud adoption journey. As seen within the next section, how a CSP advertises their capabilities can prove fateful and fuel the cloud computing chasm wherein expectations are misaligned with reality.

2.2.4 The Cloud Computing Chasm

The aura of cloud computing and its perceived benefits as understood through the matured information diffusion can blind corporations in their cloud computing adoption process. A gap from expectations to reality exists- manifested by misinformed or misleading advertising (McCrea, 2013) or the belief that cloud computing is the instant savior for organizational malaise. Even for ACMT solutions, the transition may be slow and cautioned (Balobaid & Debnath, 2018) in its approach. The cloud computing chasm as seen in Figure 1 shows how the linkage between expectations and reality is bridged by a focus on ACMTs. Consequentially, no insight into or focus on ACMTs means that unrealistic expectations can fester and organizations can fail or see no benefits from the cloud adoption due to cost over runs and inability to leverage the cloud platform.

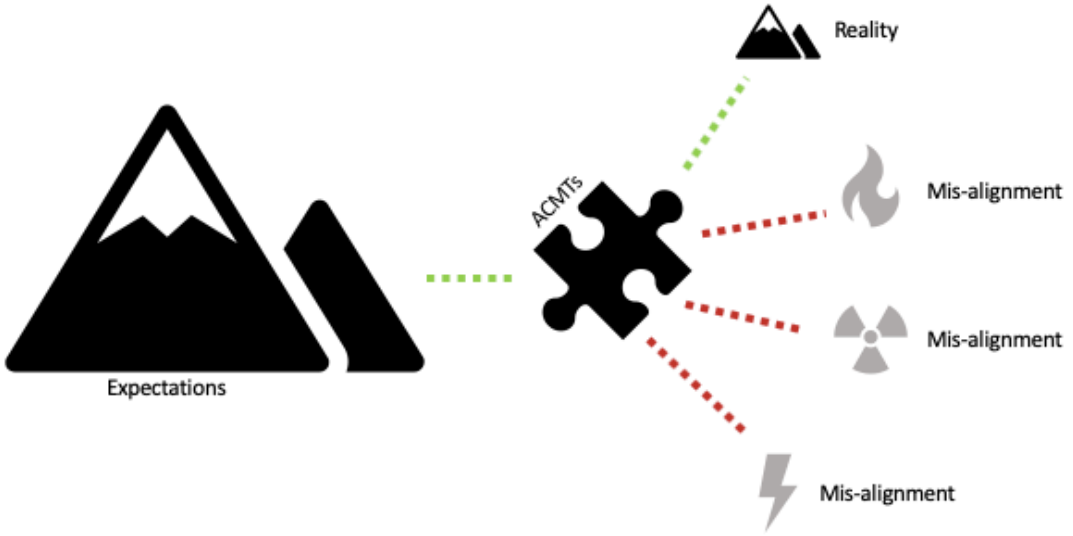

Figure 1. Cloud Computing Chasm

Note. Expectations are what an organization thinks that they will benefit from once migrated to the cloud. This is often thought of before considering the actual ACMTs and can be brought on through either information diffusion surrounding cloud computing or in conflated advertising claims from CSPs. With the right ACMT, the organization has an easier chance to chart their course to matching their end state (reality) with their initial expectations. Even utilizing ACMTs (or without using ACMTs), mis-alignment can occur due to choosing the wrong ACMT or in a failure to support the cloud transformation process. ACMTs are an integral tool, and a necessary one with which to achieve faster cloud optimization by helping to avoid cloud migration pitfalls such as migrating the wrong applications, in the wrong order or in failing to ensure cloud compatibility. The more advanced the ACMT, the more information available to the organization, thereby making cloud adoption a more streamlined process.

2.2.5 Answering the 'How' of Current Capabilities

With the accelerated pace of cloud adoption, companies providing cloud services will continue to refine and develop their ACMTs in order to get and grow their market share. The current climate in the cloud market calls for a multi-cloud approach by organizations (Cloud Industry Forum, 2020; Saita, 2020) meaning that ACMTs will need to begin to offer greater functionality with competing cloud platforms. Further advances in ACMTs will certainly involve increased support functions (Balobaid & Debnath, 2018) throughout (before, during and after) the cloud migration in addition to greater attention to offering automated application adjustments to the cloud (thereby optimizing applications and removing the market hurdle of a lack of skilled cloud technicians capable of re-engineering legacy or existing company applications). Greater choice and presented options for the organizational cloud migration via presented options to the organization and truer estimates of the success of cloud migrations for specific intricacies of the target organization are sure to follow. Migrating a process/application in the right way to the right cloud vendor with greater surety will

certainly provide organizational leaders the necessary technical information to make informed decisions and bring the cloud to the organization instead of the organization to the cloud.

2.2.6 Leadership with ACMTs

When dealing with innovation, leaders often must act with an incomplete picture of how to harness the latest technology or process in order to achieve stated organizational goals or vision. Acting with uncertainty or hesitating is not an appropriate action for taking advantage of or building dynamic capabilities (Schilling, 2017)- as the very definition is predicated on being agile and responsive to change. For cloud computing, staying informed and being educated on the technical aspects of cloud migrations means bridging the cloud computing chasm to utilize realistic success metrics on the path to faster cloud profitability. Often in a rush to the cloud, too late is there consideration for the immediate impact the cloud will have on an organization. Checking ACMTs first would alleviate this concern, as ACMTs help align to realistic capabilities of an organization, translating into expectation management and to realization of the initial expected end-state of cloud adoption. Starting with the end first, a focus on the last step of the cloud migration process- the tools themselves- provides leaders the missing link in their decision matrix of and for cloud computing success.

2.3 MNC Leadership and Innovation

A focus on the intricacies of leadership within MNCs is relevant due to the unique and complex structure of MNCs. More specifically, the focus on leadership and innovation is a near peer of cloud computing and by extension, the application of ACMTs within MNCs. As direct research between ACMTs and MNCs has been under-researched, existing research on innovation in MNCs allows for understanding of the factors that would also affect cloud computing adoption.

2.3.1 Definitions of Leadership, MNC, and Innovation

The following are working definitions in the sense that they are not definitive or absolute, and incorporate the research used for this dissertation. Leadership is an amorphous style not limited to, but widely credited to leaders or decision-makers within an organization (Northouse, 2018). Though anyone can be a leader, leadership within this dissertation, on balance, is described to originate from a high-level executive. The perspective of what leadership is and who a leader is,

though, is open to cultural interpretation (Kader Ali & Tang, 2016; Littrell et al., 2006; Schmidt et al., 2013; Wang et al., 2014) and organizational perception (Levy et al., 2014; Lo et al., 2015; Maitland & Sammartino, 2012; M. Zhao et al., 2014). These views will be discussed later in the dissertation. An MNC is a connected firm that is comprised of at least two locations partaking in transnational business operations (Ma et al., 2019). The structure of an MNC varies between wholly owned subsidiaries or partnerships (though not exhaustive). Innovation can be creating new products or improving existing ones (Jean et al., 2018). Innovation involves the ability to synthesize knowledge flows from internally and externally to an organization (Gaur et al., 2019; Johnston & Paladino, 2007; Leung et al., 2019; Rakthin, 2015; Soltani & Wilkinson, 2011), apply resources to and generate value from said processes/products.

2.3.2 The Mental Map

The mental map as seen in Figure 2 was created through the synthesis of the included research of this Section- 2.3. A focus on systems and interconnected thinking (Ramo, 2016) with further attention to creating a clear message that can be formulated in a strategic manner (Doerr, 2018) aided the figure's finished conceptualization. With the many distractions and potential for rapidly changing attentional needs of a leader in a constantly changing organization affected by external and internal pressures, having the ability to coordinate actions for a measured purpose (Rumelt, 2011) (in this case, for fostering innovation) requires scope management and structural alignment of perception.

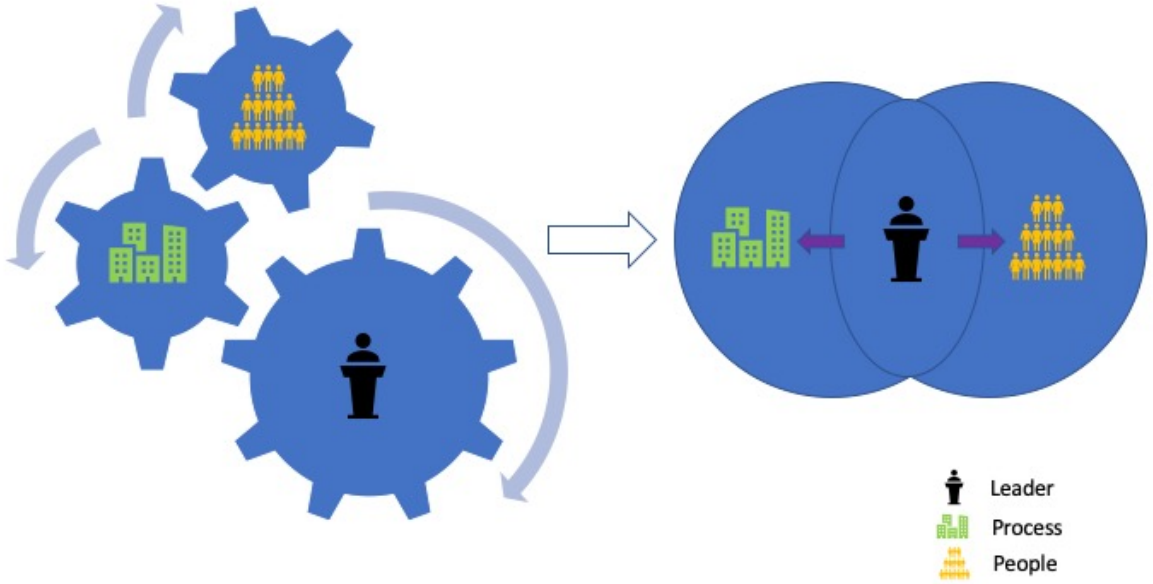

Figure 2. Mental Map

Note. This is an internal reference for leader's within MNCs to guide their thinking in order to foster innovation. The difference between an uncoordinated thinking strategy on the left and a unified ideal state on the right show the patterns of actions that can happen when in or out of ideal alignment. Uncoordinated thinking like that on the left shows that a leader may have personal motives and take action on an organizational initiative that may alienate employees in the organization- hence the varying directions of the arrows showing each of the three elements in opposite directions. In contrast, an ideal state shows the leader is working in harmony between their personal pursuits, processes for the organization and in keeping aligned with considerations for the people in the organization. A leader is able to bring together these three unique identities and varied wants/needs/actions into a holistic frame of reference and grow similarities across all three categories. The ultimate result? Growth of innovation, and the leader as the unifying lynchpin.

2.3.3 Process

Process refers to networked thinking including organizational hierarchical architecture, strategy development, market assessments and stakeholder engagement. An MNC is often uniquely structured to its industry (Soltani & Wilkinson, 2011) or based on its parent company culture and governance ideals (Ahworegba, 2017; Ma et al., 2019; Rakthin, 2015). Questions to consider regarding architecture include the pace of innovation in the industry, the necessity for growth (Tan et al., 2020) within the MNC, survival considerations (Maitland & Sammartino, 2012) or regulatory constraints (Gaur et al., 2019; Jean et al., 2018; M. Zhao et al., 2014). Strategy development and market assessment are further larger picture influences (Halme et al., 2012) that can determine the types of stakeholder engagement (Ma et al., 2019; Michailova & Zhan, 2015; Rakthin, 2015).

2.3.4 People

People refers to the internal human capital (Colakoglu et al., 2014; Kader Ali & Tang, 2016) of the multinational corporation. The more satisfied and fulfilled employees are, the greater the business returns (Kader Ali & Tang, 2016; Lo et al., 2015). Investing in people pays dividends (Colakoglu et al., 2014). Within an MNC, a leader must understand that all actions have an effect on employees, and actions taken in mind with respect to cultural differences and perceptions of a leader and leadership (Schmidt et al., 2013) is paramount to a well-heeled satisfied employee base. The employees of an MNC are further striated by their geographical location and nationality (Levy et al., 2014; Wang et al., 2014) i.e. from the parent country, a third country or from the host country. Accounting for geographic as well as cultural differences are factors a leader must understand. Not the least, talent management and staffing considerations (Halme et al., 2012; Rakthin, 2015; Schmidt et al., 2013; Soltani & Wilkinson, 2011; M. Zhao et al., 2014) are further arbiters of the success of the MNC and its subsidiaries.

2.3.5 Leader

The leader incorporates the more structural and strategic planning of the 'process' element with that of the human 'individual nature,' combining both to form a greater whole. Expansion of the leader's role in both the process and people functions shows that a leader, as an executive, has the decision-making capabilities to align interests. However, acting from a self-serving position of fulfillment or protectionism (Leung et al., 2019) reverts the harmonious elements of the ideal state in Figure 2 to the uncoordinated fiefdoms as see on the left half of Figure 2. Leaders are not only at the executive suite of the parent country company headquarters, as leaders can also be at the subsidiary management level (Dzedek, 2018; Maitland & Sammartino, 2012) or even at the level of a host country headquarters (Ma et al., 2019). As an MNC adapts to internal and external forces, the focus of a leader on coordinating their process and people decisions is fundamental to overall MNC success.

2.3.6 Opportunities and Obstacles

A leader faces many stimuli that can either be considered as opportunities or obstacles. In the best practices section to follow, information on how to harness these dichotomies in a manner to give the best possible chance for innovation to bloom will be explored. For now, these opportunities or

obstacles can be considered simply as observances. Once the observances are acted on and employed within the MNC, the action is the catalyst that turns the observance into a best practice.

2.3.7 Distances

Distances refers to both cultural distance and geographic distance (Gaur et al., 2019; Levy et al., 2014; Rakthin, 2015; Soltani & Wilkinson, 2011). A subsidiary may be separated from the parent company headquarters over vast geographical distances which might affect knowledge transfer (Gaur et al., 2019; Reilly & Sharkey Scott, 2014) and influence capacity (Ahworegba, 2017; Ciabuschi et al., 2014; Levy et al., 2014; Papanastassiou et al., 2020) with regards to securing resources, contributing to strategic decisions or implementing local policies within the host country. Cultural distance refers to the perception of a subsidiary by headquarters and vice versa (Elia et al., 2019; Littrell et al., 2006; Wang et al., 2014).

2.3.8 Leadership

What constitutes a leader and what characteristics inform leadership play a large role in the ability to lead employees in different locations and from different cultures. Employees in Malaysia (Kader Ali & Tang, 2016; Lo et al., 2015) act, perceive situations and have different expectations than employees from Thailand (Rakthin, 2015), China (Schmidt et al., 2013; Wang et al., 2014) or Japan (Nonaka & Takeuchi, 2011). Cultural knowledge combined with local business practices (or lack thereof) informs the viewpoints and actions of MNC expatriate (Ahworegba, 2017; Littrell et al., 2006) leaders that may be assigned to manage foreign locations.

2.3.9 Strategy

Strategic considerations come from different levels within an MNC which could be the headquarters or within a subsidiary. These different strategic plans, at some level, must integrate to allow for resource allocation and knowledge transfer. Who decides the strategy and how often can strategy change? Being flexible to market dynamics (Dzedek, 2018; Michailova & Zhan, 2015) and the principle of autonomy (Leung et al., 2019; Lo et al., 2015; Reilly & Sharkey Scott, 2014) both played key roles in the ability to explore or exploit (Rakthin, 2015; M. Zhao et al., 2014) sources for innovation.

2.3.10 Knowledge Transfer

How does information travel from subsidiaries to headquarters? How does headquarters disseminate information? How do subsidiaries gather information from their local environments? The storage of information within an MNC (Colakoglu et al., 2014; Johnston & Paladino, 2007) and the ability for communication to flow between departments and MNC locations (Berry, 2014; Gaur et al., 2019; Reilly & Sharkey Scott, 2014) are processes that are in need of attention and codification. An MNC could have or require market specific information (Tan et al., 2020) that needs to be shared with research and development centers or specialized departments (Berry, 2014; Papanastassiou et al., 2020) dispersed across cultural and geographic distances.

2.3.11 Stakeholder Engagement

Operating in a distinct environment from the parent country headquarters represents a need for renewed sensitives and appreciation for fundamental differences found within the local host environment. Ignoring stakeholders in a host country of a subsidiary has shown to be a ripe recipe for crises (M. Zhao et al., 2014). Adapting to local practices means building relationships at different levels of society (Ahworegba, 2017; Jean et al., 2018; Soltani & Wilkinson, 2011) through stakeholder analysis and engagement. With uncertainty in operations and expectations (Laczniak & Kennedy, 2011), established internal resources made public such as a global code of conduct may prove helpful in navigating the complex stakeholder environment.

2.3.12 Best Practices

Best practices require reflection and are often gained through experience. The experience in this instance was derived from a synthesis of and perceived connections through literature review. Each of the eight identified best practices are focused around the positive perceived correlation to encouraging innovation. Innovation herein is associated with a greater chance of business success or of creating business value. Each of these identified practices may not work for every scenario that a leader in an MNC may find themselves, hence best practices are solely guidelines to keep in mind. Each best practice is also integrated from the view of the mental map in Figure 2. When analyzed within the mental map architecture of Figure 2, the leader can better determine how the impacts of innovation interact across each of the three elements of process, people and leader:

1. Account for culture by encouraging and providing isomorphic attribution training (Littrell et al., 2006) to employees. Failure in leadership assignments often occurs due to a lack of awareness and comprehension of the target culture (Wang et al., 2014). An informed and aware leader is better positioned to value input from their surroundings/team members and will make more appropriate local decisions.
2. Allowing autonomy within subsidiaries (Reilly & Sharkey Scott, 2014) sends a message to employees that they are appreciated and influential in the larger MNC, thus increasing the potential for knowledge transfer (Berry, 2014).
3. Remaining flexible (Maitland & Sammartino, 2012) allows strategic decisions to be pushed down to host country levels, thus empowering employees and creating the capability to capitalize on locally sourced knowledge.
4. Valuing human satisfaction puts the onus on leaders to make concerted effort to carry out decisions aligned with catering to employees. Involving employees in decision making and creating a respectful and supportive environment drives employee commitment, buy-in (Lo et al., 2015) and superior productivity (Kader Ali & Tang, 2016). Following the theory of self-determination can also birth similar effects (Dzedek, 2018).
5. Stakeholder engagement endears leaders to focus on the second order effects past that of business metrics and profit motives. Is the exploitation of an emerging market country worth the assured public crisis to follow? Respect for the social climate by keeping social adaptation in-line with economic adaptation (M. Zhao et al., 2014) creates the ability for long term growth.
6. Communication flow and knowledge transfer allow for MNC competitive advantages (Rakthin, 2015). Encouraging interactions and social connections is a measure of social investment (Achor, 2010), which keeps employees happy and lowers geographic/cultural barriers. Encouraging the share of information allows dispersed information to reach necessary nodes of action to create actionable business insights.
7. Reflecting upon individual leadership styles is a prominent component of high emotional intelligence (Bradberry & Greaves, 2009). An introspective leader has a sturdy self and social awareness and foundation for cultural understanding. Cultural biases can interfere with evaluating talent, seeing strategic opportunities and allowing for autonomy at subsidiaries (Levy et al., 2014). A leader who is prone to reflect, will most likely have a

clearer picture of the present climate and internal/external factors which enables the possibility for new ideas from unexpected locations to have purchase.

8. Being efficient with resource allocation (Rocbe, 2003) means having the focus to determine which initiatives to follow. Creating a set criteria for how to assess opportunities allows for employees throughout the value chain to have an equal opportunity at bringing value to the organization. Resource allocation can also allow for built-in flexibility and the ability to adapt to changing demands.

2.3.13 MNC Leadership and Innovation Summary

The above research in this section discusses the relevance of innovation within an MNC transposed upon the actions of a leader. For effective decision making and comprehensive assessment of their operating climate, an informed leader needs a mental map for how to engage in the many competing elements necessitating their focus. It is clear that a focus on innovation within the multifaceted environs of an MNC is a challenging but also achievable objective. Creating real business value necessitates focus and attention to best practices; learning from past experiences informs the actions to be taken by leaders in charge of MNCs and is a bedrock of identified best practices. With best practices centered around fostering innovation, and armed with a mental map in order to assess future scenarios, MNC leaders can act with conviction in their decisions to drive competitive advantage in a sustainable and enduring manner.

2.4 Cloud Computing History and Business Impacts

2.4.1 Description of Cloud Computing as a Technology

A technology is defined as a platform that aids in accomplishing human goals with respect to different operational precepts such as making, communicating, powering and the like (ITEA, 2007). Cloud computing is a platform and framework made up of the elements of grid computing and virtualization (Hu et al., 2011; I. Lee, 2019; Sultan & Van de Bunt-Kokhuis, 2012) that allows for processing, data storage (Carreiro & Oliveira, 2019; Fatima & Ahmad, 2019; Zheng et al., 2019), and sharing of relevant data (Fitch Solutions, 2020a). Furthermore, cloud computing, like any technology, adjusts to our dynamic environment (Mercer, n.d.; UNEP, n.d.) through interactions with and the synthesis of edge computing and IoT device data streams and processing. IoT refers to internet connected microwaves and voice-responsive refrigerators. For edge

computing, the idea is decentralization. With the increase in power and the lowering cost of circuitry (e.g. cellphone computing power developments), devices closer to humans are increasingly capable of processing more intensive tasks, allowing for the more complex data requirements with greater needs being passed along to the cloud. Data streams from IoT and from edge devices will continue to grow as technology becomes more accessible to consumers via factors such as cost and market prevalence. In this manner, adoption of cloud computing represents a major means of environment assimilation.

Cloud computing is further identified under distinct deployment models (Fatima & Ahmad, 2019; He & Wang, 2015; Stieninger & Nedbal, 2014) and service offerings (Dimitri, 2020; Hu et al., 2011; Makhlouf, 2020; Sultan & Van de Bunt-Kokhuis, 2012). A widely cited National Institute of Standards and Technology cloud computing definition (Hu et al., 2011; Makhlouf, 2020; Stieninger & Nedbal, 2014) incorporates the concepts of on-demand access to shared computing resources with rapid provision capabilities using minimal effort (Mell & Grance, 2011). Access to computing power (Akinnuwesi et al., 2020), and solutions previously unreachable before cloud computing (Hu et al., 2011; BSA, 2018), supports the equalizing force of and opportunities that the technology of cloud computing offers. Therefore, material sourcing, obtaining energy, and identifying subject matter experts and sources (Dyrenfurth, 2019) requires further attention in the exploration of the structure of this technology with a focus on processes, knowledge and contexts (ITEA, 1996).

2.4.2 Sections of Technology

Materials, energy and information (ITEA, 1996) form the sections of technology. An illustration of the sections of cloud computing is seen in Figure 3. The cloud (and therefore, by extension, cloud computing) is based off of physical hardware and infrastructure. Typically, a cloud organization (if a commercial vendor) will look after and maintain the servers and underlying hardware. Tending to the creation, manufacture and placement of server centers and underlying infrastructure is essential. Construction and creation of this platform directly relates to the materials section of technology. Energy is understood to be the electrical resources and power infrastructure needed to run the underlying hardware and framework of the cloud. Alternatively, three other energy indicators can be posited: consumer devices accessing the cloud and their

required power profiles; optimized mobile cloud computing strategies for energy conservation (Carreiro & Oliveira, 2019; Islam et al., 2020; Zheng et al., 2019); and consolidated cloud infrastructure, meaning less privatized footprint of cloud hardware deployments (Sultan & Van de Bunt-Kokhuis, 2012). Lastly, information and communication are represented by the concept of access anywhere, anytime, from any device (Hu et al., 2011).

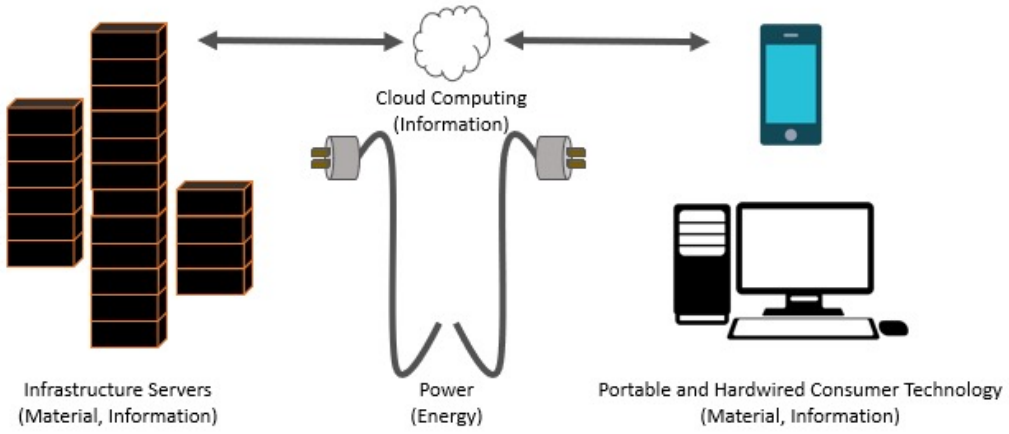

Figure 3. Sections of Cloud Computing

Note. This is the depiction of the interrelated aspects of material, energy and information.

2.4.3 Structure of Technology

The structured combination of the interrelated nodes of processes, knowledge and context marks the triangle of the structure of technology (ITEA, 1996). These three frames directly apply to cloud computing, which is a construct resulting from the overlay of technology in the structure as seen in Figure 4. The process of accessing and utilizing the cloud, and assuming the functionality of cloud computing, relates to the usage of an internet connected terminal (or device) of consumer origin. The cloud service provider (CSP) would control, design, develop and maintain the underlying cloud hardware infrastructure. Depending on the cloud deployment model and service selected, varying levels of responsibility and control are exerted. Knowledge as related to the cloud computing structure can be tied to the nature of cloud computing being of a grid or virtualized nature, as described previously. The CSP may have a hardware perceived inclination of the nature of cloud computing, and the consumer that of a virtual entity with elasticity and on-demand

characteristics (Fatima & Ahmad, 2019). The aforementioned knowledge sections best describes the interrelated nature of contexts involving informational and physical systems (ITEA, 1996). Further, context relates to the mobility and portability of access to the cloud computing resources. When combined, the changing perspective of cloud computing related to the provider or consumer paradigm reflects the respective control methodologies and responsibilities as related to the operation, design, and physical nature of the cloud.

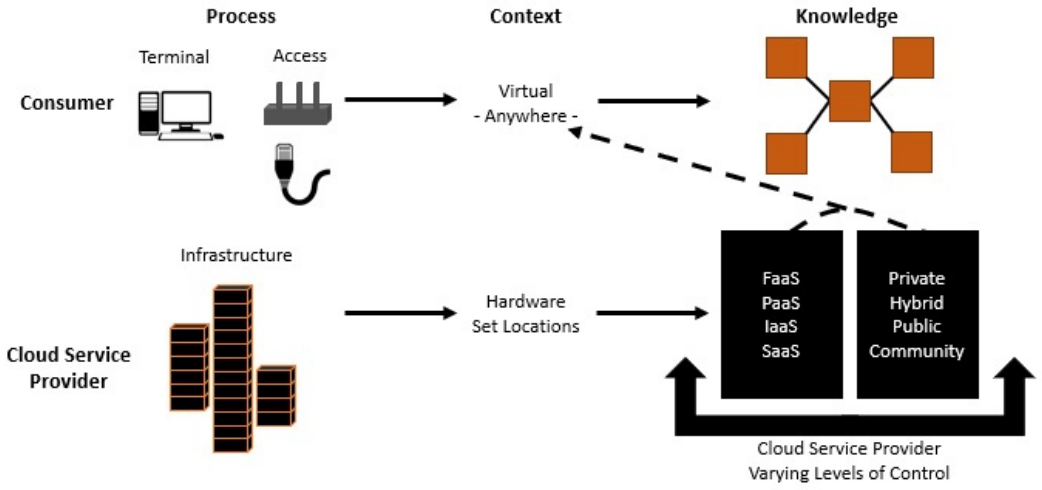

Figure 4. Structure of Cloud Computing

Note. The consumer and CSP view of the structure of cloud computing. Varying levels of control are seen through not only service offerings such as Function as a Service (FaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS) and Software as a Service (SaaS). The deployment model chosen by the consumer also has its own varying levels of control, whether the cloud is exclusive to an organization (private), a combination of public and private (hybrid) where vital information may be processed in the private cloud and non-essential information in the public half, a simply public offering or a cloud used by multiple businesses (community).

2.4.4 Pros and Cons of Cloud Computing

The reasons for and against cloud adoption can be identified in multiple ways, either based on a cost benefit analysis (I. Lee, 2019) related to investment decisions in technology (Chiriatti et al., 2020), or perceived return on investment. Reasons for adopting cloud computing include harnessing the latest consumer innovations (Fitch Solutions, 2020b), scalability (I. Lee, 2019), minimized cost (Sultan & Van de Bunt-Kokhuis, 2012), increased mobility for a global workforce, and increased business focus (He & Wang, 2015). Cons are represented by availability concerns (Fatima & Ahmad, 2019), vendor lock-in (Alexander et al., 2020; He & Wang, 2015; Hu et al., 2011), latency (I. Lee, 2019), hidden costs (Makhlouf, 2020), and loss of control (Sultan & Van

de Bunt-Kokhuis, 2012). A list of pros and cons is seen in Table 1. As technology continues to become cheaper, and consumers clamor for more devices connected to the cloud (and produce more data), organizations must look into how adopting aspects of the cloud will be beneficial and also answer the question for how to scale with the influx of consumer generated data.

Instead of a stark pros and cons evaluation of getting into the cloud, businesses must look at augmenting the pros and mitigating potential cons. This will allow organizations to not to be deemed as irrelevant in the oncoming eventuality of pervasive data and in order to return the raw data as digestible for consumers. Though cons such as lack of control over data and availability of services or governmental regulations may dissuade an organization from utilizing a cloud service or deployment model, CSPs are now working on finding solutions to these barriers that satisfy organizational requirements (Cloud Standards Customer Council, 2017; Cloud.gov, n.d; Kash, 2014; Maven Wave, 2017; Oracle, 2020).

Table 1. Pros and Cons Analysis for Cloud Computing Adoption

Rank Order	Pros	Cons
1	Providing customers with latest consumer innovation	Availability
2	Scalability based on demand	Accessibility
3	Lower costs	Vendor lock-in
4	Offloading non-core business functions	Hidden costs
5	Increased workforce mobility	Loss of data control
6	Flexible service and deployment options	Privacy

2.4.5 Organizational Preparedness

When preparing for or considering adopting cloud computing, thoughtful evaluation of structural factors is essential in any analysis. Factors include integrity, security, accessibility, location, privacy, and backups (Fatima & Ahmad, 2019; Punitha & Indumathi, 2017). These elements are also anchored in cloud deployment selection and the cloud service offering chosen. How the following factors are affected by culture or nationality have pertinence. Often overlooked may be

that of internal resistance (Sultan & Van de Bunt-Kokhuis, 2012) or organizational leadership style (Carreiro & Oliveira, 2019; F. Zhao et al., 2014).

2.4.6 Internal

Best practices for implementing cloud computing within an organization revolve around strength in communication of the vision for and use of cloud computing, along with supportive leadership, personal recognition, and the capacity to consider others' feelings about the change (Carreiro & Oliveira, 2019). The transformational leadership trait of supportive leadership has been found to be essential in the adoption and routinization of innovation in organizations (Carreiro & Oliveira, 2019). National cultural variables are also a good corollary for management or employee adoption of cloud computing within a company (F. Zhao et al., 2014).

2.4.7 External

External factors to be mindful of for successful adoption are regulatory considerations that depend on industry and governmental requirements (Aarestrup et al., 2020; Fitch Solutions, 2020b; He & Wang, 2015; Makhlouf, 2020); and the availability of the material, space, power, and finances necessary to construct the cloud infrastructure. Political climate assessment (such as political malaise at being left out of the digital arms race (Blau, 2020)) as well as competition analysis are helpful tools in determining growth potential and long-term strategic considerations.

2.5 Innovation Trajectory of Cloud Computing

The innovation trajectory of cloud computing is comprised of multiple parts. Historically, technological advancement encompasses the ability for the invention to sustain or disrupt a field, and to innovate through commercialization or wide-scale adoption. The symbol of a cloud was first used by telephone companies in the 1990s (Hu et al., 2011). These companies created a 'black box' to represent Virtual Private Network services (Hu et al., 2011). Lee (I. Lee, 2019) discusses the historical birth of cloud computing originating from the combination of the evolution of the internet, technologies for storage advancement, and a service-oriented architecture coupled with grid computing. Sultan and Bunt-Kokhuis (2012) discuss an earlier timeframe beginning with the conception of virtual memory appearing in the 1950s, the concept of 'timesharing' in the 1970s, and grid computing from the 1980s. The combination of these elements form the underlying

precepts of the cloud. Undeniably, and quite possibly apt considering global circumstances (to be discussed further), the idea that cloud computing is considered a ‘fifth utility’ (Dimitri, 2020) is not unrealistic.

The global circumstances currently pushing competition for businesses revolves around cost, flexibility (Fitch Solutions, 2020b; F. Zhao et al., 2014; I. Lee 2019; Sultan & Van de Bunt-Kokhuis, 2012), and adaptability (He & Wang, 2015). Initially adopted largely by start-ups and small businesses (BSA, 2018) due to agility, multinational enterprises (MNEs), countries (Fitch Solutions, 2020c) and transnational organizations (Aarestrup et al., 2020; Blau, 2020) are now assessing and building out infrastructure for cloud computing under the premise that the cloud is an inescapable centrality of the future of business operations (Figure 5). The access to and sourcing of solutions and services (Gellweiler, 2020) previously unobtainable, or the ability to access data faster and have it readily available and synthesized into an information overlay representing a large picture (Hytha et al., 2019), draw on the underlying core of imagination and sense of accomplishment cloud computing provides to consumers. Not all benefits of cloud computing are harnessed equally though. Cloud readiness assessments assemble the international characteristics of cloud computing and structural impediments to a healthy cloud environment (BSA, 2018).

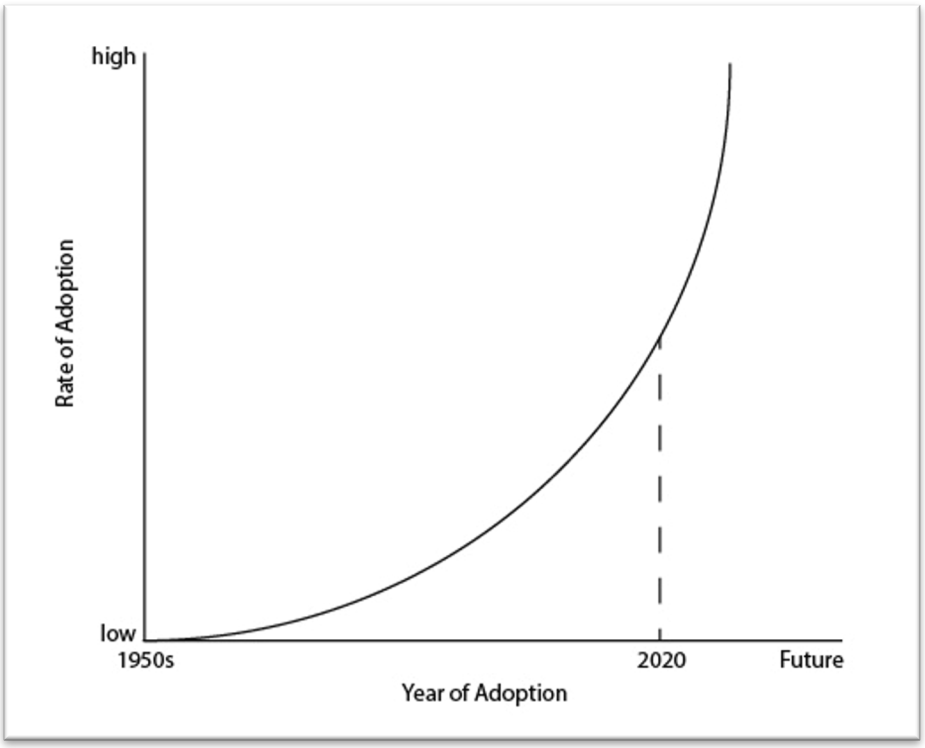

Figure 5. Cloud Computing Adoption

Note. A time based adoption trajectory of cloud computing.

Lastly, the type of innovation cloud computing is considered to be and how cloud computing can be commercialized are necessary to highlight. Sultan and Bunt-Kokhuis (2012) determine that cloud computing is to be considered both a sustaining and disruptive innovation. Sustaining innovation refers to the natural extension of 'timesharing' capabilities (Sultan & Van de Bunt-Kokhuis, 2012). Disruptive innovation denotes the manner in which IT services are provided to consumers (on-demand), and the availability of dynamic scaling based on demand (Sultan & Van de Bunt-Kokhuis, 2012) in addition to the lack of a need for previously huge investment concerns to harness scalable and immediate processing power (Sultan & Van de Bunt-Kokhuis, 2012). Cloud computing, in fact, is constantly evolving. The platform changes with learning through feedback and exploring implementation avenues for an organization. A continuous process improvement paradigm is the bedrock for technological growth, and is captured around constantly questioning and responding to challenging structured processes (National Academies of Sciences, Engineering, and Medicine, 2019). Cloud computing therefore will need to be adapted to the needs

of the organization and also grow as technological considerations present new commercial or technical capabilities.

Commercializing cloud computing involves characteristics of billing relating to pay as you go, on-demand, spot market, usage time, system congestion, and size of computing resources occupied (Dimitri, 2020). From a consumer perspective, cloud computing costs include cloud bursting (I. Lee, 2019), which involves scaling cloud computing available resources based on demand, employee training (He & Wang, 2015), internal cloud accounting guidelines (Chiriatti et al., 2020) and hidden costs (Makhlouf, 2020). As underserved markets and nations continue to look for growth through cloud computing, new tiers of commercialization coupled with offerings based off models of deployment or services are certainly to emerge. An example is that a country may be focused on technology export (i.e. Malaysia), and thus have an undeveloped local market or infrastructure for domestic cloud capabilities (Fitch Solutions, 2020c).

2.6 Adopting Innovation

When innovation is introduced to and adopted by actors (organizations or nations), the act of adoption furthers the continuation of the innovation. For the trajectory of cloud computing, an understanding of the thought processes or methodologies employed can be seen within the framework of military adoption. The United States military will serve as the example of adoption by a leading industrial nation of cloud computing.

The Department of Defense (DoD) aligns its overall vision with one of the central tenets of cloud computing (United States Department of Defense, 2018) – that being information. For the purposes of survival and in order to maintain a technical edge against competitors, the DoD recognizes that cloud computing is imperative. The Strategic Innovation Group (2002) calls this the foresight dimension of strategic innovation. That is, recognizing the potential of an impact that cloud computing represents for the analysis and computation of information. If the DoD does not adopt cloud computing (or explore possibilities of innovative technology), adversaries could use the gap in technology as a means to achieve parity or surpass DoD capabilities. Aligning top-level management efforts for the purposes of embracing the possibility that cloud computing offers – better resource alignment, information access and collation and new defensive/offensive response

capabilities – serves as a further platform for and gateway to continued emerging technology, such as AI and ML.

In fact, Ries (2011) points out that acceptance and nurturing of innovation by management is essential. The DoD's alignment of cloud computing signifies management support of cloud computing and the acceptance of innovation. Acceptance, though, is not enough. Innovation further requires that different metrics of assessment for the innovative technology be employed. In the scenario Ries (2011) describes for startups, traditional accounting metrics for success must be set aside in favor of metrics aligned with a concept of 'validated learning.' Validated learning deals with evaluating uncertainty through scientific measurement (Ries, 2011), and is therefore applicable to an innovative technology like cloud computing. Allowances must be made for growing with technology adoption. Part of the growing pains within the DoD and on the United States federal level are transitioning legacy systems to the cloud (Figliola & Fischer, 2015), and the fragmentation of specific agency cloud architecture implementation (United States Department of Defense, 2018). A unified directive, such as a vision tied into the growth of and support of a technology, means there is the presence of two important factors: executive championing and an adaptive assessment framework for implementing the innovation.

2.7 International Characteristics of Cloud Computing

Stieninger and Nedbal (2014) brilliantly reference cloud computing as a 'digital divide.' Various distinctive factors play into this paradigm: disparity in access to digital infrastructure based on race, gender, age, rich versus poor countries; industrialized versus developing countries; differences in socio-economic levels; and generational segmentation of digital literacy (Stieninger & Nedbal, 2014). Across countries (Fitch Solutions, 2020b), various barriers to entry and competency for implementation and use are visible. Figure 6 shows a national profile based off of infrastructure and domestic considerations that focuses on how the country will collaborate and compete on the international stage. Is there sufficient infrastructure to handle supplying power to server centers? Is there expert architecture knowledge for implementation of the cloud ecosystem? Is there funding and support for cloud infrastructure by government or private industry? Is the strength of connection to the internet robust and reliable and available?

Differences in culture also relate to cloud computing recognition and adoption (F. Zhao et al., 2014). Will business leaders reconfigure processes from legacy systems to work in the cloud? How is new technology and new business process-flow handled by organizational leadership? Infrastructure (Fitch Solutions, 2020b), regulatory/legal environment (Fatima & Ahmad, 2019; He & Wang, 2015) and bandwidth (Hu et al., 2011; I. Lee, 2019) are all major reasons for or lack of perceived strength in cloud computing. The case study of India and Malaysia are two examples of the international characteristics and considerations for cloud computing.

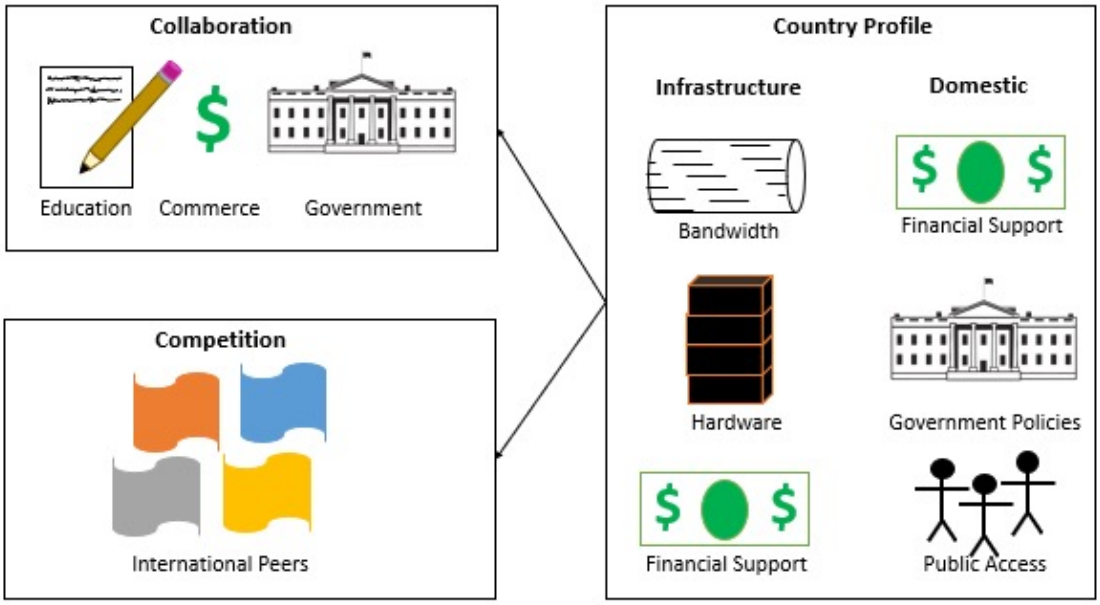

Figure 6. A Country Cloud Profile within an International Framework

Note. The components of competition and collaboration are directly influenced by the national factors within a country. Increases in the domestic and infrastructure fronts lead to greater collaboration, and a more viable stance regarding competition on an international level. The weaker a country is on their infrastructure and domestic fronts, the lesser their ability for collaboration or competition on an international scale.

2.8 International Standards and Agencies

International business and professional practices need national and international standards bodies for collaboration or competition to be viable. Some of the key associations and agencies with work involving cloud computing include the Fraunhofer Cloud Computing Alliance (Fraunhofer Cloud, 2019), National Institute of Standards and Technology (NIST, 2019), International Organization for Standardization (ISO) (ISO, n.d.), Department of Defense (DoD) (United States Department

of Defense, 2018), the Technical Committee on Cloud Computing (TCCLD) (IEEE CS, n.d.), International Telecommunication Union Standardization Sector (ITU-T) (n.d.), Cloud Security Alliance (CSA) (CSA, n.d.), European Union Agency for Cybersecurity (ENISA) (ENISA, n.d.) and the European Cloud Initiative (European Commission, 2019). The cross section of government, non-government, regional, industry and business focused standards highlight the importance of communication. Furthermore, this discussion acknowledges a basic framework for purposes of fair market competition, and best practice implementation for consumer requirements and functionality. Companies have different needs pertaining to cloud computing functionality, architecture and organization. Available guidance from associations and agencies serves to publicize these key factors.

In developed and developing nations, standards and requirements can be seen in a form of a continuum. A country profile may show a developing nation as working on building out bandwidth capabilities for internet access and connectivity speeds, or lacking governmental policies to align with required cloud association standards. Any of these actions would cause a nation to trail a developed nation that is fortifying an existing solid infrastructure incorporating cloud standards. An example of a developing nation lagging in bandwidth access would be Indonesia (BSA, 2018). Singapore would be an example of a developed nation that is able to accept immediate investments due to existing infrastructure and favorable governmental policies for cloud computing (BSA, 2018).

2.9 Developed Versus Underdeveloped Countries

How does the technology infrastructure of developed (industrial) versus underdeveloped (developing) countries, with respect to natural, economic and technology resources relate to capabilities of technology development? Competition and collaboration principles for a nation are found within a country profile as shown in a high-level overview in Figure 6. Technology infrastructure bears further exploration. A logical pertinent question is if the representation of the intersection of technology and innovation is indicative of the ability for nations to collaborate or be internationally competitive. The following profiles of India and Malaysia will address this intersection. Before these specific findings, a general review of distinctions between developed and underdeveloped countries will explore the factors of technology infrastructure.

The Human Development Report is one measure to determine a holistic view of a country with a clear focus on developing or developed nations (UNDP, 2019). The report states that countries ranking low on human development have decreased access to and infrastructure for internet (15 times faster growth for fixed broadband subscriptions for high human development nations), and a less educated population based on the level of academic attainment (UNDP, 2019). The focus on basic infrastructure needs and fulfilling life-sustaining initiatives occupies a greater portion of attention in those nations classified as having low human development scores.

The Organisation for Economic Co-operation and Development (OECD, 2018) lists the basic needs of countries as the first four out of 17 strategic development goals (SDGs) that need to be met for basic survival. Cloud computing is SDG number nine (OECD, 2018). This illustrates the advantage of focus and resource application that developed nations can utilize compared to developing nations, which are defined as those countries still accomplishing lower numbered SDGs as a means of survival and basic services attainment. The International Monetary Fund further states that developing nations suffer from an identified shortfall in funding to achieve critical SDGs, and are potentially incapable of reaching SDGs without other sources of finances unrelated to expected tax revenues (IMF, 2019). A closer look at India and Malaysia below will provide additional insights into cloud computing and its integration based on country profile factors.

India suffers from an underdeveloped cloud market when compared to other countries in the Asia Pacific (Fitch Solutions, 2020b). One reason for this is identified as the dearth of IT resources for the domestic market (Subramanian, 2011). Though, with government initiatives like ‘Digital India,’ a push for standardized clouds on the national and state levels, and as a historical importer of hardware, India is working to grow its cloud footprint (Fitch Solutions, 2020b). Data localization and protection laws translate to an increase in foreign company investments in data center capacity. A supply of cloud services to the domestic market shows potential for growth with strong popularity for software as a service (SaaS) within India (Fitch Solutions, 2020b). There is a need, however, for reliable wireline broadband infrastructure (Fitch Solutions, 2020b). It can also be noted that the Indian concept of ‘Jugaad’ will accelerate adoption of and utilization of cloud

computing (Subramanian, 2011). Jugaad means recognizing that there is a lack of resources and finding how to maximize results with the present tools (Subramanian, 2011).

Malaysia's cloud infrastructure services and cloud enabled software, when compared to North America and Western Europe, are in the early stages of development (Fitch Solutions, 2020c). Neighboring Singapore poses a near-peer threat, as Singapore is already considered a regional hub for cloud services provision (Fitch Solutions, 2020c). In an effort to create a cloud computing platform on a national scale, and compete with Indian vendors for pushing cloud adoption through information technology services, Malaysia is focusing on two important measures through the Multimedia Super Corridor (MSC) (Fitch Solutions, 2020c). The first is recognizing cloud computing as the number one strategic technology priority (Fitch Solutions, 2020c). The second being the intent to create a cloud computing platform on a national scale (Fitch Solutions, 2020c).

The two brief examples above of India and Malaysia highlight profiles and forces with contextual considerations surrounding international aspects of cloud computing. The strong interplay of government and private sector relations paint a picture of necessary linkages in the pursuit of, and realization of cloud computing infrastructures. Academia and trans-national organizations play additional potent roles in cloud computing adoption. These efforts include European initiatives (Aarestrup et al., 2020; Blau, 2020), university processing power in Nigeria (Akinnuwesi et al., 2020), or for scientific study (Aarestrup et al., 2020). Cultural mores are also relevant to cloud adoption. When it comes to privacy, Asians prioritize business opportunity over privacy, Americans call for industry to regulate itself, and Europeans call for governmental oversight to ensure privacy is met (Subramanian, 2011). Through national or cultural distinctions, the varied interpretations for growing concerns, such as privacy in cloud computing or in public private partnerships, are connected through multiple tiers of dependent factors that bear careful consideration and perspective from an international and cultural frame. These factors rest largely on the present internal and external considerations of an organization to include industry requirements, government support and consumer demand.

2.10 Forecast Conclusion

Cloud computing is a transformative technology globally, providing readily accessible information to consumers. Adoption of cloud computing platforms depends on several factors including access to resources (material, financial, energy), international policies, cultural beliefs and priorities. The pros and cons of implementation and adoption, alongside internal and external organizational preparedness, detail the complexity, global and cultural impact of cloud computing technology.

It is imperative for organizations to perform process assessment and generate a detailed plan of how cloud computing serves not only in the short term but also on a strategic planning horizon. The companies that do not adopt or see the need for cloud computing will show a serious failing of leadership through technological stagnation. This decision will have serious implications for organizational longevity. Resource intensive applications and the necessity for utilizing the cloud will only accelerate in time. Consumers, with their penchant for adopting the use of an ever growing amount of computer devices (smartwatches, tablets, smartphones, computers, gaming devices, smart microwaves), will continue to create a rush of data that needs organizing, analyzation and storage. Organizations that understand this paradigm shift will take necessary steps to create or get access to resources to aid the consumer in their data consumption habits. The strength of an organization will therefore be centered around a progressive and proactive cloud adoption stance.

The paradigm shift from one computer utilized by many people to one person having multiple computing devices (Van Hove et al., 2018) is just the beginning of the interconnectivity of humans to machines. This connection is an indication of the exponential masses of data that requires computing, synthesis and collation. One of the answers for handling this influx of data is with a solution for real-time overlay and comprehensive visualization known as cloud computing (Hytha et al., 2019). Cloud computing is growing in recognition and adoption (Chiriatti et al., 2020; Dimitri, 2020; Fitch Solutions, 2020a). The global nature of the platform allows for a unique knowledge base to explore and understand different geographic, cultural and national domains and indices. Domains include funded initiatives for cloud computing through government or private funding. Indices include contributions of cloud computing to GDP. As a burgeoning field, cloud computing enables new platforms including edge computing (BSA, 2018; Fitch Solutions, 2020b),

Internet of Things (IoT) (I. Lee, 2019), and consumer facing technologies (Chunpir, 2018; Fitch Solutions, 2020b; Van Hove et al., 2018). The impact and future trajectory of cloud computing are important societal artifacts of technological exploration. How leaders and organizations make decisions regarding the internal and external stimuli (Carreiro & Oliveira, 2019; Chiriatti et al., 2020; I. Lee, 2019; F. Zhao et al., 2014) surrounding cloud computing are defining moments in local and global information technology infrastructure. As the trend toward mobility (Islam et al., 2020; Zheng et al., 2019) and geographic accessibility strengthens with global flattening of market dynamics and globalization, portability and demand for accessible on-demand computing is surging. For these reasons, cloud computing is an integral part of modern society.

2.11 Research Design Methodology

Where quantitative research is more structured in nature, considering the setting of parameters and analyzing a data set, qualitative research is more exploratory as it possess the ability to explore the reasons behind a phenomena instead of proving or disproving a hypothesis (Taguchi, 2018). Interpretations from many studied elements can be used in a dynamic, holistic approach to interpreting observed changes (Taguchi, 2018). The three pronged elemental framework for qualitative research- naturalistic, emergent and purposeful designs- speak to the ability of qualitative research to study real-world situations, change and adapt to the inquiry and intentional focus on phenomena of interest (USC Libraries, 2020). Moreover, qualitative research can follow a case studies approach of studying one or a number of specific events in detail or in ethnographies wherein a particular culture is observed (White et al., 2009). Phenomenology refers to understanding and the study of the lived experience of a person or persons, generally no larger than a small sample group, with detailed investigation into their conscious experience (Connelly, 2010). The research in this dissertation utilizes a qualitative design.

CHAPTER 3. METHODOLOGY

3.1 Procedures/Methods Employed to Conduct Study

Grounded theory is the approach that this dissertation follows. Specifically, the three elements found within grounded theory of theoretical sampling, coding and constant comparison (Sekaran & Bougie, 2016). The grounded theory relates to and follows the research arch of an inductive to deductive knowledge application (Sale & Thielke, 2018; Sekaran & Bougie, 2016). The derived knowledge applied within the inductive to deductive arch is uncovered through the following five subparts of the main research question:

1a. Identify leading commercial cloud computing platforms utilized by large multinational corporations.

1b. Identify and develop a taxonomy to categorize the cloud migration tools utilized in their adoption.

1c. Analyze case studies where the most advanced migration tools have been employed.

1d. Categorize the leadership best practices in the most successful migrations.

1e. Analyze and present the best practices by goal for adoption including business innovation, market leadership, cost reduction, and speed to migration.

Existing secondary sources serve as the qualitative data upon which the document analysis of the grounded theory is centered. The sample used for this research is described in the next section.

With the specialized focus of this dissertation pertaining to ACMTs and leaders within MNCs, adherence to search terms as defined within each of the five subparts of the main research question was critical. Section 3.3 goes further in-depth with the data collection procedures. The five subparts of the main research question were purposefully arranged to guide the dissertation research in tiers of effort. Such that, working through each subpart was essential to then reaching the next subpart. While through the carrying out of research and the adjustment of search terms to locate relevant specific information, information not necessarily related to a cloud migration was not included. The distinction for relevant and included sources within the dissertation was based on the applicability to leaders utilizing ACMTs. Many types of sources were referenced in the research, as shown within Section 3.2. And the sources/source types fell under the three categories

of industry data, case studies and CSP trends while further adhering to the specificity found with each main research question subpart.

3.2 Discussion of the Sample Used in the Study

Due to performing a qualitative study, nonprobability sampling is employed. Further specifics include utilizing purposive sampling and the further specification of theoretical sampling (Sekaran & Bougie, 2016). Triangulation of existing information to include- industry data, case studies and current cloud service provider trends allows for the practicality and efficient application of theoretical sampling to fulfill its goal of the exhaustion of unearthing new insights. There is a panacea of relevant sources/information that already exists, and this information has not been synthesized and collated to form a missing/larger understanding of the cloud industry with respect to best leadership practices in MNCs relating to ACMTs, and this missing view is integral to the many MNC organizations that have yet or have not had successful cloud migrations.

Industry data, case studies and current CSP trends were analyzed and referenced in the process of performing research on the stated purpose of this dissertation. Specific document types as referenced and analyzed within the research included conference proceedings, white papers, reports, published interviews, published surveys, operations manuals, specification sheets, trade journals, academic journals, industry blogs, think tanks, magazines, news releases, case studies and consulting collateral documentation. More than 120 total information sources were analyzed. A visualization of the document analysis and sources used is seen in Figure 7.

Figure 7. Sources Analyzed

3.3 Data Collection Procedures

The research conducted was a meta/document analysis utilizing the grounded theory on the triangulation of industry data, case studies and current CSP trends. A holistic viewpoint afforded by qualitative research and the abundant data available on cloud computing adoption allowed for the basis of inductive conclusions on cloud computing adoption via the use of ACMT best leadership practices for MNCs. As case studies were available specifically for ACMT use by

MNCs, or more generally ACMT usage case studies, these were explored. A further inclusion of research around innovation within MNCs, the history of cloud computing and its innovative origins, and the application of IT projects within companies/MNCs provided a rich data overlay of exploration. Surveys exist from industry and private organizations with regards to cloud computing adoption and its intricacies. Case studies exist with respect to organization adoption of cloud computing. Research exists on innovation within MNCs and in leading/fostering innovation within MNCs. There also exists information pertaining to current CSP offerings and trends can be synthesized. There further exists the ability to catalogue and categorize ACMTs to determine and create a resource which does not presently exist for this current time period. Thus, with existing surveys, observations, cloud computing industry data, and meta/document analysis, best leadership practices for MNCs utilizing ACMTs were derived and can be understood.

In determining answers for and locating relevant resources, a combination of search terms were used across the Purdue Library Portal, Google Scholar and Open Source Information (OSINT) as found on the Internet. The grounded theory acted as the sinew to connect research aims as the research was conducted. Upon the discovery of a new ACMT, redefining the proposed taxonomy, or categorization of ACMTs for this research, search terms were adjusted anew with focus on the new discoveries and resultant information provision. Search terms, listed in Figure 8, are an output of the results of data reduction. A comprehensive data display distilling researched ACMTs and their relationship to business objectives and leadership practices is visible within Section 4.1 (Findings).

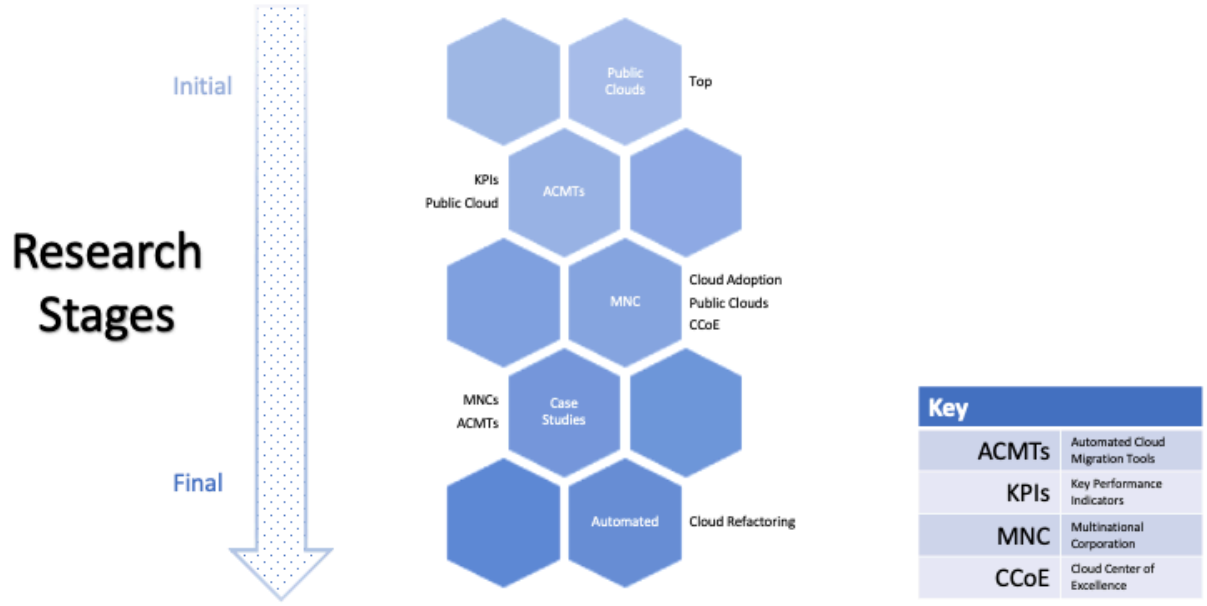

Figure 8. Search Terms Over Time

Note. Research over time yielded a narrowing of search terms that was closely marked to the guiding research questions. Search terms within the hexagon shapes were the primary word(s) used, followed then by different pairings with the words in black text adjacent to each respective shape. The projection following along the downward oriented arrow follows the filling of specific knowledge gaps as seen within the five identified research questions; the ability to build off of prior knowledge, observation, and document analysis; and finally culminating in the later stages of research for this dissertation.

As illustrated within Figure 8, a measured approach to research was conducted. The first search terms centered around identifying public clouds. Further stratification was then used by searching for 'top' public clouds. These results then lead to the understanding of the public clouds that were market leaders for their respective niches/shed light on public clouds that are utilized by MNCs. This answered subpart 1a of the main research question. Searches then segued into subpart 1b of the main research question to understand ACMTs for the leading public clouds (as found within 1a). More broadly, then, in the hopes of creating a taxonomy for ACMTs, a combination of search terms centered around ACMTs, to include efficacy in evaluation links to key performance indicators (KPIs) and in association with public clouds, was performed. Here it was found that there are ACMTs that are platform agnostic and unrelated to CSPs.

A main focus (aligned with subpart 1c) was then employed centering search terms on MNCs and in finding, when able, case studies of the ACMTs that had been identified previously. Where ACMTs where the main focus of previous research thrusts, search terms were modified to have

MNCs being the focal point. It was important to thoroughly search from different key terms to uncover available data and information, as the difference in perspective regarding the use of ACMTs makes for the information results to be presented distinctly (perspectives on ACMTs can be from the ACMT provider, the organization utilizing the ACMT and research on the intersection or separation of each of the aforementioned). A mixture of search terms centered on MNCs and ACMTs specifically, as seen within the hexagons within Figure 8, led to the ability to categorize (subpart 1d), analyze and present (subpart 1e) leadership best practices; for the study of successful case studies uncovered relevant data as needed to provide actionable leadership insights. Following Figure 8 will uncover the sources shown within Figure 7 and by using the five subparts of the main research question, the distillation of information uncovered will generate similar conclusions with respect to identifying the best leadership practices of MNCs in the use of automated migration tools for the adoption of commercial cloud computing platforms.

The relevance to utilizing the Purdue Library Portal, Google Scholar and Open Source Information (OSINT) as found on the Internet in the targeted research approach, was intentional. Currency, credibility and replicability of research were all cogent going concerns leading to their respective search utilization. Further, as gateways to varied information source types, these three platforms (Purdue Library Portal, Google Scholar and OSINT) were capable of providing the many data points/publications that can answer to the triangulation thrusts of industry data, case studies and CSP trends. Moreover,

3.4 Data Analysis Procedures

Data analysis steps followed the path of qualitative data analysis to include data reduction (categorization and identification), and data display (Sekaran & Bougie, 2016)- being employed via Figure 9, showing aspects of and differences of ACMTs which allowed for the determination of the most advanced ACMT (also including here the conclusions being drawn as the most advanced ACMT is selected). Data reduction was then used for leadership practices utilizing the identified advanced ACMT and then displayed as 'best leadership practices' centered around business objectives (Figures 18-20).

Identifying ACMT usage and its effect on business defined objectives was cross-referenced from various sources to include the cloud service provider that owns the ACMT and, when available, through publications directly related to the target company that utilized the ACMT. Using, then, data reduction, data display and derived conclusions were the logical steps for protocols employed in analyzing data in this research dissertation.

3.5 Presentation of Findings

The findings in this dissertation are centered around best leadership practices. Where graphics are present, the visual representations allow for MNC leaders to quickly understand the concepts derived therein, while also creating a platform for discussion, dissemination and applied use on the cloud migration journey utilizing automated migration tools. The best leadership practices can then be loosely mapped to three general categories, based off of their intent, i.e. awareness, impact and actions. Section 4.1.4 describes the definitions and implications of each of these categories. Figure 9 is a graphical representation of answers to the research question subparts of 1a, 1b, 1c, and 1e. Research question 1d is then subsequently displayed and the relevant findings presented in the following sections of Chapter 4. Chapter 5 is for discussion, and Chapter 6 for conclusions.

CHAPTER 4. FINDINGS

4.1 Analysis of Findings by Research Question

4.1.1 Identify Leading Commercial Cloud Computing Platforms Utilized by Large Multinational Corporations (1a)

MNCs utilize big public clouds such as AWS, Azure, Google Cloud, Oracle, IBM, and Alibaba. Public cloud usage can also be thought of and categorized by cloud service offerings (SaaS, PaaS, IaaS). As examples of SaaS, other public cloud players that emerge are Adobe, Workday and SAP. A few other hybrid cloud providers, when segmenting by cloud deployment type, are Dell Technologies, VMware and HP Enterprise. A further breakdown of public cloud providers sees differences in what can be termed as niche cloud players, those potentially focusing just on the SaaS vertical, like Carbonite and data backup; and public cloud integrated network ecosystems with built-in marketplaces, comprehensive cloud deployment models, and service offerings like Microsoft with Azure and AWS. Another means of differentiation is that of cloud platforms that are designed with multi-cloud strategy capabilities and functionality, like that of Google Cloud with management controls and visibility that welcomes a multi-cloud organizational cloud composition. Further, public cloud platforms can be segmented by geographic power projections, such that a cloud like Alibaba is uniquely positioned to service the mass market of China (Alibaba Cloud, n.d.c). There can be other local players in different regional markets (IT Convergence, 2019a, 2019d), like in South Korea (Wong MNC Center, 2019). Moreover, the type of applications and workloads that the clouds process can serve as a further differentiator, like the penchant for IBM to be known for running critical work applications (IBM Cloud, n.d.a). Whether it be service, deployment, solution-offering, multi-cloud friendly, geographic or industry specific focused (PR Newswire, 2013), the public cloud market is diverse, deep and fragmented reflecting the greater organizational constituency that adopts and uses its services (cloud offerings).

4.1.2 Identify and Develop a Taxonomy to Categorize the Cloud Migration Tools Utilized in Their Adoption (1b)

While the cloud is not new (see Chapter 1 and Chapter 2 for context), the means of getting an organization to the cloud or bringing the cloud to an organization is undergoing a shift in operational trends from a predominately manual migration line of effort to one including facets of

automation. What used to take months or longer, with a higher level of error when performed manually (over 60% failure (CAST, n.d.)), now takes days or mere minutes. More data is now readily available for decision makers involved in the cloud migration. With more data, comes greater decision points of the migration process, and new and increased analytics for the migration (Cloudamize, n.d.). A cloud migration also does not end at the assessment of the organization for cloud readiness, adoption, or even execution. Two reasons for this may be that the organization is continually assessing infrastructure or assets (aka applications and workloads) to go to the cloud; or that mergers, acquisitions, or new markets become available for organizational penetration thus bringing the need for cloud assets in the form of service offerings, deployment models, or in previously assessed not to be migrated applications now needing to move to the cloud. It is clear, that the cloud is a platform for continual process improvement and innovation requiring ongoing management and automated tools (see Figure 9). These tools can take the form of 'right-sizing,' cost optimizing, and recommendations for future cloud innovations adoption/cloud posture restructuring.

Three areas of focus- initial, execution, and post- were determined to be appropriate as a means of taxonomy for consideration for automated cloud migration tools. Figure 9 shows this breakdown. Further, additional informational data sets were important to marry with the three phases as just identified. This includes the provider type of the migration tool, and the posture for cloud integration (supporting/of a multi-cloud organizational deployment). Clouds largely breakdown between 'all-in' sticky ecosystems (like an AWS), or clouds with the assumption of and makeup for multi-cloud operability and functionality as used by the end consumer (like Google Cloud). Cloud integration or the nature of acceptance for and support of the multi-cloud narrative is segmented between migration tools, thus offering insights into the best cloud solutions and the management tools that operate on, for and with multi-clouds.

The provider type, as aforementioned, is a critical piece of the puzzle to help understand the insights and recommendations that the migration tools offer. Is the leader performing the cloud migration getting best-in-class solution offerings mapped to their business needs (Plus Company Updates, 2019) and existing infrastructure, or simply the best-option-that-still-stays-within-the-cloud-ecosystem? A pertinent example may be that of a cloud agnostic tool that can provide

different cloud recommendations for organizational applications and workloads (which may cost to use), and a CSP migration tool (often free) that is tied solely to what options the CSP possesses. A provider type, though, is not all encompassing with the scope of its offerings. Remaining questions regarding limitations and uncertainty around a cloud agnostic approach will be addressed in later Chapters 5 and 6.

4.1.3 Analyze Case Studies Where the Most Advanced Migration Tools Have Been Employed (1c)

Business objectives and best leadership practices of MNCs were mapped from case studies that were uncovered during research. Case studies were prevalent and available for MNC cloud adoption. Various sources, such as successful cloud migrations as directed by consulting firms, in addition to case studies from the identified ACMTs were included. A specific mapping to MNCs and their use of ACMTs presented in a comprehensive taxonomic framework did not previously exist, and is the gap that this research begins to fill. As such, in order to gain perspectives of MNC cloud adoption case studies, critical insight was gained from following the research activities as seen in Figure 7, and in the directed grounded theory based document analysis shown via search terms in Figure 8. Broadening the scope of relevant, contextual and useful case studies was pertinent. Best leadership practices with corresponding respective visual graphics are to follow. Research findings uncovered that many ACMTs researched and profiled within this dissertation were very close in terms of level of automation and advanced capabilities. These similarities allowed for further applicability of case studies from varied ACMTs and in the informing of best leadership practices.

4.1.4 Categorize Leadership Best Practices in the Most Successful Migrations (1d)

The leadership best practices fall into three broad categories: those centered on awareness, impact, and actions. After the final of the five questions below is addressed, the findings for the leadership best practices within each of these three categories are highlighted. These categories are loose constructs, wherein, multiple of these identifiers can be applied to the various identified practices. Generally, the definitions of each of the categories are as follows:

1. Awareness: How a leader within an MNC should think, consider and conceptualize the information provided/insights given by ACMTs.

2. Impact: Building on awareness, impact delves deeper into the secondary and tertiary (often considered strategic outlook) effects of cloud and how change will be an inevitable (and welcome) part of the cloud journey. The cloud, as a gateway, is the beginning for an organization on the path past modernization to market leadership, business dynamism and strategic agility. ACMTs serve as a marker along a transformative path that impacts the entirety of the organization.
3. Actions: Decisive steps that leaders can take to bring the cloud to the organization and increase chances of a successful cloud migration. Whereas bringing the organization to the cloud can be considered as accepting standard cloud configurations, bringing the cloud to the organization signifies choosing the best parts of the cloud and tailoring the cloud migration and cloud service offerings to the organization.

Ultimately, successful migrations are those in which the business meets defined business objectives or agreed upon key performance indicators (KPIs). Assessing what success means for the cloud is itself a continually evolving process. As the organization begins to internalize cloud principles, gaining access to greater information and tools in which to make the information palatable, consumable and actionable, success (and the goals anchored along with its meaning) adapts and updates to the present and future organizational circumstances.

4.1.5 Analyze and Present the Best Practices by Goal for Adoption Including Business Innovation, Market Leadership, Cost Reduction, and Speed to Migration (1e)

The following figure, Figure 9, maps business objectives to the various identified taxonomic elements of ACMTs. The corresponding importance of identified elements of the ACMTs each present pertinent considerations and markers for leaders with which to assess the cloud migration journey.

Figure 9. Automated Cloud Tools Stop-Light Chart

Note. An x in inside the cell means that the specific tool within that row has that identified capability/functionality. The stop-light nature of the chart uses the three colors of red, yellow and green to show a measure of visual ranking to determine the most advanced ACMT. The key shows further the criteria for how each color was awarded to each tool. It must also be noted that due to the rapid change in developments in cloud offerings, this list is not to be considered exhaustive or perpetually current. A leader will be required to continually assess the cloud ACMT market for new entrants, capabilities and possibilities. This graphic is, however, a benchmark for understanding how business objectives map to ACMT functionality.

Figure 9 continued

Provider	Provider Type	Cloud Integration	Initial	Execution	Post
	Scope	Supporting Multi-Cloud	Automated Cloud Readiness Assessment	Automated Workload Adjustments	Management & Monitoring
CAST	Migration Tool	x	x		
Cloud Technology Partners	Migration Tool	x	x		
Cloudamize	Migration Tool	x	x		x
Device42	Migration Tool	x	x		x
LTI	Migration Tool	x	x		
Micro Focus PlateSpin Migrate	Migration Tool	x	x		x
Tidal Migrations	Migration Tool	x	x		
CloudCheckr	Management Tool	x			x
Densify	Management Tool	x			x
Dynatrace	Management Tool	x			x
Turobnomic	Management Tool	x			x
AppDynamics	M&M Tool	x	x		x
Cloud Hedge	M&M Tool	x	x	x	x
Corent SurPaaS	M&M Tool	x	x		x
hystax	M&M Tool	x	x		x
Txture	M&M Tool	x	x		x
Alibaba	CSP				x
AWS	CSP		x		x
Azure	CSP		x		x
Google	CSP	x	x		x
IBM	CSP	x	x		x
Oracle	CSP		x		x
Deloitte	Consultant	x	x	x	x
Business Objectives	Transparency	Multi-Cloud Strategy	Organizational Readiness Benchmark	Workload Optimization: Cost and Time Savings	Access to and Compatibility with Future Innovations
	Insight Into Partiality of Recommendations	Best-In-Class Solution Availability	Identified Workloads for the Cloud	Fewer Resources Required to Reach the Cloud	CPI: Master Cloud Visibility, Holistic Strength Synthesis
		Solutions Tailored to Industry/Geographic Location	Migration Prioritization	Eliminates Skilled-Professional Bottleneck	
			Migration Expectations/Heuristic Migration Success Rates		
			Workload Migration Recommendations		
			Service Offerings Comparison		
			Key		
				1-2 criteria	
				3 criteria	
				4 criteria	
				CSP	Cloud Service Provider
				M&M Tool	Migration and Management Tool

Two providers above, Cloud Hedge and Deloitte, show that they meet all four criteria for being awarded a green rating (color). The key differentiator here, which became evident across research as seen in Figure 8 with key search terms, was the ability to re-write applications to be cloud native. This is an involved process that usually requires a high-level of technical expertise and can be considered to be 're-factoring' an application. Re-working critical business functions is needed to address growth in cloud computing, clamor for organizations to onboard to the cloud (Bourne, 2020b), and legacy infrastructure/applications/workloads that were written before the cloud/are not optimized to run in the cloud (or considered what is cloud native). Types of migrations to the cloud are referenced as either the five, six or seven R's (Ahmad et al., 2018; Chambers, 2018; CSCC, 2018): re-host/repost, re-platform, refactor, repurchase, retain, retire. Depending on the person using the terms, the definitions vary slightly. The main understanding needed for an MNC leader is that an existing application can be fully moved to the cloud without any changes, modified only slightly, or completely refactored to be cloud native and optimized for the cloud. Some assets/applications as seen with the list of Rs will no longer be necessary, and will thus be retired or repurchased entirely as cloud native. Due to the definition of refactoring being technically complex, this was the standout point for maxing the valuation of the ACMTs in Figure 9.

As it is accepted that there is a lack of skilled cloud professionals, not just perhaps within an organization (IT Convergence, 2020b; Software World Intelligence, 2018), but also in the technology marketplace (Bavare, 2017; IT Convergence 2020d), alleviating the skilled worker bottleneck through the automation of applications is a welcome and also advanced capability. Considerations, however, arise relating to what current applications can really do with their automated refactoring of applications (Borges et al., 2018). Is the refactoring limited to certain coding languages? Does it only work on certain application structures? Is the refactoring limiting to a certain cloud architecture and therefore potentially a new victim of vendor lock-in? These questions are explored further within Chapter 5 and Chapter 6.

4.2 Per Best Leadership Practices of MNCs

This section discusses the research derived best leadership practices of MNCs. The leadership practices are linked to the three categories of being based on the principles of awareness, impact and action. The practices, however, may be relevant to more than one category. The three

categories (awareness, impact and action) help to align MNC leader conceptualization of the usefulness and realized utility of ACMTs in the public cloud adoption journey.

4.2.1 Awareness

Leaders within MNCs must have an understanding of the context of the cloud including what the cloud can offer and the components of a migration. Specifically, this section discusses implications of cloud offerings and components of a migration for ACMTs.

4.2.2 Fragmentation of Cloud Migration Market

With respect to ACMTs, a migration has an assessment phase, the execution phase, and then the management phase. As an MNC may find themselves at any of the three stages at any time, they are not stages which are ever fully 'complete' in the sense that the continuous process improvement mantra bore out by the cloud is one that seeks to continual updating, improvement and assessment of business architecture (Bourne, 2020a; Filatov, 2019). This can be thought of as future-proofing or rolling with innovation. The cloud, as a gateway to inventions such as AI and ML, means there are new ways of assessing data, storing data and acting upon data. Leaders knowing where the organization is within the cloud migration market serves as the beacon for where to focus attentions and for how to interact with presented information sources in order to make informed decisions.

Mergers, acquisitions or new business opportunities present themselves to MNCs. A leader can utilize their current state (whether the organization needs to assess readiness for migration, execute a migration or manage their cloud) and gain necessary insights from ACMTs for making practical business objective driven decisions by choosing the right ACMT. ACMTs, by their nature of being an analytic tool, can be reused or actively deployed to maintain organizational currency with regards to assessment/readiness and optimization posture. There will always be changes to be had, with the presented examples representing a few that MNC leaders face. Figure 10 provides a visual for the three identified ACMT phases of assessment, execution and management.

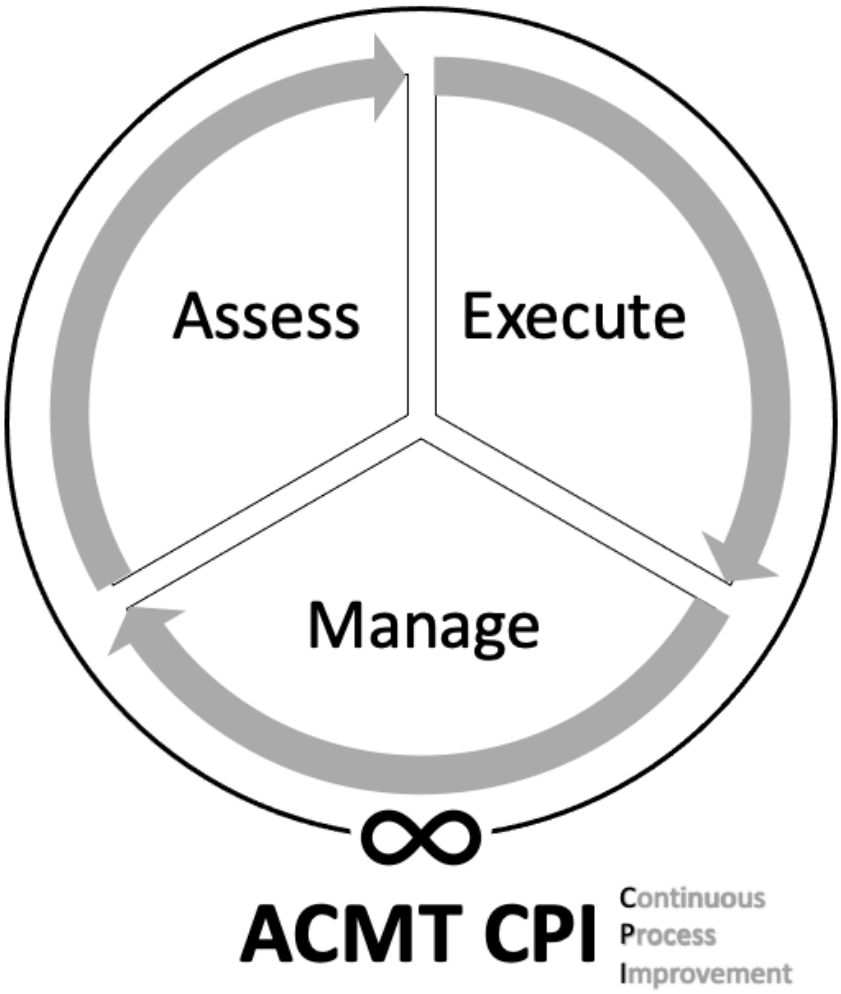

Figure 10. ACMT Phases

Note. ACMTs can be utilized at any time. The infinity symbol represents that the need for optimization as seen through the use of the different types of ACMTs, is perpetual. Organizations can continually hone their competencies to improve their leading strengths and also to identify and correct deficiencies or weaknesses. In the pursuit of market leadership and business success, the functionality of ACMTs, and understanding which phase/category of ACMTs to use, is a valuable skill for leaders.

4.2.3 Automation Capabilities of Tools

When discussing assessing, executing or managing the cloud/cloud migration, ACMTs are capable of performing various functions. Considering ACMTs and any part of the cloud migration as a type of 'black box' (wherein only the output or end state matters) proves counterproductive to making the best decisions with the most information. This concept of transparency is highlighted in future practices that follow. The black box concept, where one uses a tool without understanding how or why it works, can lead to misguided decisions or a lack of strategic visibility on secondary

and tertiary consequences. A good example is using a cloud agnostic ACMT versus an ACMT provided by an 'all-in' sticky ecosystem such as AWS. Does AWS provide for the best-in-class available solutions for each specific organizational application, or simply the best that AWS provides?

Armed with questions and insight into the data that ACMTs provide, leaders can make better actionable decisions. What should be migrated, how it should be migrated, and what should be prioritized are a few of the insights gained under the assess phase when utilizing ACMTs. The execution phase covers actions that the ACMT can take regarding application readiness/refactoring in order to be better optimized for the cloud. The management phase can find synergies with existing cloud products, provide optimization suggestions, and realize concrete financial savings (Densify, n.d.a). One ACMT has stated, that since inception, it has saved its clients over $100 million dollars with their client's cloud migrations (Cloudreach, 2017). Figure 11 depicts a finer granularity for leader awareness of ACMT actions.

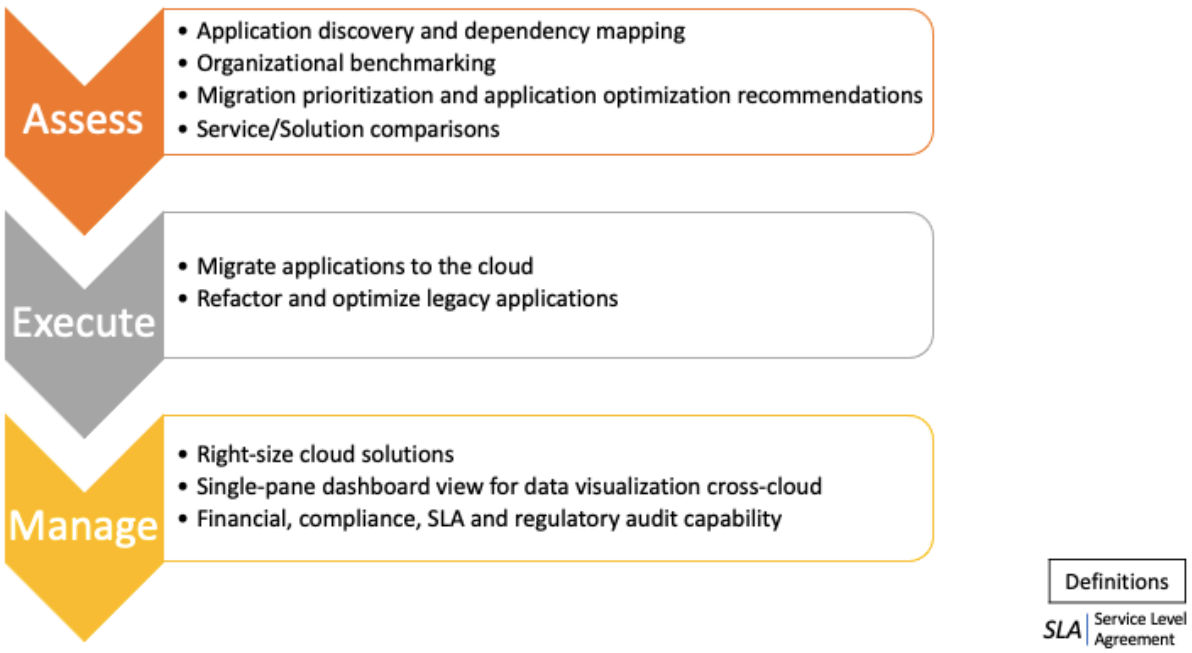

Figure 11. Capabilities of ACMTs

Note. Knowing available capabilities allows leaders to manage expectations, direct decision making, and act with clarity. Each phase of the automated cloud migration journey provides value. When leaders map their business objectives to value additive actions, the organization, albeit a subsidiary or parent company headquarters, achieves synergy and cloud success.

4.2.4 Is the Organization Ready for the Cloud?

Two types of readiness statuses stand out for MNCs: moving existing infrastructure/applications to the cloud or building out new capabilities. Captured in an easy to remember saying, this can be closely related via the mantras of either ‘cloud smart’ or ‘cloud first’ (PR Newswire, 2020e). Cloud smart can be mapped as applying to bringing applications to the cloud that do not already exist. Cloud first assumes starting with solutions that already exist in the cloud. Figure 12 shows this differentiation, using more nuance and including the nomenclature of legacy and new. The legacy versus new inflection decision criteria can be based off of either retiring old applications in favor of new cloud native applications, entering into a new market, or building a new capability and starting within the cloud. Considerations for leaders vary around the strategic horizon for future business capabilities (Gulati, 2021; IT Convergence, 2020a). In identifying the direction of the organization and the organization’s reaction to internal and external forces upon it (e.g. internal such as forecasted demand or external as in political/environmental considerations), the forces shape the organizational cloud readiness decisions in the present (Biswas et al., 2018). With knowledge of the type of decision to make, an organization with a clear path has an increased chance at finding success utilizing the cloud for business objectives.

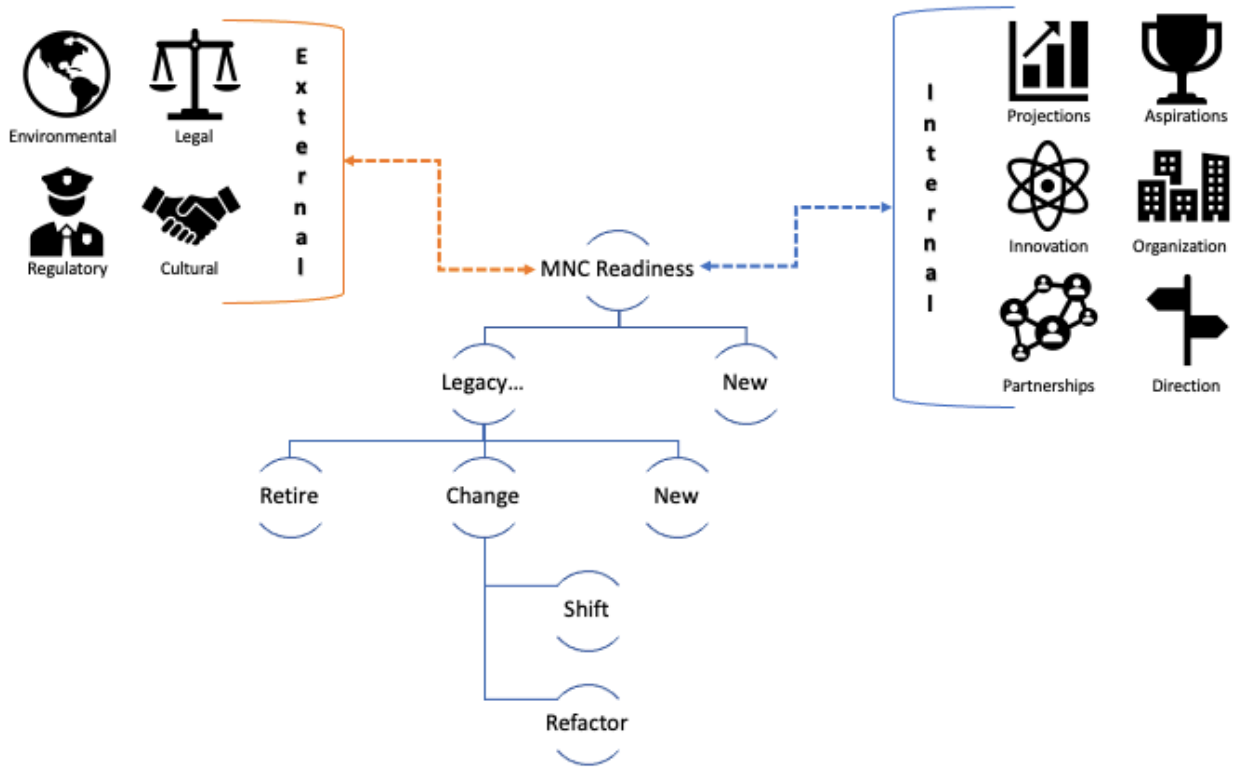

Figure 12. Leader Assessment of Organizational Readiness

Note. Through the lens of ACMTs, this figure captures various external and internal forces leaders must consider when assessing organizational readiness for the cloud. If an organization is looking at existing applications (legacy), recommendations from an ACMT may include whether to retire the application, make changes to it and continue to use it in the cloud, or start with something new entirely. Business critical applications may be one example of something necessitating cloud optimization and retention. A better solution may exist already on the cloud, and this would represent going from the legacy beginning to a new solution selection within the decision tree framework as shown. When entering a new market, such as China (Infosys, n.d.), an MNC may need to build completely new solutions/applications (Deloitte, 2019c), and would start new (per the chart). The external factors illustrated each play an important part when making assessments on ACMT recommendations: environmental for sustainability initiatives, legal for governmental policies, regulatory for industry specific regulations, and cultural for host nation and parent company nation sensibilities and manners of doing business. The internal factors can both relate to a subsidiary or parent company headquarters: financial projections, aspirations for market leadership or niche specific competition, innovation for and in the use of new technologies (Contify Breaking News, 2020), information/knowledge transfer ideas within the organization, organizational leadership structure of the MNC (Tripathi, 2017) and subsidiary relationships with the headquarters, partnerships within the supplier network and business partners of the MNC and organizational direction/strategic outlook. As the internal and external factors change, MNC leaders must also adapt their readiness assessment and resulting decision tree for what decisions provided by ACMT recommendations are best to act on (Mitra et al., 2014).

4.2.5 Decision Gateways for Leaders

From a macro-perspective, the decisions a leader must make for cloud migrations spell the acronym ‘IDEA.’ The I.D.E.A. framework:

- **Identify** business objective(s)
- **Decide** the ‘which, how, how’
- **Evaluate** cloud key performance indicators (KPIs)
- **Analyze** cloud KPIs

The I.D.E.A. framework is shown below in Figure 13.

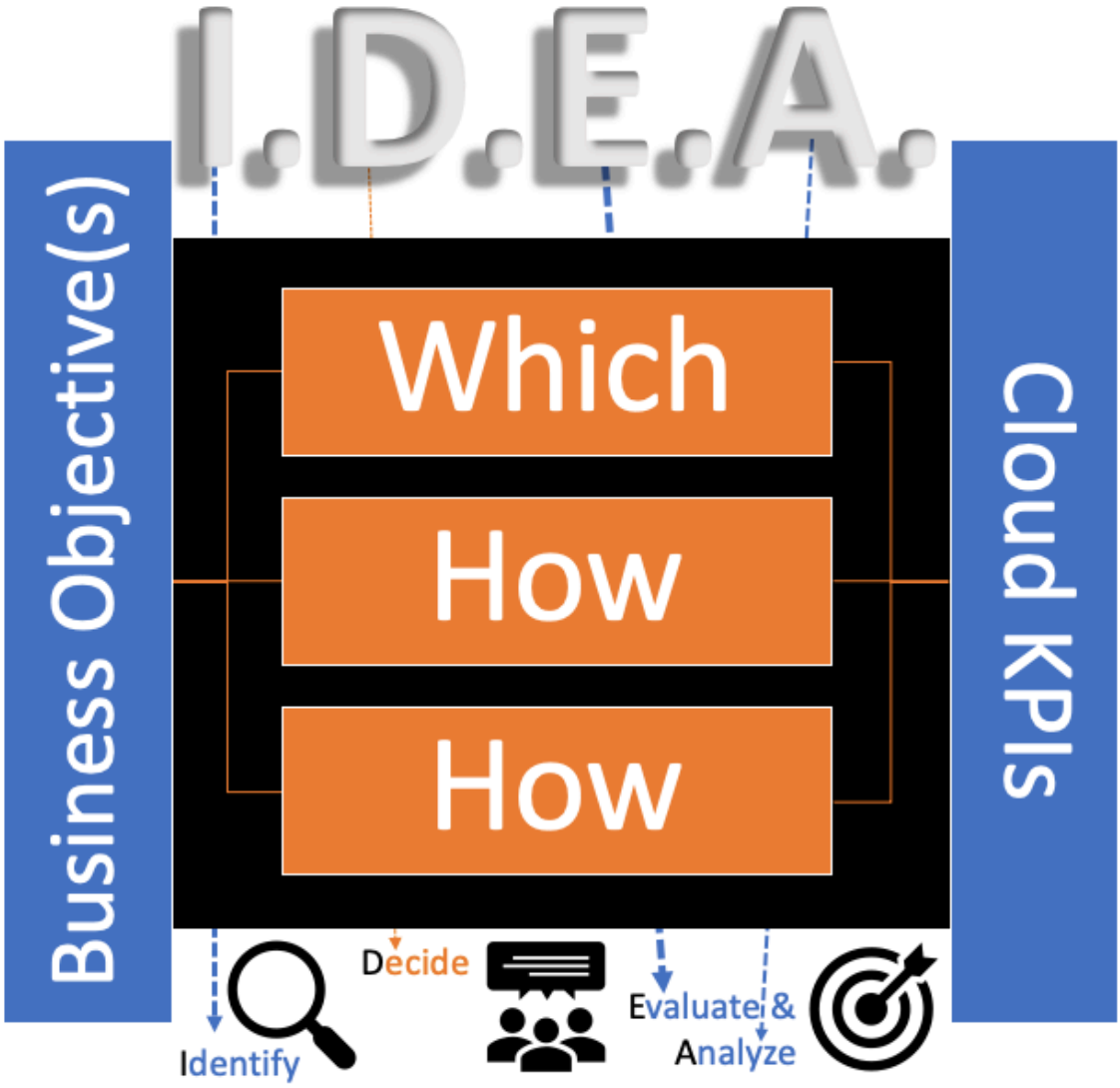

Figure 13. I.D.E.A Framework

Note. Successful cloud migrations occur due to proper planning and identification of why the organization wants to move to the cloud. Identifying business objectives is crucial. Next, a leader can use the 'which, how, how' model within the I.D.E.A. framework to make important migration decisions: *which ACMT* to use, *how* many opinions to solicit before feeling comfortable with the decision, and *how* to complete the cloud migration (should the organization retire applications not fit for the cloud, revamp existing applications to be cloud friendly or purchase new cloud native applications). Finally, selecting proper evaluation mechanisms for the cloud migration is paramount. This takes the form of cloud specific KPIs. Evaluating and analyzing KPIs serves as the compass for the ongoing progress/success of the migration. A few examples of cloud specific KPIs (ClourdCheckr, 2017): customer satisfaction (application latency and conversion rate), governance (cloud visibility), automation (resource optimization), migration costs (management time, cost of training) and agility and performance (service availability, project turnaround times)

Why is the I.D.E.A. framework necessary? Leaders, especially within MNCs, often occupy a strategic position. Easily understandable frameworks enable leaders to provide the necessary executive sponsorship that cloud migration projects require. Thinking within the I.D.E.A. framework keeps relevant decision points front and center.

A deeper dive into the 'which, how, how' model is now necessary, as leaders have important considerations within this critical piece of the I.D.E.A. framework. Regarding the *which*: will the ACMT be one provided by a company that only offers its own platform solutions (AWS, 2017), or one that is cloud agnostic and provides many different options for service mapping and comparisons? How many opinions, requests for information and interactions, will leaders make until they are satisfied with their decision and the information at their disposal? Some MNCs find that after an initial cloud migration, they are better suited for a different cloud provider and subsequently switch clouds (and perform a cloud to cloud migration) (Google Cloud, 2020; Oracle, n.d.a). The second *how* of this framework relates to the technical specifics of application migrations (Bavare, 2017; CSCC, 2018), and these specifics should match with organizational vision and the external and internal factors discussed within Figure 12.

Differences in the decision process related to a cloud agnostic ACMT or that of a cloud specific tool can be related to cost (free for a cloud specific ACMT such as AWS) and infrastructure/application matching strengths (CloudAtlas, n.d.; Network World, 2012). Not all clouds are the same (Oracle, n.d.b, n.d.c), and not having visibility to potentially better application possibilities could mean needing to migrate from the present cloud to another one later down the road. An improper cloud fit at first migration/selection flows directly into the question of how many opinions MNCs should solicit when migrating to the cloud. Factors that come into play for this decision matrix that could be provided to a leader would be cost/budgets, resources available (employees and expertise), time and urgency (Preimesberger, 2018). How applications and workloads are migrated may be considered and decided based on security concerns (Dataquest, 2016; Leong & Gittlen, 2011; Networks Asia, 2016), current/existing application portfolio, and existing partnerships (supplier interoperability).

Finally, a quick note on evaluating and analyzing cloud KPIs. It is important that careful consideration be given for the KPIs selected for assessing the cloud migration. Moreover, a cloud migration may not have immediate effects, as a migration may occur over a measured timeframe. A cloud migration is unlike a traditional information technology project, which will be discussed further on in Section 4.3.1. This means, that, traditional criteria for evaluation and timelines for expected progress/results are distinct from a simple 'information technology upgrade.' For these reasons, be certain, as a leader, to approach the cloud migration with caution and deliberate care in assessing KPIs and expected timelines.

A leader, to become informed and make an educated decision upon cloud migrations, need only think of an I.D.E.A to bring clarity and quality assurance in making the best decision possible for the migration for the organization.

4.2.6 Levels of Understanding

For the amount of information and presentation format (visualization) afforded by ACMTs (Gannon, 2019; White, 2020), a logical conclusion would be that, overall, a leader requires less cloud understanding, for the ACMT provides everything that there needs to be known with the cloud migration (Froehlich, 2017). The opposite case, however, tends to be true for cloud migrations generally and with ACMTs in particular. A more informed leader will make a better cloud migration decision. ACMTs alone cannot be used as a crutch by leaders to assure cloud migration success or as a definitive source by itself for cloud migration knowledge. An ACMT is a tool, not a singular point of emphasis in a decision process. Moreover, knowledgeable leaders will have an easier time working through roadblocks that may arise, and in understanding how to pivot decision making to adapt to changing circumstances (Cloudsine, 2019). As an example from MNCs, a leader who may be transferred to a new subsidiary in a new country may not have experience working with and living in that target culture. Reading a book on the culture is no substitute to being present and immersed within the country. A book, like an ACMT, is a tool that helps aid in the decision making process of leaders tasked with the cloud migration. The strategic positioning, available organizational resources (Jamshidi et al., 2013), and political climate of the MNC are all factors that further relate to cloud migration decisions. Increasingly, an MNC must consider its consumers (e.g. consumer access to or utilization of the internet) and if there is

available infrastructure (Networks Asia, 2018) in the local area to support the cloud. Though an over-simplification, the crux of being informed does equate to a more successful cloud migration. This seemingly innocuous but important distinction on knowledge accrual and leadership understanding is necessary for a successful migration. Figure 14 captures this knowledge paradox that although an ACMT provides ample information, more information is still needed as ACMT output cannot itself be relied upon alone.

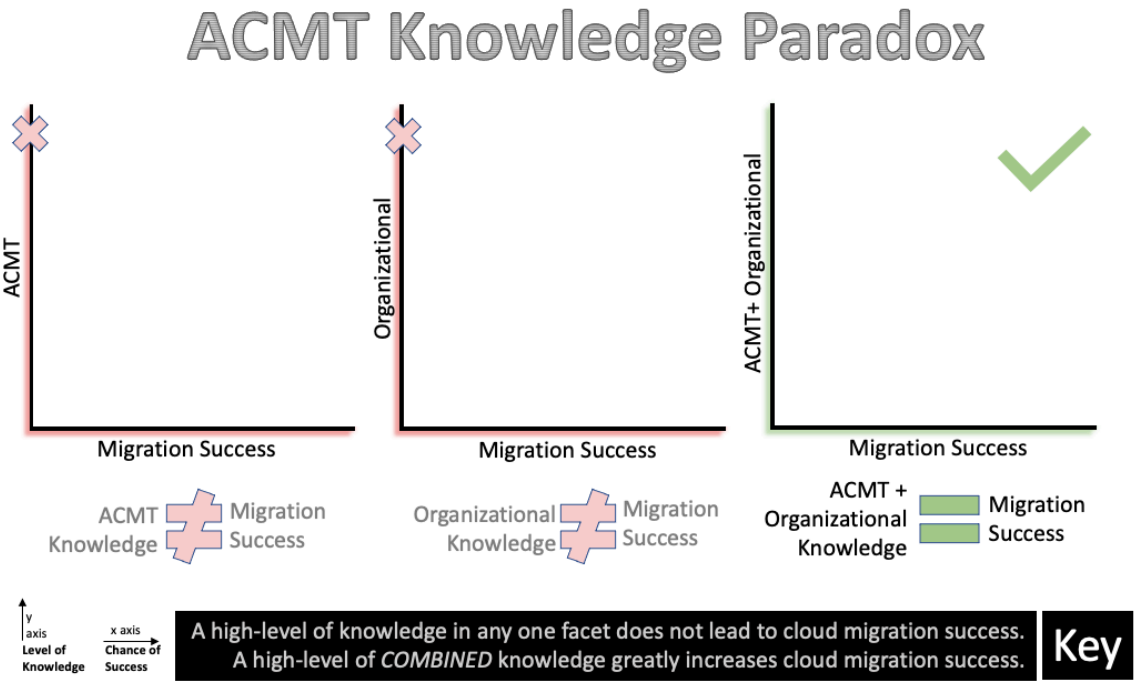

Figure 14. The Knowledge Paradox of ACMTs

Note. The y axis represents the level of knowledge and the x axis represents chances of cloud migration success. High levels of knowledge, respectively (that is, mutually exclusively) from just an ACMT or just on an organizational level lead to low chances of cloud migration success. When a leader possesses combined high levels of knowledge, from ACMT(s) and of the organization, the chances of cloud migration success are greatly increased as seen in the far most right graph.

4.3 Impact

The following leadership best practices follow the auspice of impact, putting context into the framework of how the cloud will change the organization. Along with impact comes how best to manage the newfound change, harness business agility, create strategic alliances, and identify cloud synergies.

4.3.1 Cloud as a Change Agent

A common narrative for the cloud is that the cloud cuts costs (Alibaba Cloud, n.d.a; Galov, 2020; IBM Cloud, n.d.a; Qasem et al., 2020) and is essentially a tech upgrade for existing information technology systems. The failure in this thinking is how the leader views digital transformation (Rogers, 2019) and the role of information technology. Tying the cloud into the innovation and transformation aims of the organization (Deloitte, 2019a) is a deliberate action that leaders must take for a successful cloud migration. A counterproductive view, however, that still exists is that the cloud is merely a form of an information technology upgrade and as such is a peripheral matter or simply a conduit of innovation (Bourne, 2017b) and not central to innovation itself. The latter misguided view, often seen in the information diffusion of the cloud paradigm, is one harbored by those who have not undergone a cloud migration (digital transformation) thus misidentifying the opportunities that the cloud represents. Figure 15 shows both views side by side.

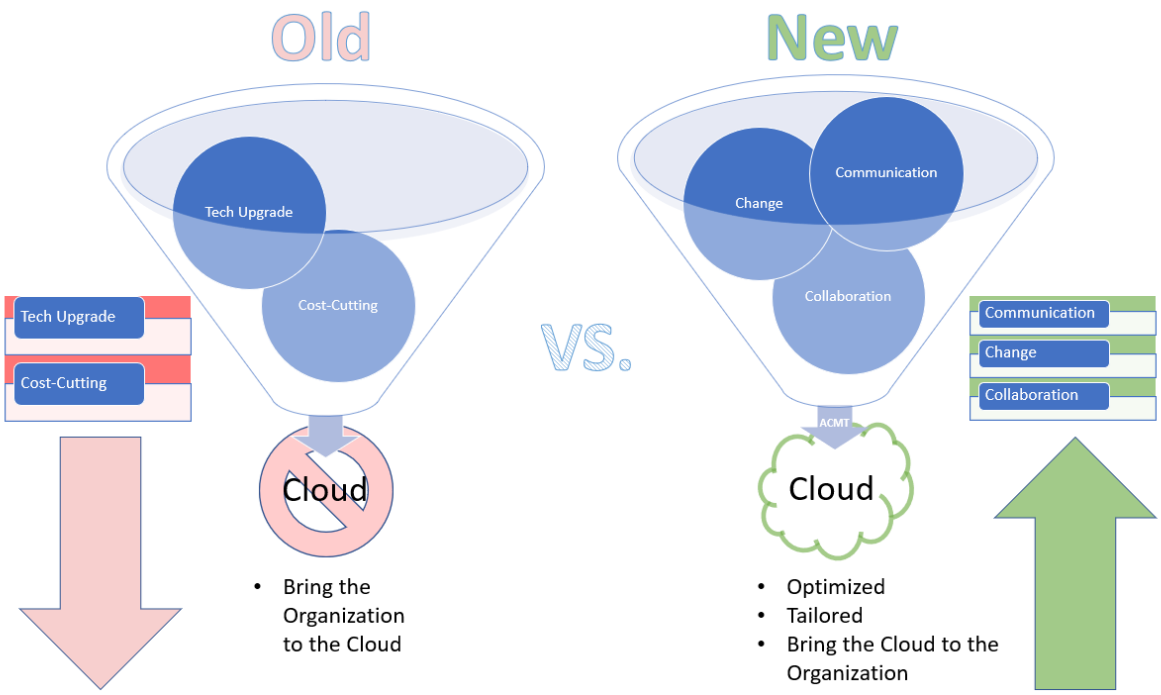

Figure 15. Cloud as a Change Agent

Note. The cloud, under the new paradigm of thinking, captures intangible qualities, the likes of communication, change and collaboration; this is different to the old manner of thinking wherein the cloud is simply a means to an end. The big difference is how, through advanced capabilities, ACMTs can provide the best possible cloud solutions tailored and optimized to the organization. The old way of thinking was simply moving the company to the cloud to ostensibly 'upgrade tech' and 'cut-costs.' When viewed as a change agent, the cloud, as discovered and mapped to and for the organizations with ACMTs, changes the core cultural components of the organization. Consideration for and appreciation of this distinction in thinking, for leaders, is important.

Successful cloud migrations affect the entirety of the organization (Tripathi & Nasina, 2017). Inviting constant change into the organization as a new cultural precept is one outcome of the cloud. The cloud, a gateway to information (Blanchard, 2019) and tools previously inaccessible or yet to be invented (e.g. edge computing, ML, etc.), affects people, processes, and technology. Viewed statically and not holistically, cloud efforts could be stymied by employees, cultural inertia, or learned helplessness (Cooney et al., 2020). Prepared for change and armed with the understanding that the cloud unlocks new business potential and is a changing paradigm for business continuity (PR Newswire, 2020a) and operations, leaders are better equipped to sponsor organizational change initiatives that remove roadblocks to welcoming the cloud to the organization. The cloud, when viewed as a platform for the new normal for business functions, maximizes cloud solutions and provides continued access to powerful business tools in analytics (Densify, n.d.b), processing and market leadership. ACMTs, with the provided recommendations

for application portfolio optimization, answer to this new paradigm of change. A leader accepting of and aware of the incoming change will view the recommendations provided with proper gravitas. In essence, ACMTs act as the conduit for organizational change.

4.3.2 Quick Recommendations Are Not Quick Actions

ACMTs often advertise and deliver on the promise of time savings (Wani, 2020). What was once a manual task taking months or longer can now take minutes. Complex inventories and baselines of organizations replete with dependency mapping is as easy as running software on your network. ACMTs can assess compatibility with 25 million different potential cloud configurations and over 1 billion data points (Cloudamize, n.d.). Migrations are also fast due to the different options for getting data and applications to the cloud, and the tools that assist with migrations. Having information fast, however, does not make a leader's decision easier or faster. Leaders must weigh the information provided from ACMTs and move with a measured pace. Organizations often refer to a minimum viable cloud (MVC) (HPE, 2019) concept that is married from agile development concepts of a minimum viable product. The MVC is an operational version of organizational adoption/applications in the cloud that is not unlike putting one's toes in water to test the temperature. The same can be done for an organizational cloud migration, wherein applications are moved piecemeal with caution. ACMTs increasingly assist with statistics on the likelihood of the viability for an application's successful migration to the cloud, and which applications and workloads to migrate first. With the encompassing change the cloud delivers to an organization, a measured approach is often the appropriate decision to ensure compliance, organizational buy-in, and the functionality of different services/products of the MNC that are critical components/business functions. Immediate action on migrations may have counter-intuitive affects contrary to business objectives. Some organizations have had to roll back their cloud migrations and experience business interruptions that otherwise would have been mitigated by a slower cloud adoption process. Figure 16 shows the balance needed between getting information fast and making fast decisions.

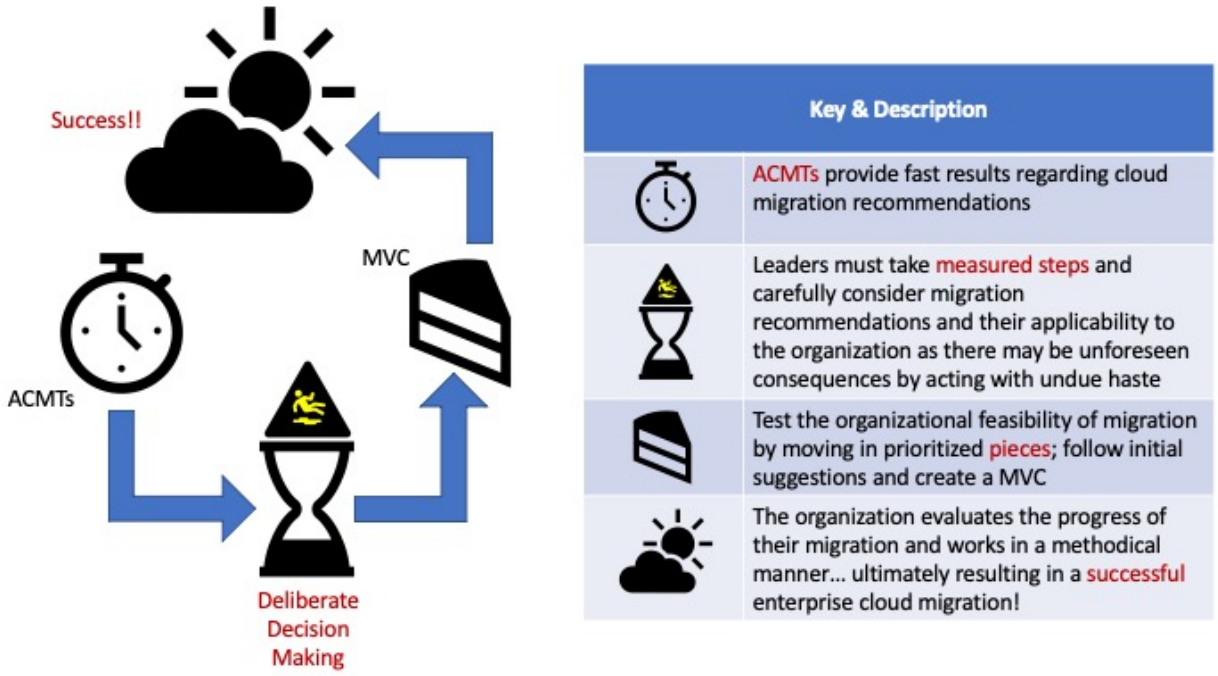

Figure 16. Deliberate Cloud Decision Making

Note. Leaders understanding that information attained fast does not mean that fast actions have to be taken are more prepared for cloud migration success.

4.3.3 Value Chain for Cloud Validity

The cloud presents undisputed benefits for organizations. ACMTs allow for organizations to bring the cloud to them and reap the prescribed business synergies. However, even with access to and utilization of ACMTs, leaders may not unlock cloud benefits. A major reason for this shortcoming is that parts of an organization, for instance subsidiaries of MNCs, may be unprepared for the cloud (IT Convergence, 2020f; Reitzel, 2019). In order to utilize the cloud, there needs to be proper infrastructure in place (Nizam & Vilhi, 2018; Yang et al., 2015) as shown in Figure 6. Moreover, if the partners within the supply chain do not use cloud solutions, there may be potential integration or compatibility issues. Certain subsidiaries, due to cultural or other reasons, may also circumvent implemented cloud solutions even though the organization 'migrated to the cloud.' With support institutions, such as local cloud enabling infrastructure and connectivity, and a value chain communicating (Donnelly, 2020; eWeek Editors, 2019) on and using cloud solutions in harmony, cloud benefits can be better realized.

4.4 Actions

Actions represent steps that leaders should take when undergoing a cloud migration. Application of these following practices may need fine-tuning for each particular organization due to variances in industry or company hierarchical structure.

4.4.1 Create Dynamic Partnerships

Migrating to the cloud allows for communications, insights and business agility. MNCs, with their footprint in two or more countries, interact with many different organizations. Multiply that interaction by each country and also inter-branch (between different subsidiaries and the parent headquarters) and this presents a scenario conducive to focusing on developing partners enabling the development of new capabilities (Singh & Hong, 2017). Partnerships can also spur opportunities (Computer Weekly News, 2020) in the integration of new or existing assets (Alibaba Cloud, n.d.c; Singh & Hong, 2017). Integrating with vendors on communications platforms or in sharing relevant data (IT Convergence, 2020c) can improve efficiencies, create economies of scale, and bring new ideas/technology to market. Leaders must understand that developing strategic partnerships is an extension of the cloud benefits centered around optimization and peak value from cloud solutions. Leaders must determine how to involve the organizations within the company's value chain to also utilize the cloud.

4.4.2 Multi-Cloud Preparations

For the purposes of specific geographic regions (Alibaba Cloud, n.d.d), building a new capability to target a specific demographic of users (Alibaba Cloud, n.d.c), interest in business continuity, disaster recovery planning (Journal of Engineering, 2017), and best-of-class solutions (Telecom Asia, 2017; White, 2020), leaders need to embrace a multi-cloud approach (Ahmad et al., 2018; Dignan, 2020; IT Convergence, 2020f). Indeed, statistics back up this approach showing that 84% of enterprises have a multi-cloud strategy (Choudhary & Bhadada, 2020). This can be done concretely by employing a management tool or consolidated single-pane dashboard (AppDynamics, n.d.b; CloudCheckr, 2017; Densify, n.d.c; Densify, 2020; Information Technology Newsweekly, 2019) that searches for optimizations in cloud portfolio configurations. Another method is identifying clouds that are necessary for doing business in a certain area or for a specific subset of people. When considering redundancy and disaster preparations, having data

stored on multiple clouds allows for data availability in times of crises or emergencies. The fact is, that, most organizations already have multiple clouds within their organization, and, the trend for integration is something cloud service providers recognize (Taft, 2013). Leaders need to begin with an understanding that there are different benefits within clouds, with solutions across SaaS, PaaS or IaaS offerings. It is paramount to institute a policy to get functionality between and amongst cloud offerings, and seek to allow instead of stymie the diversification of the cloud portfolio. Problems with inhibiting or not being inclusive of a multi-cloud strategy could mean a lack of oversight into cloud initiatives partaken by different subsidiaries leading to 'shadow IT,' or in redundancies thereby leading to duplicative costs and inability to harness economies of scale (Axarloglou, 2020). Case studies show, that when optimized (IT Convergence, n.d.), cloud visibility management tools can make real financial savings with some ACMTs advertising a rate of 30-40% savings on public cloud spend or even higher (Cloudamize, 2020; CloudCheckr, n.d.a).

While cloud ecosystems do exist, such as AWS which is centered around being an 'all-in-one' provider, future business considerations such as mergers, development of new capabilities/cloud offerings, and new market penetration (Supramaniam & Teoh, 2019) mean considerations for the best possible solutions available for each use case and a focus on integration will inevitably take place. Creating pathways for integration, managing understanding, and creating synergy will lead to faster deployment of solutions and the operationalizing of business agility, which is a core tenet of the cloud.

ACMTs help leaders to continually assess their cloud portfolio and can provide recommendations for different cloud services to employ. Having a framework in place to assess these recommendations means a greater possibility of service-adoption and employee buy-in for executing of ideas. As the cloud is a multi-touch point paradigm reconceptualizing how an organization operates on a macro and micro level, executive sponsorship of embracing change opportunities translates into organizational flexibility and a core competency of perpetual capability enhancement.

4.4.3 Enable Subordinates for Cloud Action

Cloud solutions are now easy to provision, access and utilize. When leaders enact a framework of acceptance for a multi-cloud environment, leaders must extend this decision nexus by further pushing cloud decisions to employees closer to day to day activities, on the tactical management level (Supramaniam & Teoh, 2019). This concept is known as operationalizing the cloud. Leaders are often at the helm and take the position of guiding the organization through change and large-scale adoption initiatives such as the digital transformation brought forth by the cloud and enabled by ACMTs. Operationalizing the cloud serves to have decisions on cloud products that meet business demands approved, vetted, submitted and enacted on a finer and faster scale with more detail to subsidiaries (Alibaba Cloud, n.d.b), and potentially benefiting the larger organization as a whole. Guiding the organization to a multi-cloud environment, maintaining a complete cloud oversight picture through cloud management tools (AppDynamics, n.d.a), and empowering business units to identify practical cloud solutions means a faster realization of cloud value (Turner & Grieser, 2017). Figure 17 illustrates this value chain, starting from the leader's actions to the end result of cloud value attainment.

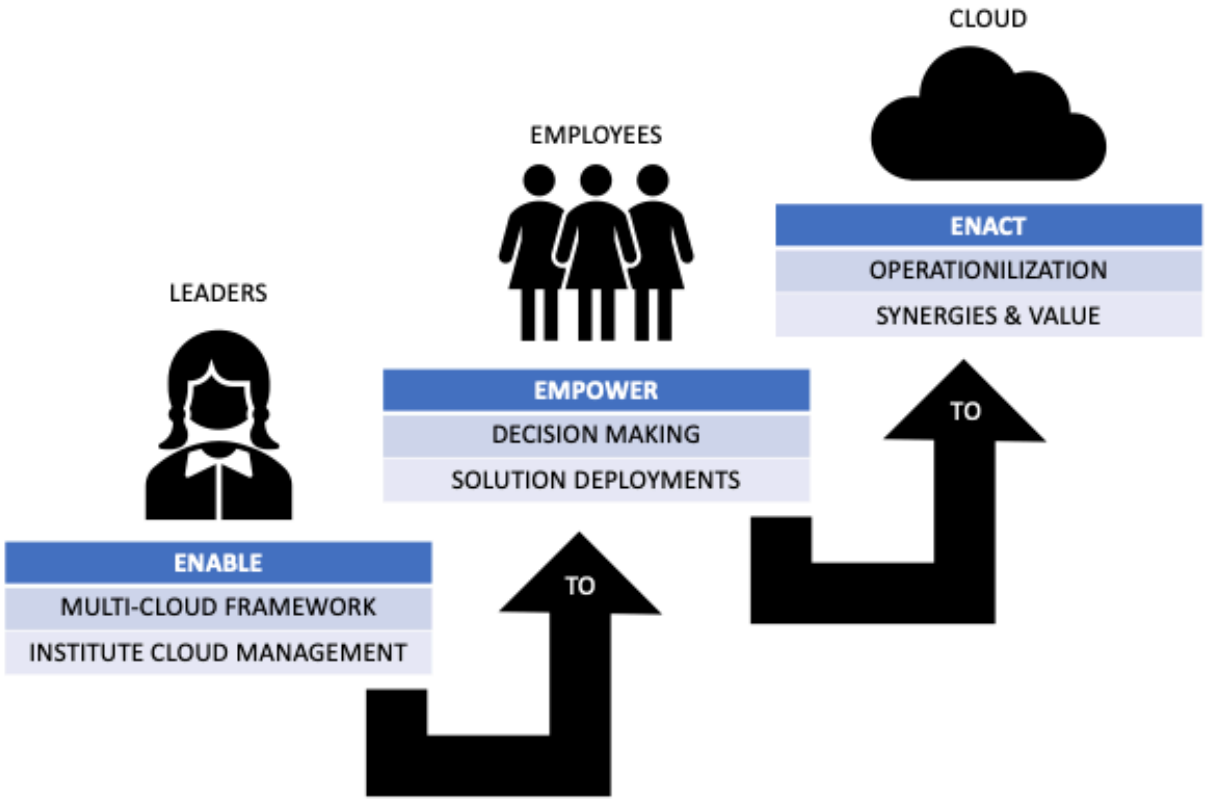

Figure 17. Leadership Action for Cloud Value Attainment

Note. One means of discovery of specific solutions for cloud organizations are ACMTs. Whether these tools are assessment based or management focused. This graphic can be read as follows: *leaders* enable a multi-cloud framework and institute cloud management to empower *employees* in decision making and solution deployments to enact *cloud* operationalization and realize *cloud* synergies and value.

4.4.4 Eliminate Legacy Resistance

Effective executive sponsorship for successful information technology projects and cloud migrations is widely accepted as one of the most important facets in a cloud migration/organizational digital transformation. Leaders as executive champions must take steps to ensure that barriers and roadblocks (Jasgur, 2019) to implementation are removed. A potentially overlooked issue is entrenched resistance from different departments of an organization. Managing resistance, and thereby change, is an accepted reality of cloud migrations. A leader's role here is to ensure that department heads and subsidiary executives are fully on-board; expect that change will become the new constant; and that all routines, processes, and methods of conducting business may and realistically will be changed (Filatov, 2019).

Not often talked about with cost savings or access to new technology are that institutional foundations of the organization will go through growing pains. An example of this would be the finance department and purchasing/procurement procedures (Cooney et al., 2020). Though procedures of the finance department may first seem outside of the purview of cloud migration and adoption, the secondary and tertiary effects of the cloud migration are soon often felt. Having frequent meetings with stakeholders within the organization regarding progress of plans, timelines and goals will enable discussions like these to be held constructively and solved swiftly. Stalled purchases and delayed deployments of identified solutions may cost the organization not only internal momentum but real business value, lost market opportunities, or deprecation of market share. The concept can be likened to actualization of business agility and inviting and welcoming change through open and regular dialogue spurred by executive and leadership urging. ACMTs will force an organization to be nimble in approaching presented opportunities (Bourne, 2017a; Singh & Hong, 2017), and also result in and be the cause of collateral changes to business functions not traditionally viewed as information technology specific.

4.4.5 Build a Cloud Center of Excellence

Knowledge transfer, the ability to have communication from and to all units of the organization, for MNCs (Shaw & Luiz, 2017) can often serve as a competitive advantage. A common problem seen within MNCs is a top down directed information flow where the headquarters will send information out to subsidiaries without good information flows upwards. When implementing the cloud, there are sure to be many lessons learned throughout the process (Johnson, 2017). One subsidiary, perhaps reflecting a vertical of the MNC (such as, being responsible for finance for the MNC), may be the unit undergoing the cloud migration first, as the ACMT prioritized the migration of their application suites first due to their relative lack of complexity as seen identified through cloud readiness reporting analysis. It is important for leaders to create a central unit, known as a cloud center of excellence (CCoE) (CloudCheckr, n.d.b; HPE, 2019; Leong, 2019), that can help with the flow of information from the cloud migration. This unit should be unencumbered by entrenched political interworking's of a headquarters to subsidiary or vice versa. In fact, estimations are that 66% of organizations utilize a CCoE (Galov, 2020). Cloud providers may also have centers of excellence that can be tapped into for assistance and guidance (Modh, 2020).

With the ACMT being only one part of the cloud migration, the other parts of people, process and technology must be supported by a framework that harnesses the lessons learned from the migration and protects information for companywide dissemination. Planning functions of ACMTs also exist, with one tool claiming a 75% reduction of time in planning and executing difficult cloud migrations (Cloudamize, 2020). Best practice can further be established and specific guidelines can be created for how to incorporate and lead with the ACMT provided insights and suggestions.

4.4.6 Be Wary of Familiarity

An existing MNC, one that has been operating before or even during the growth of the cloud, may have pre-existing partnerships and vendor relationships. Some MNCs may even have contracts with hardware suppliers, telecommunications companies and system integrators (Ostergaard, 2014). Most vendors within the information technology space may now have cloud offerings or cloud based solutions that the organization can implement. Going with the easy solution, the familiar company, may not be the best decision. Leaders must consider factors such as cloud relationships, cost of service solutions, and long term viability of these familiar recommendations. The reasoning here is that there may be advanced ACMTs that do not yet have partnerships with existing firms. These ACMTs may also have functionality or capabilities that are not yet widely adopted by other providers. One research finding was that most ACMT solutions did not have the capability to revamp applications to operate as cloud native. If the business objective is to have applications/code made to be cloud native (Lukasik, 2020), but the cost may be prohibitive to hire an organization to do so or an existing partnership suggests going a different route, one would never know that this advanced capability exists as an automated option (Gogate, 2018) and could potentially be feasible.

The rapidity of growth within and the possible opportunities represented by the cloud means that leaders must seek out and explore the ACMT landscape to gain perspective and context of solutions before blindly committing. An easy check to make is to inquire with solution providers the types of partners that they work with, what types of solutions can be provided (SaaS, IaaS, PaaS), and how is one's personal organizational posture assessed for cloud readiness. Complexity may hide easy value opportunities (Bourne, 2020c; Lichtenthaler et al., 2019; Rai et al., 2015;

Yang et al., 2015) that ACMTs can exploit (PR Newswire, 2020c, 2020d), but that existing vendor relationships may not be able to uncover.

4.5 Summary

Best leadership practices of MNCs in the use of ACMTs in adoption of commercial cloud computing platforms are presented and catalogued within three different categories: awareness, impact, and action. A graphical summary highlights these leadership practices in Figures 18, 19, and 20 respectively.

AWARENESS	*Understanding* for ACMTs	
4.6.2.1.1	Fragmentation of the Cloud Migration Market	The cloud migration market is fragmented. Assess the aims of the organization to determine which type of ACMT is most suited-whether this is a migration (assessment + execution) tool or management tool. ACMTs can be continually used to provide current operating information picture for leaders.
4.6.2.1.2	Automation Capabilities of Tools	ACMTs possess many different functionalities. Within the assess, execute and manage framework, different benefits accrue to each type of capability that the ACMT possess. Leaders understanding of the particular strengths and advantages of tools within the aforementioned framework leads to information clarity regarding value mapping for business functions and, in turn, direct and informed decision making.
4.6.2.1.3	Is the Organization Ready for the Cloud?	Is the organization ready for the cloud? Assess whether the current organizational posture is moving legacy applications to the cloud or in creating new cloud capabilities. Further factors which will influence the determinations for how to handle migrating legacy applications and/or adopting new cloud solutions are both external as well as internal to the organization. Assess the totality of the influences on the organization to determine how to navigate ACMT recommendations and cloud migration decisions.
4.6.2.1.4	Decision Gateways for Leaders	The decision gateways for leaders when using ACMTs revolve around the I.D.E.A. framework, the central part of the framework being the 'which, how, how,' namely: which ACMT(s) will be used, how many ACMTs will be used and how will the migration (technically) proceed. The other important considerations center around identifying business objective(s) and evaluating and analyzing cloud KPIs. A leader armed with answers to the I.D.E.A. will be able to make educated decisions on cloud migrations while being sure to keep in mind external and internal factors acting upon and within the MNC.
4.6.2.1.5	Levels of Understanding	While an ACMT provides ample information, leaders must not equate recommendations from the ACMT as the ONLY information needed. A leader must be informed and consider other facets along with the ACMT output, intangibles not captured within the tool, such as strategic positioning, available organizational resources and political climate internal to the MNC.

Figure 18. Best Leadership Practices for ACMT Awareness

IMPACT	*Realizing the Context* of ACMTs	
4.6.2.2.1	Cloud as a Change Agent	Mistakenly, and partly to blame for successful advertising initiatives, the cloud is viewed as a means to cut costs and to upgrade technology. While true, the cloud quickly pervades all facets of an organization and should be seen as a complete change agent- a multi-dimensional force that introduces change into the DNA of an organization. ACMTs act as the bridge for organizations to realize the new normal- the permanent change fostered by the cloud paradigm (this being the cloud positioned as a gateway to technological advancements, future innovations and unmatched analytics and insights.
4.6.2.2.2	Quick Recommendations Are Not Quick Actions	ACMTs provide fast results for a cloud recommendation. A leader must realize that fast results does not translate into quick actions. A deliberate, measured process for a cloud migration is the appropriate posture. One such example is by working with an MVC or minimum viable cloud approach, wherein, a migration occurs in stages.
4.6.2.2.3	Value Chain for Cloud Validity	An organization, like an MNC, operates in a web of relationships, partnerships and contracts. Through suppliers, vendors or industry trade groups, MNCs, and their global scale rely on support from disparate entities. Moreover, local infrastructure or consumer behavior may not support cloud initiatives. For a successful cloud migration, leaders must consider the impact of cloud adoption across their designated value chain.

Figure 19. Best Leadership Practices for ACMT Impact

ACTION	*Optimizing* for ACMTs	
4.6.2.3.1	Create Dynamic Partnerships	Foster partnerships to build competencies and and improve efficiencies. Actively pursue opportunities to engage, share and collaborate with organizations where the effects of the cloud can approach economies of scale. The more an organization is integrated with its partners- partners that are also utilizing the cloud- means more synergies for the business and more opportunities for growth.
4.6.2.3.2	Multi-Cloud Preparations	MNCs require the ability to adopt best-in-class cloud solutions, which means, that, MNCs most likely currently utilize multiple clouds, and will continue to do so. Taking an approach that values a multi-cloud architecture enables dynamic flexibility for growth opportunities, whether for onboarding a recent acquisition and their technology or entering into a new market. ACMTs can be used to continually assess opportunities for assessing potential cloud solutions optimized for the organization.
4.6.2.3.3	Enable Subordinates for Cloud Action	The ease of access to and discovery of cloud solutions tailored for an organization, helped by ACMTs, is pushing the decision process and identification of value driving cloud solutions to an operational level, down from a previous strategic position. Empowering employees to make relevant cloud decisions, within a strategic multi-cloud framework and based on robust cloud management, will drive synergies for the organization and real business value. Operationalize the cloud by pushing decisions further down the leadership hierarchy.
4.6.2.3.4	Eliminate Legacy Resistance	Internal departments and employees may be resistant to the change that the cloud ushers into the organization. Leaders need to engage stakeholders to create an environment of identifying and working through problems. This open communication will ensure to help eliminate resistance with the organization.
4.6.2.3.5	Build a Cloud Center of Excellence	Proper knowledge transfer within an organization is essential. A central coordinating body tasked with this mission, is paramount to understand the lessons learned and experience exchange of implementing ACMT recommendations and the cloud migration as a whole. A Cloud Center of Excellence will also help to alleviate traditional knowledge transfer issues within an MNC.
4.6.2.3.6	Be Wary of Familiarity	MNCs, largely, have existing relationships, hardware and infrastructure and resultant contracts with various organizations that supply information technology. A leader must not immediately look to the cloud from their existing partnerships, but explore other cloud solutions to determine the best possible solution, at the best possible price, with considerations for future-proofing. ACMTs allow for this knowledge capture and pivotal exploration mechanism of the larger cloud landscape. As ACMTs evolve, the most advanced options may not be tied into existing organizations, and thus, seeking out these cloud agnostic tools may provide insights not formerly known as possible or perceived as available.

Figure 20. Best Leadership Practices for ACMT Action

CHAPTER 5. DISCUSSION

5.1 Commentary on Automation

Are automated cloud migration tools the future? Or, to what extent will tools utilize automation? Is there a limit to automation? A limit to automated solutions as accepted by organizations? Or, could it be, that, given current trends such as a dynamic push for organizational digital transformation in the wake of the ongoing COVID-19 Pandemic (Shubhendu, 2020), any and all solutions (fully automated or not) are necessary to keep up with surging demand? The question here revolves around the principality of trust (Goodwin, 2011). As security is a major concern for cloud migrations (Ahmed & Singh, 2019; Cidres et al., 2020; Tanner, 2012), and most likely will continue as an ongoing concern in the future, ACMTs are largely still a feature of startup style organizations that have a sole focus of comparing and presenting cloud offerings and solutions for customers. The concept of how an ACMT is maintained will be explored later on. For gaining trust, ACMTs must possess credibility and legitimacy equally. As seen within the cloud marketplace, established recognized names have been purchasing these migration upstarts, i.e. Deloitte with innoWake (Deloitte, n.d.; Deloitte, 2019b; Wilkers, 2017) and Google Cloud with Velostrata (Harvey, 2018) are two examples of accruing ACMT capabilities. The established names now offering these same tools, perhaps re-branded, capture trust. Trust is especially poignant for MNCs as a level of surety and service expectation is warranted and expected. Perhaps one method of ACMTs gaining trust is the absorption of said ACMTs by a growing number of organizations or through partnerships.

A further question, and one outside the scope of this dissertation, is how fully is an automated solution trusted? Even if the solution provided and recommendations offered are correct, does not having an interface touch point with humans allow for an accepted outcome within the organization (Shein, 2018)? Resistance to not feeling like one has a say in decisions, aka learned helplessness (Cooney et al., 2020), sabotage, or disregard are further possibilities of a full automation. So, perhaps, full automation is not the future destination? Deloitte has a suite of automated solutions that are only accessed via engaging the services of Deloitte. This manner of engagement seems to elicit a human quotient of involvement, and perhaps, greater surety.

Further, on automation capabilities as assessed within the ACMT market, what is the reason for so few ACMTs to employ automated code refactoring to turn legacy applications into optimized cloud native versions? Is this a symptom of trailblazing companies that offer this functionality? Or, perhaps, it is the limited functionality of refactoring, whether it be only focusing on certain coding languages and in certain limited circumstances, that make this offering less attractive for other companies to provide. It could be that it is more 'window-dressing' than full-fledged capability; or this functionality does not need to be offered for ACMTs to be employed and successfully utilized. The growth of the cloud market and organizations clamoring for entry may mean that this type of functionality does not need much attention. Thus for the organizations that have a need to make legacy applications cloud native, these organizations are the ones that can pay for the developers to make this happen. A discussion on how ACMTs are compiled and maintained is also pertinent.

5.2 ACMTs as a Black Box

How are ACMTs updated? How frequently are they updated? A cloud agnostic ACMT may lag behind an ACMT that is proprietary and tied to a sole provider. This avenue, the idea of ACMT maintenance, was not the focus of nor researched for this dissertation and is here for the means of discussion. Are there standards in place to govern when functionality in ACMTs are updated? Would a consultation of multiple ACMTs help to alleviate the potential for outdated or incomplete information for the decision maker? The question of how many ACMTs, on average, should be consulted is a good one. This may also fluctuate by criticality of the application, size of company, and industry. There is no universal ACMT. ACMTs are not black boxes. But for some, the output itself may suffice and head-off any additional questions as to the *why* the output was provided. Realizing that the cloud brings far reaching changes to an organization, knowing the *why* behind the output is essential.

5.3 Digital Only Organizations

For new organizations, or digital only organizations, how would ACMTs be applied? ACMTs scan existing infrastructure and applications to determine and provide recommendations for migrating to the cloud. What if there is no existing architecture? What would be the decision process for this

type of organization to migrate to the cloud? Could there be an ACMT which takes a business idea or criteria and then maps the desired business functions to cloud solutions? This scenario, as written, appears to be one fit for consultants, involving more direct human interaction. Digital MNCs, as researched (Axarloglou, 2020), show an interesting relation between foreign revenue and foreign presence. There is an inverse relationship wherein greater foreign revenue is related to a smaller foreign presence. Having easier access to consumers and the ability to analyze data provided by and for these consumers highlights this dichotomy. If the cloud and digitalization make organizations leaner, does this have a larger commentary on the future of MNCs? What is not debatable, and will surely not abate in importance, is the information sharing and knowledge transfer within an MNC. This very knowledge transfer serves as a competitive advantage when harnessed and efforts made to maximize flows. The cloud and the ACMTs that help facilitate communication and collaboration solutions are welcome digital solutions for MNCs.

5.4 Consultants as a Corollary for ACMT Development

Case studies as provided by consultants offer unique insights into the cloud migration process. A common theme of successful cloud migration is the organization that wants to migrate to the cloud has identified specific business functions (Alibaba Cloud, n.d.e; IT Convergence, 2019e) that are to be affected. Regarding MNCs, this could translate into different subsidiaries within the MNC having different business functions or objectives, and thus requiring different cloud solutions (Software World, 2018). Applied further, an MNC with many different subsidiaries and distinct business functions would then be best served by having a framework that allows for multi-cloud solutions and gives flexibility to subsidiaries to choose clouds that work for their unique positioning. ACMTs can be deployed within subsidiaries to assess existing applications, and also to provide a unified management tool layered across an organization's cloud solutions portfolio to identify redundancies and push optimization across all MNC cloud offerings. Consultants, if viewed as a model for and subsequent functionality of future ACMT development (thus ACMTs mirroring capability of consultants – as ACMTs seek to automate the solution finding recommendation forte that consultants currently possess) would mean ACMTs may continue differentiation through specialization/advertised competency of/for different industries and applications. Additionally, should there prove to be a unique problem or even no knowledge of a problem or optimizations, an ACMT can provide and serve as the gateway to technologies within

the cloud that can fill the role of an advanced problem solver like ML (IT Convergence, 2020e) analytics.

A benchmark analysis of an organization's baseline architecture and processes (IT Convergence, 2020f), as can be provided by an ACMT, helps fill the role of a consultant by alighting to and covering best practices and institutional knowledge (IT Convergence, 2019c). These are facets that the existing information technology team within the organization may not possess. In one case study, an MNC chose to make custom software (IT Convergence, 2019b) based on a consulting recommendation, which potentially could have been avoided if an ACMT had been used and a better job of searching for and matching requirements to existing cloud solutions had been implemented.

5.5 Prioritizing ACMT Functionality

Ultimate adoption of ACMTs by organizations provides the clear business proposition of faster migration, prioritized recommendations, smaller/non-existent downtime, lower cost, strong cloud matching capabilities to organizational needs (Maurya, 2019), and the factor of usability (H.L. et al., 2018). The usability factor relates to ease of use (Riaz & Muhammad, 2015), meaning easy to learn and deploy (PR Newswire, 2020b). User friendly ACMTs stand a better chance of cementing a foothold within the cloud migration market when leaders are looking for migration capabilities and resources. User functionality also enables heightened awareness to ACMT governance protocols in some industries that require certain conditions be met in the process of a cloud migration (Evangelista & Neto, 2015).

CHAPTER 6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The accelerated pace of cloud adoption will continue to place importance on the tools that facilitate organizations in their cloud migration journey. With the cloud computing paradigm, the new and inescapable access to leading innovations, or the lack thereof, will shape market dynamics and contribute to organizational competitiveness. The central position of ACMTs within cloud management and optimization, and the matching insights they provide for the cloud migration assessment phase, mean that leaders cannot ignore these pivotal tools in their organizational digital transformation. Best leadership practices, like those uncovered here with respect to MNCs, shed light on an under researched phenomena of how to strategically assess and prepare for the radical change that the cloud represents within an MNC framework. With growing information now available from increasingly sophisticated tools, leaders must be prepared to prioritize and value critical business information as it relates to cloud migrations. A failed migration or one that is not properly aligned with identified business objectives and supported by the executive suite, will be defining moments for enterprises. The pennants of strategic leadership and clarity of foresight for MNCs and organizations at large will separate technologically savvy leaders and their respective organizations from the rest.

6.2 Research Contribution

This dissertation provided a taxonomic framework and categorization for ACMTs, demonstrating that the stages getting to the cloud are crucial to realizing true business value from organizational cloud adoptions. Further, best leadership practices for MNCs in the use of ACMTS in the adoption of commercial cloud computing platforms was heretofore an under-researched phenomena. The distinct pairing of leadership insight and clarity into ACMTs serves organizations and decision-makers as an important tableau in the new digital normal in which information superiority and access to innovations determines organizational leadership and success.

6.3 Future Recommended Research

Researchers would benefit from continuing to study the developments of ACMTs and their effects on leadership practices of complex organizations, such as MNCs. Improvements in automation, an underlying feature of the importance of ACMTs, and in organizational adoption trends utilizing this tool bears further study. Will organizations begin to move past a human-aided framework of assistance, such as consulting, to a purely automated solution without human points of contact? The continual study of the development of ACMTs and the measure to which automation will progress in the future are two paths warranting further consideration.

REFERENCES

Aarestrup, F. M., Albeyatti, A., Armitage, W. J., Auffray, C., Augello, L., Balling, R., Benhabiles, N., Bertolini, G., Bjaalie, J. G., Black, M., Blomberg, N., Bogaert, P., Bubak, M., Claerhout, B., Clarke, L., De Meulder, B., D'Errico, G., Di Meglio, A., Forgo, N., … Van Oyen, H. (2020). Towards a European health research and innovation cloud (HRIC). *Genome Medicine*, *12*(1). https://doi.org/10.1186/s13073-020-0713-z

Achor, S. (2010). *The happiness advantage: The seven principles that fuel success and performance at work*. Crown Business.

Agee, J. (2009). Developing qualitative research questions: A reflective process. *International Journal of Qualitative Studies in Education*, *22*(4), 431-447. https://doi.org/10.1080/09518390902736512

Ahmad, N., Naveed, Q. N., & Hoda, N. (2018). *Strategy and procedures for migration to the cloud computing*. In *2018 IEEE 5th International Conference on Engineering Technologies and Applied Sciences (ICETAS), Bangkok, Thailand* (pp. 1-5). IEEE. https://doi.org/10.1109/ICETAS.2018.8629101

Ahmed, M., & Singh, N. (2019). *A framework for strategic cloud migration*. In *ICCAI '19: Proceedings of the 2019 5th International Conference on Computing and Artificial Intelligence* (pp. 160-163). Association for Computing Machinery. https://doi.org/10.1145/3330482.3330528

Ahworegba, A. H. (2017). The role of local context in headquarters–subsidiaries relationships: A global analysis of the literature. *Journal of East-West Business*, *23*(1), 71-103. https://doi.org/10.1080/10669868.2016.1228554

Akinnuwesi, B. A., Odumabo, A., & Aribisala, B. S. (2020). Knowledge Grid: An intelligent system for collaboration and knowledge management in Nigerian universities. *Data Science Journal*, *19*(1). http://doi.org/10.5334/dsj-2020-002

Aleem, A., & Ryan Sprott, C. (2012). Let me in the cloud: Analysis of the benefit and risk assessment of cloud platform. *Journal of Financial Crime*, *20*(1), 6-24. https://doi.org/10.1108/13590791311287337

Alexander, K., Hanif, M., Lee, C., Kim, E., & Helal, S. (2020). Cost-aware orchestration of applications over heterogeneous clouds. *PLOS ONE*, *15*(2), e0228086. https://doi.org/10.1371/journal.pone.0228086

Alharbi, F., Atkins, A., & Stanier, C. (2017). *Cloud computing adoption readiness assessment in Saudi healthcare organisations: a strategic view*. In *ICC '17: Proceedings of the Second International Conference on Internet of things, Data and Cloud Computing* (pp. 1-8). Association for Computing Machinery. https://doi.org/10.1145/3018896.3025156

Alibaba Cloud. (n.d.a). *Cynopsis: Ecs, OSS, slb, RDS - Alibaba cloud case study*. Retrieved November 22, 2020, from https://www.alibabacloud.com/customers/cynopsis

Alibaba Cloud. (n.d.b). *Duolingo: Cloud technology empowers education APP*. Retrieved November 22, 2020, from https://www.alibabacloud.com/customers/duolingo

Alibaba Cloud. (n.d.c). *Ford mall: New digital platform for digital transformation - Alibaba cloud case study*. Retrieved November 22, 2020, from https://www.alibabacloud.com/customers/ford

Alibaba Cloud. (n.d.d). *Munchkin: ICP application & CDN content delivery - Alibaba cloud case study*. Retrieved November 22, 2020, from https://www.alibabacloud.com/customers/munchkin

Alibaba Cloud. (n.d.e). *Schneider electric: ECS, auto scaling & server load balancing - Alibaba cloud case study*. Retrieved November 22, 2020, from https://www.alibabacloud.com/customers/schneider

Alkhater, N., Walters, R., & Wills, G. (2018). An empirical study of factors influencing cloud adoption among private sector organisations. *Telematics and Informatics*, *35*(1), 38-54. https://doi.org/10.1016/j.tele.2017.09.017

Alshamaila, Y., Papagiannidis, S., & Li, F. (2013). Cloud computing adoption by SMEs in the north east of England. *Journal of Enterprise Information Management*, *26*(3), 250-275. https://doi.org/10.1108/17410391311325225

Anderson, E., & Smith, D. (2018, July 31). *Hype cycle for cloud computing, 2018*. Gartner. Retrieved June 20, 2020, from https://www.gartner.com/en/documents/3884671

AppDynamics. (n.d.a). *Alaska Airlines*. Retrieved November 23, 2020, from https://www.appdynamics.com/case-study/alaska-airlines

AppDynamics. (n.d.b). *NASDAQ*. Retrieved November 23, 2020, from https://www.appdynamics.com/case-study/nasdaq

Arutyunov, V. V. (2012). Cloud computing: Its history of development, modern state, and future considerations. *Scientific and Technical Information Processing*, *39*(3), 173-178. https://doi.org/10.3103/s0147688212030082

AWS. (2017). *Blackboard case study*. Retrieved November 23, 2020, from https://aws.amazon.com/solutions/case-studies/blackboard/

AWS. (n.d.). *AWS Cloud Adoption Framework*. Amazon Web Services, Inc. Retrieved June 11, 2020, from https://aws.amazon.com/professional-services/CAF/

Axarloglou, K. (2020). Digitalization: Disrupting the business models of multinationals. *Contributions to Economics*, 21-32. https://doi.org/10.1007/978-3-030-48210-7_3

Azure. (n.d.). *Microsoft Cloud Adoption Framework for Azure*. Technical documentation, API, and code examples | Microsoft Docs. Retrieved June 11, 2020, from https://docs.microsoft.com/en-us/azure/cloud-adoption-framework/

Balobaid, A., & Debnath, D. (2018). *Cloud migration tools: Overview and comparison*. In A. Yang, S. Kantamneni, Y. Li, A. Dico, X. Chen, R. Subramanyan, & L. Zhang (Eds.), *Services – SERVICES 2018: 14th world Congress, held as part of the services conference Federation, SCF 2018, Seattle, WA, USA, June 25–30, 2018, proceedings* (pp. 93-106). Springer. https://doi.org/10.1007/978-3-319-94472-2_7

Barrett, J. R. (2007). The researcher as instrument: Learning to conduct qualitative research through analyzing and interpreting a choral rehearsal. *Music Education Research*, *9*(3), 417-433. https://doi.org/10.1080/14613800701587795

Bavare, A. (2017, November 14). The importance of Refactoring when moving to the cloud. *Accenture | Let there be change*. https://www.accenture.com/us-en/blogs/blogs-amod-bavare-keys-to-refactoring-cloud-migration

Berry, H. (2014). Global integration and innovation: Multicountry knowledge generation within MNCs. *Strategic Management Journal*, *35*(6), 869-890. https://doi.org/10.1002/smj.2140

Biswas, B., Bhadra, S., Sanyal, M. K., & Das, S. (2018). Cloud adoption: A future road map for Indian SMEs. *Advances in Intelligent Systems and Computing*, *695*, 513-521. https://doi.org/10.1007/978-981-10-7566-7_67

Blanchard, J. F. (2019, April 4). Dialing in or head in the clouds? China's prospective opening of its ICT sector. *Wong MNC Center | Probing Multinational Corporations in and from East Asia*. https://mnccenter.org/blog/dialing-or-head-clouds-china's-prospective-opening-its-ict-sector

Blau, J. (2020). Europe's great digital gap. *Research-Technology Management*, *63*(2), 3-6. https://www.questia.com/library/journal/1G1-616047393/europe-s-great-digital-gap

Bommadevara, N., Del Miglio, A., & Jansen, S. (2018, April 12). *Cloud adoption to accelerate IT modernization*. McKinsey & Company. Retrieved June 17, 2020, from https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/cloud-adoption-to-accelerate-it-modernization

Borges, M., Barros, E., & Maia, P. H. (2018). Cloud restriction solver: A refactoring-based approach to migrate applications to the cloud. *Information and Software Technology*, *95*, 346-365. https://doi.org/10.1016/j.infsof.2017.11.014

Bourne, J. (2017a, September 1). *New York Times moves gaming and crossword platform to Google app engine from AWS*. Cloud Computing News. Retrieved November 23, 2020, from https://cloudcomputing-news.net/news/2017/sep/01/new-york-times-moves-gaming-and-crossword-platform-google-app-engine-aws/

Bourne, J. (2017b, July 5). *How Travis Perkins put cloud at the heart of its five-year roadmap – and reaped dividends*. Cloud Computing News. Retrieved November 23, 2020, from https://cloudcomputing-news.net/news/2017/jul/05/how-travis-perkins-put-cloud-heart-its-five-year-roadmap-and-reaped-dividends/

Bourne, J. (2020a, January 13). *Bundesliga goes all-in on AWS, cites ML and AI expertise for archiving as key*. Cloud Computing News. Retrieved November 23, 2020, from https://cloudcomputing-news.net/news/2020/jan/13/bundesliga-goes-all-aws-cites-ml-and-ai-expertise-archiving-key/

Bourne, J. (2020b, July 20). *Nordic enterprises moving to multi-cloud strategies, says ISG report*. Cloud Computing News. Retrieved November 23, 2020, from https://cloudcomputing-news.net/news/2020/jul/20/nordic-enterprises-moving-to-multi-cloud-strategies-says-isg-report/

Bourne, J. (2020c, October 20). *COVID-19 acceleration contributes to $1 trillion cloud ecosystem by 2024, says IDC*. Cloud Computing News. Retrieved November 23, 2020, from https://cloudcomputing-news.net/news/2020/oct/20/covid-19-acceleration-contributes-to-1-trillion-cloud-ecosystem-by-2024-says-idc/

Bradberry, T., & Greaves, J. (2009). *Emotional intelligence 2.0*. TalentSmart.

BSA. (2018). *BSA global cloud computing scorecard* (4). https://cloudscorecard.bsa.org/2018/pdf/BSA_2018_Global_Cloud_Scorecard.pdf

Carcary, M., Doherty, E., & Conway, G. (2014). The adoption of cloud computing by Irish SMEs – an exploratory study. *Electronic Journal Information Systems Evaluation*, *17*(1), 003-014. https://www.ejise.com

Carreiro, H., & Oliveira, T. (2019). Impact of transformational leadership on the diffusion of innovation in firms: Application to mobile cloud computing. *Computers in Industry*, *107*, 104-113. https://doi.org/10.1016/j.compind.2019.02.006

CAST. (n.d.). *CAST highlight - Rapid application portfolio analysis*. Retrieved June 11, 2020, from https://www.castsoftware.com/products/highlight

Chambers, S. (2018, March 27). *Migrating to AWS method 4 - Refactoring, Aka cloud native - Cloudsoft*. Cloudsoft. Retrieved November 23, 2020, from https://cloudsoft.io/migrating-to-aws-method-4-refactoring-aka-cloud-native/

Chiriatti, C., Hurley, M., & Torr, S. (2020, February/March). 3 considerations for new cloud computing rules. *CFO*, 24-25.

Choudhary, A., & Bhadada, R. (2020). *Emerging threats in cloud computing*. In S. Gupta & J. Sarvaiya (Eds.), *Emerging technology trends in electronics, communication and networking: Third International Conference, ET2ECN 2020, Surat, India, February 7–8, 2020, revised selected papers* (pp. 147-156). Springer Nature. https://doi.org/10.1007/978-981-15-7219-7_13

Chunpir, H. I. (2018). *How to include users in the design and development of cyberinfrastructures?* In A. Marcus & W. Wang (Eds.), *Design, user experience, and usability: Theory and practice: 7th International Conference, DUXU 2018, held as part of HCI international 2018, Las Vegas, NV, USA, July 15-20, 2018, proceedings* (pp. 658-672). Springer. https://link.springer.com/chapter/10.1007/978-3-319-91797-9_46

Ciabuschi, F., Holm, U., & Martín Martín, O. (2014). Dual embeddedness, influence and performance of innovating subsidiaries in the multinational corporation. *International Business Review*, *23*(5), 897-909. https://doi.org/10.1016/j.ibusrev.2014.02.002

Cidres, E., Vasconcelos, A., & Leitao, F. (2020). *Cloud Calculator: A cloud assessment tool for the Public Administration*. In *The proceedings of the 21st annual International Conference on digital government research (DGO2020) : Intelligent government in the intelligent information society: Seoul national University, June 15-19, 2020, Seoul, Korea* (pp. 130-137). Association for Computing Machinery. https://doi.org/10.1145/3396956.3396964

Cloud Industry Forum. (2020). *The changing role of the IT department*. Cloud Forum IP Ltd. https://www.cloudindustryforum.org/content/changing-role-it-department

Cloud Standards Customer Council. (2017). *Impact of cloud computing on healthcare* (2). Author. https://www.omg.org/cloud/deliverables/CSCC-Impact-of-Cloud-Computing-on-Healthcare.pdf

Cloud.gov. (n.d.). *You don't have to build your tech from the ground up*. Author. Retrieved April 19, 2020, from https://cloud.gov

Cloudamize. (2020). *Cloud Migration Assessment and Planning*. https://info.cloudamize.com/l/785203/2020-11-18/2snxg/785203/1605709153ZnrN3ijn/Cloudamize_Feature_Sheet.pdf

Cloudamize. (n.d.). *Manage your cloud with confidence and predictability*. https://d1.awsstatic.com/Marketplace/solutions-center/downloads/Cloudamize-datasheet.pdf

CloudAtlas. (n.d.). *Cloud migration assessment tools | Application modernization - CloudPilot®*. Retrieved November 15, 2020, from https://www.cloudatlasinc.com/cloudpilot-migration-tool/

CloudCheckr. (2017). *50 essential KPIs your enterprise needs to benchmark its cloud migration journey – CloudCheckr*. Retrieved November 23, 2020, from https://cloudcheckr.com/cloud-automation/50-essential-kpis-enterprise-needs-benchmark-cloud-migration-journey/

CloudCheckr. (n.d.a). *Enterprises save money. MSPs make money*. Retrieved November 26, 2020, from https://cloudcheckr.com/

CloudCheckr. (n.d.b). *The cloud center of excellence*. Total Visibility Cloud Management Platform | CloudCheckr. Retrieved November 26, 2020, from https://click.cloudcheckr.com/rs/222-ENM-584/images/ccoe_whitepaper%20%282%29.pdf

Cloudreach. (2017, August 3). *Cloudreach & Cloudamize join forces in Blackstone backed merger*. Retrieved November 26, 2020, from https://www.cloudreach.com/en/news/cloudreach-and-cloudamize-join-forces-in-blackstone-backed-merger-to-accelerate-intelligent-cloud-adoption/

Cloudsine. (2019, March 4). *Case study: How Netflix uses cloud for innovation, agility and scalability*. Retrieved November 23, 2020, from https://www.cloudsine.tech/news-trends/case-study-how-netflix-uses-cloud-for-innovation-agility-and-scalability/

Coghlan, W. (2019). *How leaders are managing the complexity of cloud*. Forbes Insights. https://www.bmc.com/content/dam/bmc/solutions/forbes-managing-cloud-complexity.pdf

Colakoglu, S., Yamao, S., & Lepak, D. P. (2014). Knowledge creation capability in MNC subsidiaries: Examining the roles of global and local knowledge inflows and subsidiary knowledge stocks. *International Business Review*, *23*(1), 91-101. https://doi.org/10.1016/j.ibusrev.2013.08.009

Computer Weekly News. (2020, August 12). AHEAD unveils "State of Modern Applications in the Enterprise" 2020 report detailing progress of U.S. enterprises in delivering better software, faster. *Computer Weekly News*, p. 83. https://link.gale.com/apps/doc/A631996524/ITOF?u=purdue_main&sid=ITOF&xid=c87df5de

Connelly, L. M. (2010). What is phenomenology? *MedSurg Nursing*, *19*(2), 127+. https://link-gale-com.ezproxy.lib.purdue.edu/apps/doc/A224932156/AONE?u=purdue_main&sid=AONE&xid=05030590

Contify Banking News. (2020). *Digital and innovation: Societe Generale strengthens its leadership to co-build the bank of tomorrow with its clients*. Athena Information Solutions. https://link.gale.com/apps/doc/A639017530/STND?u=purdue_main&sid=STND&xid=7154b58b

Cooney, A., Hayes, J., McAvoy, J., & O'Raghallaigh, P. (2020). Barriers to deciding on a consumption-based model for funding IT. *Journal of Decision Systems*, 1-11. https://doi.org/10.1080/12460125.2020.1778875

Costello, K. (2019, April 2). *Gartner forecasts worldwide public cloud revenue to grow 17.5 percent in 2019*. Gartner. Retrieved June 11, 2020, from https://www.gartner.com/en/newsroom/press-releases/2019-04-02-gartner-forecasts-worldwide-public-cloud-revenue-to-g

CSA. (n.d.). *About*. Retrieved April 19, 2020, from https://cloudsecurityalliance.org/about/

CSCC. (2018). *Migrating applications to public cloud services: Roadmap for success version 2.0*. https://www.omg.org/cloud/deliverables/CSCC-Migrating-Applications-to-Public-Cloud-Services-Roadmap-for-Success.pdf

Dataquest. (2016). *Microsoft accelerates public cloud adoption in India*. https://search.proquest.com/docview/1799847213?accountid=13360

Deloitte. (2019a, December 30). *How to deploy a cloud strategy when MNCs enter China?* Deloitte China. Retrieved November 17, 2020, from https://www2.deloitte.com/cn/en/pages/strategy-operations/articles/cloud-strategy-mncs.html

Deloitte. (2019b, November 18). *Deloitte named a strong performer in application modernization and migration services by independent research firm*. Retrieved November 26, 2020, from https://www2.deloitte.com/global/en/pages/about-deloitte/press-releases/deloitte-named-strong-performer-in-application-modernization-and-migration-services-by-independent-research-firm.html

Deloitte. (2019c). *Alibaba Cloud for MNCs*. https://www2.deloitte.com/content/dam/Deloitte/cn/Documents/technology/deloitte-cn-alibaba-cloud-white-paper-for-mncs.pdf

Deloitte. (n.d.). *Application modernization powered by innoWake*. Deloitte United States. Retrieved November 26, 2020, from https://www2.deloitte.com/us/en/pages/technology/solutions/application-modernization.html

Densify. (2020). *Enterprise cloud cost optimization & control*. Retrieved November 23, 2020, from https://www.densify.com/

Densify. (n.d.a). *Case study: Global insurer gets control of complex IBM WebSphere licensing to save $2 million annually*. Retrieved November 23, 2020, from https://www.densify.com/resources/case-study-insurance-company-ibm-websphere-license-savings

Densify. (n.d.b). *Case study: Global transportation & business services organization eliminates $3.8M in CA APM licenses*. Retrieved November 23, 2020, from https://www.densify.com/resources/case-study-transportation-business-services-ca-apm-license-savings

Densify. (n.d.c). *Case study: Multinational bank uncovers $82 million on Windows Server data center licensing savings over 5 years*. Retrieved November 23, 2020, from https://www.densify.com/resources/case-study-multinational-bank-windows-server-license-savings

Dignan, L. (2020, October 1). *Top cloud providers in 2020: AWS, Microsoft Azure, and Google cloud, hybrid, SaaS players*. ZDNet. Retrieved November 17, 2020, from https://www.zdnet.com/article/the-top-cloud-providers-of-2020-aws-microsoft-azure-google-cloud-hybrid-saas/

Dimitri, N. (2020). Pricing cloud IaaS computing services. *Journal of Cloud Computing*, *9*(1). https://doi.org/10.1186/s13677-020-00161-2

Doerr, J. (2018). *Measure what matters: How Google, Bono, and the Gates Foundation rock the world with OKRs*. Penguin.

Donnelly, C. (2020, November 5). *Multi-year migration of BBC online to the cloud 'nearing completion', broadcaster confirms*. ComputerWeekly.com. Retrieved November 17, 2020, from https://www.computerweekly.com/news/252491623/Multi-year-migration-of-BBC-Online-to-the-cloud-nearing-completion-broadcaster-confirms

Dutta, A., Peng, G. C., & Choudhary, A. (2013). Risks in enterprise cloud computing: The perspective of it experts. *Journal of Computer Information Systems*, *53*(4), 39-48. https://doi.org/10.1080/08874417.2013.11645649

Dyrenfurth, M. (2019). Tech 621 (Spring, 2020). a2 technology detailed_ac [PowerPoint slides]. (Technology Leadership & Innovation, Purdue University)

Dzedek, L. R. (2018). *Initiatives by subsidiaries of multinational corporations: An empirical study on the influence of subsidiary role context*. Springer Gabler. https://doi.org/10.1007/978-3-658-20950-6

Elia, S., Messeni Petruzzelli, A., & Piscitello, L. (2019). The impact of cultural diversity on innovation performance of MNC subsidiaries in strategic alliances. *Journal of Business Research*, *98*, 204-213. https://doi.org/10.1016/j.jbusres.2019.01.062

Ellison, M., Calinescu, R., & Paige, R. F. (2018). Evaluating cloud database migration options using workload models. *Journal of Cloud Computing*, *7*(1). https://doi.org/10.1186/s13677-018-0108-5

ENISA. (n.d.). *Cloud security*. Retrieved April 16, 2020, from https://www.enisa.europa.eu/topics/cloud-and-big-data/cloud-security

Erl, T., Puttini, R., & Mahmood, Z. (2013). *Cloud computing: Concepts, technology & architecture*. Prentice Hall.

European Commission. (2019, November 8). *The European cloud initiative*. Policies, information and services. Retrieved April 16, 2020, from https://ec.europa.eu/digital-single-market/en/%20european-cloud-initiative

Evangelista, W., & Neto, J. S. (2015). *COBIT 5 supports cloud computing migration in the Brazilian public sector*. COBIT Focus.

EWeek Editors. (2019). *Seven considerations for doing secure cloud migration*. EWeek. eweek.com

Fatima, S., & Ahmad, S. (2019). An exhaustive review on security issues in cloud computing. *KSII Transactions on Internet and Information Systems*, *13*(6). https://doi.org/10.3837/tiis.2019.06.025

Figliola, P. M., & Fischer, E. A. (2015). *Overview and issues for implementation of the Federal cloud computing initiative: Implications for Federal information technology reform management* (R42887). Congressional Research Service. https://fas.org/sgp/crs/misc/R42887.pdf

Filatov, B. (2019, August 1). 10 useful cloud migration examples you need to know. *Distillery*. https://distillery.com/blog/cloud-migration-case-studies/

Fitch Solutions. (2020a). *Global infrastructure report* (ISSN: 2398-0710). Author. https://store.fitchsolutions.com/all-products/global-infrastructure-report

Fitch Solutions. (2020b). *India information technology report* (ISSN: 1750-5062). Author. https://store.fitchsolutions.com/all-products/india-information-technology-report

Fitch Solutions. (2020c). *Malaysia information technology report* (ISSN: 1750-5097). Author. https://store.fitchsolutions.com/all-products/malaysia-information-technology-report

Fraunhofer Cloud. (2019). *About us*. Fraunhofer-Allianz Cloud Computing. Retrieved April 19, 2020, from https://www.cloud.fraunhofer.de/en/profile.html

Froehlich, A. (2017, June 26). *Automated tools ease cloud migration*. InformationWeek. Retrieved November 15, 2020, from https://www.informationweek.com/cloud/automated-tools-ease-cloud-migration/a/d-id/1329216

Galov, N. (2020, November 12). Cloud adoption statistics - It's everywhere & everyone's using it in 2020! *HostingTribunal*. https://hostingtribunal.com/blog/cloud-adoption-statistics/

Gannon, N. (2019, December 5). *12 best cloud migration tools*. Inedo Blog. Retrieved November 15, 2020, from https://blog.inedo.com/12-best-cloud-migration-tools

Gaur, A. S., Ma, H., & Ge, B. (2019). MNC strategy, knowledge transfer context and knowledge flow in MNEs. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3368627

Gellweiler, C. (2020). Types of IT architects: A content analysis on tasks and skills. *Journal of theoretical and applied electronic commerce research*, *15*(2), 15-37. https://doi.org/10.4067/s0718-18762020000200103

Ghaffari, F., Gharaee, H., & Arabsorkhi, A. (2019). *Cloud security issues based on people, process and technology model: A survey*. In *2019 5th International Conference on web research (ICWR)* (pp. 196-202). IEEE. https://doi.org/10.1109/ICWR.2019.8765295

Gogate, S. (2018, October 23). Why Refactor an app? We have Rehosted app on cloud! *CloudHedge*. https://cloudhedge.io/why-refactor-an-app-we-have-rehosted-app-on-cloud/

Goodwin, B. (2011, May 17). *Multinationals show growing interest in cloud computing, survey reveals*. ComputerWeekly.com. Retrieved November 17, 2020, from https://www.computerweekly.com/news/1280095889/Multinationals-show-growing-interest-in-cloud-computing-survey-reveals

Google Cloud. (2020). *Current case study | Google cloud*. Retrieved November 23, 2020, from https://cloud.google.com/customers/current/

Google Cloud. (n.d.). *Migrate for compute engine*. Retrieved June 11, 2020, from https://cloud.google.com/migrate/compute-engine/

Gulati, K. (2021). Latest Data and Analytics Technology Trends That Will Change Business Perspectives. In R. Agrawal, M. Paprzycki, & N. Gupta (Eds.), *Big Data, IoT, and Machine Learning* (pp. 153-183). CRC Press.

H.L., M., Mathew, A. O., & Rodrigues, L. L. (2018). Prioritizing the factors affecting cloud ERP adoption – an analytic hierarchy process approach. *International Journal of Emerging Markets*, *13*(6), 1559-1577. https://doi.org/10.1108/ijoem-10-2017-0404

Halme, M., Lindeman, S., & Linna, P. (2012). Innovation for inclusive business: Intrapreneurial bricolage in multinational corporations. *Journal of Management Studies*, *49*(4), 743-784. https://doi.org/10.1111/j.1467-6486.2012.01045.x

Harvey, C. (2018, November 9). *Top 8 cloud migration tools*. Datamation: Emerging Enterprise Tech Analysis and Products. Retrieved November 15, 2020, from https://www.datamation.com/cloud-computing/top-8-cloud-migration-tools.html

He, W., & Wang, F. (2015). A hybrid cloud model for cloud adoption by multinational enterprises. *Journal of Global Information Management,*, *23*(1), 1-23. https://www.igi-global.com/gateway/article/124899

Hesse, A., Glenna, L., Hinrichs, C., Chiles, R., & Sachs, C. (2018). Qualitative research ethics in the big data era. *American Behavioral Scientist*, *63*(5), 560-583. https://doi.org/10.1177/0002764218805806

Hickman, J., & Swisher, J. K. (2020). Strategies for intelligent automation: Building a resilient workforce. *Journal of Government Financial Management*, *68*(4), 12-17. https://guidehouse.com/-/media/www/site/downloads/energy/2020/agajournalwinter2020strategies-for-intelligent-aut.pdf

Houle, C. (2018). *Value stream services*. Cognizant. https://www.cognizant.com/Resources/value-stream-offering-overview.pdf

HPE. (2019, May 31). *Cloud adoption: 10 best practices for success*. CIO. Retrieved November 23, 2020, from https://www.cio.com/article/3398620/cloud-adoption-10-best-practices-for-success.html

Hu, F., Qiu, M., Li, J., Grant, T., Taylor, D., McCaleb, S., Butler, L., & Hamner, R. (2011). A review on cloud computing: Design challenges in architecture and security. *Journal of Computing and Information Technology*, *19*(1), 25-55. https://doi.org/10.2498/cit.1001864

Hugos, M. H., & Hulitzky, D. (2011). *Business in the cloud: What every business needs to know about cloud computing*. John Wiley & Sons.

Hytha, D., Aronson, J., & Eng, A. (2019). Technology innovation and the rebirth of self-regulation: How the internet of things, cloud computing, blockchain, and artificial intelligence solve big problems managing environmental regulation and resources. *International Journal of Communication*, *13*(5), 5568-5572. https://ijoc.org/index.php/ijoc/article/view/13499/2862

IBM Cloud. (n.d.a). *American Airlines*. IBM. Retrieved November 23, 2020, from https://www.ibm.com/case-studies/american-airlines

IBM Cloud. (n.d.b). *IBM cloud adoption and transformation*. IBM - United States. Retrieved June 11, 2020, from https://www.ibm.com/cloud/architecture/adoption/

IEEE CS. (n.d.). *About us*. IEEE Cloud Computing. Retrieved April 19, 2020, from https://cloudcomputing.ieee.org/about-us

IEEE. https://doi.org/10.1109/ICWR.2019.8765295

IMF. (2019). *IMF Annual Report 2019 - Our connected world*. Author. https://www.imf.org/external/pubs/ft/ar/2019/eng/assets/pdf/imf-annual-report-2019.pdf

Information Technology Newsweekly. (2019). *Quest included in the 2019 Gartner market guide for cloud office migration tools*. NewsRX. https://link.gale.com/apps/doc/A578808285/ITOF?u=purdue_main&sid=ITOF&xid=65f9548c

Infosys. (n.d.). *Oracle retail and EBS financials implementation - Case study | Infosys*. Infosys - Consulting | IT Services | Digital Transformation. Retrieved November 23, 2020, from https://www.infosys.com/industries/retail/case-studies/digital-foundation-scale.html

Islam, A., Kumar, A., Mohiuddin, K., Yasmin, S., Khaleel, M. A., & Hussain, M. R. (2020). Efficient resourceful mobile cloud architecture (mRARSA) for resource demanding applications. *Journal of Cloud Computing*, *9*(1). https://journalofcloudcomputing.springeropen.com/articles/10.1186/s13677-020-0155-6

ISO. (n.d.). *35.210 - cloud computing*. Retrieved April 16, 2020, from https://www.iso.org/ics/35.210/x/

IT Convergence. (2019a, August 29). *A multinational Biopharmaceutical manufacturer and distributor partners with ITC*. Retrieved November 17, 2020, from https://www.itconvergence.com/case-study/a-multinational-biopharmaceutical-manufacturer-and-distributor-partners-with-itc/

IT Convergence. (2019b, September 4). *Global management consulting firm relies on ITC*. Retrieved November 17, 2020, from https://www.itconvergence.com/case-study/global-management-consulting-firm-relies-on-itc/

IT Convergence. (2019c, September 10). *Global securities trading company migrates to Oracle ERP cloud*. Retrieved November 17, 2020, from https://www.itconvergence.com/case-study/global-securities-trading-company-migrates-to-oracle-erp-cloud/

IT Convergence. (2019d, September 4). *Supply & trading company implements Oracle ERP cloud in China*. Retrieved November 15, 2020, from https://www.itconvergence.com/case-study/supply-trading-company-implements-oracle-erp-cloud-in-china/

IT Convergence. (2019e, August 8). *Why should you use automation in cloud migration?* Retrieved November 15, 2020, from https://www.itconvergence.com/blog/why-should-you-use-automation-in-cloud-migration/

IT Convergence. (2020a, April 3). *A French multinational food-products Corporation implements RPA technologies*. Retrieved November 17, 2020, from https://www.itconvergence.com/case-study/a-french-multinational-food-products-corporation-implements-rpa-technologies/

IT Convergence. (2020b, November 10). *Eyewear company migrates to OCI upgrading database Inflight*. Retrieved November 16, 2020, from https://www.itconvergence.com/case-study/eyewear-company-migrates-to-oci-upgrading-database-inflight/

IT Convergence. (2020c, November 10). *Global recreation and lifestyle brands company migrates into multiple clouds at scale with OCI*. Retrieved November 17, 2020, from https://www.itconvergence.com/case-study/global-recreation-and-lifestyle-brands-company-migrates-into-multiple-clouds-at-scale-with-oci/

IT Convergence. (2020d, November 10). *Leading global bike manufacturer*. Retrieved November 17, 2020, from https://www.itconvergence.com/case-study/leading-global-bike-manufacturer/

IT Convergence. (2020e, October 14). *Leading pension fund manager in Latin America implements OAC and ADWC*. Retrieved November 17, 2020, from https://www.itconvergence.com/case-study/leading-pension-fund-manager-in-latin-america-implements-oac-and-adwc/

IT Convergence. (2020f, November 10). *Oracle ERP cloud implementation and support for a leading biotech company*. Retrieved November 17, 2020, from https://www.itconvergence.com/case-study/oracle-erp-cloud-implementation-and-support-for-a-leading-biotech-company/

IT Convergence. (n.d.). *Global technology solutions company succeeds with Hybrid Cloud Migration*. Retrieved November 15, 2020, from https://www.itconvergence.com/case-study/global-technology-company-succeeds-with-multiple-application-hybrid-cloud-migration/

ITEA. (1996). *Technology for all Americans: A rationale and structure for the study of technology*.

ITEA. (2007). *Standards for technological literacy: Content for the study of technology* (3rd ed.).

ITU-T. (n.d.). *Cloud computing*. ITU. Retrieved April 16, 2020, from https://www.itu.int/en/ITU-T/climatechange/resources/Pages/topic-08.aspx

Jamshidi, P., Ahmad, A., & Pahl, C. (2013). Cloud migration research: A systematic review. *IEEE Transactions on Cloud Computing*, *1*(2), 142-157. https://doi.org/10.1109/tcc.2013.10

Jasgur, C. (2019). Leveraging disaster recovery in the cloud as a cloud migration path: A case study. *Journal of Business Continuity & Emergency Planning*, *13*(2), 150-159.

Jean, R., Sinkovics, R. R., & Zagelmeyer, S. (2018). Antecedents and innovation performance implications of MNC political ties in the Chinese automotive supply chain. *Management International Review*, *58*(6), 995-1026. https://doi.org/10.1007/s11575-018-0370-2

Johnson, M. (2017, February 13). How a center of excellence can help you achieve next level CRM. *Accenture | Let there be change*. https://www.accenture.com/us-en/blogs/blogs-how-center-excellence-can-help-you-achieve-next-lvl-crm

Johnston, S., & Paladino, A. (2007). Knowledge management and involvement in innovations in MNC subsidiaries. *Management International Review*, *47*(2), 281-302. https://doi.org/10.1007/s11575-007-0016-2

Journal of Engineering. (2017). *HotLink partners with Avnet to enable public cloud adoption by corporate data centers*. NewsRX LLC. https://link.gale.com/apps/doc/A480892765/AONE?u=purdue_main&sid=AONE&xid=8cbe7577

Kader Ali, N. N., & Tang, S. Y. (2016). Does multiple leadership styles mediated by job satisfaction influence better business performance? Perception of MNC employees in Malaysia. *SHS Web of Conferences*, *23*, 02005. https://doi.org/10.1051/shsconf/20162302005

Kash, W. (2014, January 21). *Cloud providers align with FedRAMP security standards*. InformationWeek. Retrieved April 19, 2020, from https://www.informationweek.com/government/cybersecurity/cloud-providers-align-with-fedramp-security-standards/d/d-id/1113499

Khandelwal, D. (2019, March 7). *These three trends define the next phase of cloud computing*. Digitalist Magazine News on Cloud, Mobile, Big Data, Analytics & More | SAP Innovation. Retrieved June 20, 2020, from https://www.digitalistmag.com/digital-economy/2019/03/07/3-trends-define-next-phase-of-cloud-computing-06196853/

Koehring, M. (2015). *Harnessing cloud technology: How multinationals are using the cloud to reinvent business models*. The Economist. https://eiuperspectives.economist.com/technology-innovation/harnessing-cloud-technology/white-paper/harnessing-cloud-technology

Laczniak, G. R., & Kennedy, A. (2011). Hyper norms. *Journal of Macromarketing*, *31*(3), 245-256. https://doi.org/10.1177/0276146711405530

Lee, I. (2019). An optimization approach to capacity evaluation and investment decision of hybrid cloud: a corporate customer's perspective. *Journal of Cloud Computing*, *8*(1). https://journalofcloudcomputing.springeropen.com/articles/10.1186/s13677-019-0140-0

Lee, Y. (2019). Adoption intention of cloud computing at the firm level. *Journal of Computer Information Systems*, *59*(1), 61-72. https://doi.org/10.1080/08874417.2017.1295792

Leong, K. B., & Gittlen, S. (2011, June/July). Taking the plunge into the cloud. *Network World Asia*, 10-15.

Leong, L. (2019, January 15). *How to build a cloud center of excellence*. Gartner. Retrieved November 23, 2020, from https://www.gartner.com/en/documents/3898167/how-to-build-a-cloud-center-of-excellence

Leung, F. F., Tse, C. H., & Yim, C. K. (2019). Engaging customer cocreation in new product development through foreign subsidiaries: Influences of multinational corporations' global integration and local adaptation mechanisms. *Journal of International Marketing*, *28*(2), 59-80. https://doi.org/10.1177/1069031x19890345

Levy, O., Taylor, S., Boyacigiller, N. A., Bodner, T. E., Peiperl, M. A., & Beechler, S. (2014). Perceived senior leadership opportunities in MNCs: The effect of social hierarchy and capital. *Journal of International Business Studies*, *46*(3), 285-307. https://doi.org/10.1057/jibs.2014.53

Lichtenthäler, R., Prechtl, M., Schwille, C., Schwartz, T., Cezanne, P., & Wirtz, G. (2019). Requirements for a model-driven cloud-native migration of monolithic web-based applications. *SICS Software-Intensive Cyber-Physical Systems*, *35*(1-2), 89-100. https://doi.org/10.1007/s00450-019-00414-9

Lin, A., & Chen, N. (2012). Cloud computing as an innovation: Percepetion, attitude, and adoption. *International Journal of Information Management*, *32*(6), 533-540. https://doi.org/10.1016/j.ijinfomgt.2012.04.001

Littrell, L. N., Salas, E., Hess, K. P., Paley, M., & Riedel, S. (2006). Expatriate preparation: A critical analysis of 25 years of cross-cultural training research. *Human Resource Development Review*, *5*(3), 355-388. https://doi.org/10.1177/1534484306290106

Lo, M., Ramayah, T., & Wang, Y. C. (2015). Sustainable leadership: Power of influence in MNCs in Malaysia. *Applied Economics*, *47*(30), 3198-3215. https://doi.org/10.1080/00036846.2015.1013610

Low, C., Chen, Y., & Wu, M. (2011). Understanding the determinants of cloud computing adoption. *Industrial Management & Data Systems*, *111*(7), 1006-10023. https://doi.org/10.1108/02635571111161262

Lukasik, K. (2020, April 23). *Case study: How to quickly build and deliver a cloud-agnostic product*. Cloud Computing News. Retrieved November 23, 2020, from https://cloudcomputing-news.net/news/2020/apr/23/case-study-how-to-quickly-build-and-deliver-a-cloud-agnostic-product/

Ma, X., Delios, A., & Yu, S. (2019). Innovation in MNC'S strategy and structure: The (re) emergence of host country headquarters in large emerging markets. *Asia Pacific Journal of Management*. https://doi.org/10.1007/s10490-019-09669-x

Magoulas, R., & Swoyer, S. (2020, May 19). *Cloud adoption in 2020*. O'Reilly Media.

Maitland, E., & Sammartino, A. (2012). Flexible footprints: Reconfiguring MNCs for new value opportunities. *California Management Review*, *54*(2), 92-117. https://doi.org/10.1525/cmr.2012.54.2.92

Makhlouf, R. (2020). Cloudy transaction costs: A dive into cloud computing economics. *Journal of Cloud Computing*, *9*(1). https://doi.org/10.1186/s13677-019-0149-4

Manek, S. (2020, March 31). *IDC expects 2021 to be the year of multi-cloud as global COVID-19 pandemic reaffirms critical need for business agility*. IDC: The premier global market intelligence company. Retrieved June 11, 2020, from https://www.idc.com/getdoc.jsp?containerId=prMETA46165020

Maurya, R. (2019, April 8). *10 top cloud migration tools & services for companies or businesses*. H2S Media. Retrieved November 15, 2020, from https://www.how2shout.com/tools/top-cloud-migration-tools-companies-or-businesses.html

Maven Wave. (2017). *Removing the barriers to move to the cloud*. Author. Retrieved April 19, 2020, from https://www.mavenwave.com/white-papers/removing-the-barriers-to-move-to-the-cloud/

McCrea, B. (2013, October). State of cloud computing: Sky's the limit. *Logistics Management*, 41-43. https://www.logisticsmgmt.com/article/state_of_cloud_computing_skys_the_limit

McKendrick, J. (2013, December 1). *10 traits of highly effective cloud leaders*. Forbes. Retrieved June 11, 2020, from https://www.forbes.com/sites/joemckendrick/2013/12/01/10-traits-of-highly-effective-cloud-leaders/#abbef35537af

Mell, P., & Grance, T. (2011). *The NIST definition of cloud computing* (SP 800-145). NIST. https://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-145.pdf

Mercer, E. (n.d.). *How to adapt to changes at work with technology*. Small Business - Chron.com. https://smallbusiness.chron.com/adapt-changes-work-technology-30901.html

Michailova, S., & Zhan, W. (2015). Dynamic capabilities and innovation in MNC subsidiaries. *Journal of World Business*, *50*(3), 576-583. https://doi.org/10.1016/j.jwb.2014.10.001

Micro Focus. (2018). *Multi-national electronics manufacturer: Atos leverages PlateSpin to seamlessly migrate multi-national electronics manufacturer to Amazon Web Services* (168-000455-001). https://www.microfocus.com/media/success-story/multi_national_electronics_manufacturer_ss.pdf

Mitra, A., O'Regan, N., & Ruan, X. (2014). *Rays of Uniqueness – Cloud in Multinational Organisations: Challenge to Traditional Business System Alignments*. In H. Li, M. Mantymaki, & X. Zhang (Eds.), *Digital Services and Information Intelligence. I3E 2014. IFIP Advances in Information and Communication Technology, vol 445* (pp. 91-103). Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-662-45526-5_9

Modh, N. (2020, March 12). Google: Modern analytics made easy with new Redshift, S3 migration tools. *Google Cloud Blog*. https://search.proquest.com/docview/2376282113?accountid=13360

Muller, H. (2015). *The big shift in IT leadership: How great CIOs leverage the power of technology for strategic business growth in the customer-centric economy*. John Wiley & Sons. https://learning.oreilly.com/library/view/the-big-shift/9781118867129/

National Academies of Sciences, Engineering, and Medicine. (2019). *Continuous improvement of NASA's innovation ecosystem: Proceedings of a workshop (2019)*. The National Academies Press. https://doi.org/10.17226/25505

Network World. (2012). *What to look for in cloud data migration tools*. https://search.proquest.com/docview/1019724593?accountid=13360

Networks Asia. (2016). *S'pore MNCs have a cloud adoption rate that's three times the global average*. https://search.proquest.com/docview/1821760127?accountid=13360

Networks Asia. (2018). *Tech businesses in Singapore reveal their key concerns for 2018*. https://search.proquest.com/docview/2025091564?accountid=13360

NIST. (2019, July 9). *NIST cloud computing program - NCCP*. https://www.nist.gov/programs-projects/nist-cloud-computing-program-nccp

Nizam, I., & Vilhi, M. (2018). The determinants of green ICT adoption in foreign multinational organizations in Malaysia. *International Journal of Management, Accounting and Economics*, *5*(4), 214-243. http://www.ijmae.com/

Nonaka, I., & Takeuchi, H. (2011, May 1). The Wise Leader. *Harvard Business Review*, 58-67. https://www.asme.org.uk/images/pdfs/2013/Wise_Leader_-_Nonaka_takeuchi.pdf

Northouse, P. G. (2018). *Leadership: Theory and practice* (8th ed.). SAGE Publications.

OECD. (2018). *OECD science, technology and innovation outlook 2018 adapting to technological and societal disruption: Adapting to technological and societal disruption*. OECD Publishing. https://doi.org/10.1787/sti_in_outlook-2018-en

Oracle. (2020). *Customer 2 cloud program*. Oracle | Integrated Cloud Applications and Platform Services. Retrieved April 19, 2020, from https://www.oracle.com/applications/customer2cloud/

Oracle. (n.d.a). *Cloud infrastructure that costs less than AWS*. Oracle | Integrated Cloud Applications and Platform Services. Retrieved November 23, 2020, from https://www.oracle.com/cloud/economics/

Oracle. (n.d.b). *Migrate your on premise apps to the cloud*. Oracle | Integrated Cloud Applications and Platform Services. Retrieved November 23, 2020, from https://www.oracle.com/cloud/migrate-applications-to-oracle-cloud/

Oracle. (n.d.c). *Zoom scaled rapidly to millions of users on Oracle cloud infrastructure platform*. Oracle | Integrated Cloud Applications and Platform Services. Retrieved November 23, 2020, from https://www.oracle.com/customers/zoom.html

Ostergaard, B. (2014, March). How to select the best hybrid cloud provider for your firm. *ComputerWeekly.com*, 17-19. ComputerWeekly.com

Papanastassiou, M., Pearce, R., & Zanfei, A. (2020). Changing perspectives on the internationalization of R&D and innovation by multinational enterprises: A review of the literature. *Journal of International Business Studies*, *51*(4), 623-664. https://doi.org/10.1057/s41267-019-00258-0

Pettigrew, A. M. (2012). The conduct of qualitative research in organizational settings. *Corporate Governance: An International Review*, *21*(2), 123-126. https://doi.org/10.1111/j.1467-8683.2012.00925.x

Plus Company Updates. (2019). *Cloudsfer: the new cloud migration tool for the masses*. Plus Media. https://link.gale.com/apps/doc/A589642381/ITOF?u=purdue_main&sid=ITOF&xid=9017bc61

PR Newswire. (2013). *Cloud technology partners to demo PaaSLane application migration tool at cloud expo*. PR Newswire US. prnewswire.com

PR Newswire. (2020a). *Global cloud migration office tools market was valued at US$ 3,658.0 Mn in 2018 and is expected to reach US$ 25,153.9 Mn by 2027, growing at a CAGR Of 24.2% over the forecast period, owing to the increased demand for cloud backup across all organizations, says absolute markets insights*. PR Newswire US. prnewswire.com

PR Newswire. (2020b). *GlobalSCAPE unveils enhanced file transfer 2020 platform*. PR Newswire US. prnewswire.com

PR Newswire. (2020c). *TDS announces cloud migration accelerator offering available on AWS Marketplace*. PR Newswire US. prnewswire.com

PR Newswire. (2020d). *The Next Pathway "SHIFT" - Legacy Data Warehouse Migration to the Cloud in Just a Few Clicks*. PR Newswire US. prnewswire.com

PR Newswire. (2020e). *Two thirds of Global 2000 risk unexpected cost/performance issues by rushing their legacy applications to the cloud due to COVID-19*. PR Newswire US. prnewswire.com

Preimesberger, C. (2018). *How Oracle is convincing institutional users to move to the cloud*. EWeek. eweek.com

Punitha, A. A., & Indumathi, G. (2017). A review on cloud storage security in distributed computing. *Advances in Natural and Applied Sciences*, *11*(6), 206-213. https://go.gale.com/ps/anonymous?id=GALE%7CA499343772&sid=googleScholar&v=2.1&it=r&linkaccess=abs&issn=19950772&p=AONE&sw=w

Qasem, Y. A., Abdullah, R., Yah, Y., Atan, R., Al-Sharafi, M. A., & Al-Emran, M. (2020). Towards the development of a comprehensive theoretical model for examining the cloud computing adoption at the organizational level. *Studies in Systems, Decision and Control*, 63-74. https://doi.org/10.1007/978-3-030-47411-9_4

Rai, R., Sahoo, G., & Mehfuz, S. (2015). Exploring the factors influencing the cloud computing adoption: A systematic study on cloud migration. *SpringerPlus*, *4*(1). https://doi.org/10.1186/s40064-015-0962-2

Raisinghani, M. S. (2018). Interview on next generation it. *Journal of Information Technology Case and Application Research*, *20*(3-4), 158-160. https://doi.org/10.1080/15228053.2019.1588552

Rakthin, S. (2015). Assessing knowledge transfer in a Thai multinational corporation. *Global Business and Organizational Excellence*, *34*(6), 30-41. https://doi.org/10.1002/joe.21633

Ramkhelawan, S., Cadersaib, Z., & Gobin, B. (2015). Cloud computing as an alternative for on-premise software for Mauritian hotels. *Lecture Notes on Software Engineering*, *3*(2), 113-119. https://doi.org/10.7763/lnse.2015.v3.176

Ramo, J. C. (2016). *The seventh sense: Power, fortune, and survival in the age of networks*. Little, Brown.

Rani, S. (2017). Cloud computing: A perspective approach. *International Journal of Advanced Research in Computer Science*, *8*(1), 184-197. https://www.ijarcs.info

Raut, R. D., Gardas, B. B., Jha, M. K., & Priyadarshinee, P. (2017). Examining the critical success factors of cloud computing adoption in the MSMEs by using ISM model. *The Journal of High Technology Management Research*, *28*(2), 125-141. https://doi.org/10.1016/j.hitech.2017.10.004

Reilly, M., & Sharkey Scott, P. (2014). Subsidiary driven innovation within shifting MNC structures: Identifying new challenges and research directions. *Technovation*, *34*(3), 190-202. https://doi.org/10.1016/j.technovation.2013.11.004

Reitzel, D. (2019). *Grant Thornton: Guiding organizations through cloud-based ERP adoption*. Grant Thornton. grantthornton.com

Repschlaeger, J., Erek, K., & Zarnekow, R. (2013). Cloud computing adoption: An empirical study of customer preferences among start-up companies. *Electronic Markets*, *23*(2), 115-148. https://doi.org/10.1007/s12525-012-0119-x

Retrieved June 17, 2020, from https://www.oreilly.com/radar/cloud-adoption-in-2020/

Riaz, S., & Muhammad, J. (2015). *An evaluation of public cloud adoption for higher education: A case study from Pakistan*. In *2015 International Symposium on Mathematical Sciences and Computing Research (iSMSC)* (pp. 208-213). IEEE. https://doi.org/10.1109/ISMSC.2015.7594054

Ries, E. (2011). *The lean startup: How today's entrepreneurs use continuous innovation to create radically successful businesses*. Crown Business. https://www.amazon.com/dp/0307887898

Rocbe, E. M. (2003). Ubiquitous computing i.n the multinational enterprise. *Journal of Global Information Technology Management*, *6*(4), 1-5. https://doi.org/10.1080/1097198x.2003.10856357

Rogers, R. (2019). *The road to cloud: how to execute a seamless migration*. Good Gear Guide. goodgearguide.com.au

Rumelt, R. (2011). *Good strategy/Bad strategy: The difference and why it matters*. Profile Books.

Saita, A. (2020, May/June). Making your way through the cloud. *InfoSecurity Professional*, *3*(13), 16-19. https://magazines.isc2.org/pages/2020/2020-05/

Sale, J. E., & Thielke, S. (2018). Qualitative research is a fundamental scientific process. *Journal of Clinical Epidemiology*, *102*, 129-133. https://doi.org/10.1016/j.jclinepi.2018.04.024

Schilling, M. (2017). *Strategic management of technological innovation* (5th ed.). McGraw-Hill Higher Education.

Schmidt, C., Mansson, S., & Dolles, H. (2013). Managing talents for global leadership positions in MNCs: Responding to the challenges in China. *Asian Business & Management*, *12*(4), 477-496. https://doi.org/10.1057/abm.2013.11

Sekaran, U., & Bougie, R. (2016). *Research methods for business: A skill building approach* (7th ed.). John Wiley & Sons.

Shaw, B., & Luiz, J. M. (2017). The impact of distance (External) and organizational factors (Internal) on the knowledge chain of multinational corporations: South Africa as a host country. *Thunderbird International Business Review*, *60*(3), 295-311. https://doi.org/10.1002/tie.21892

Shaw, S. (2020, May 19). *Beyond infrastructure: Turning cloud computing into concrete, measurable benefits*. VentureBeat. Retrieved June 20, 2020, from https://venturebeat.com/2020/05/19/beyond-infrastructure-turning-cloud-computing-into-concrete-measurable-benefits/

Shein, E. (2018, September). Journey to the cloud. *University Business*, 47-49. universitybusiness.com

Shubhendu, S. (2020). *'Heavy reliance on cloud data and automation is a big trend'*. Voice & Data. https://search.proquest.com/docview/2450213201?accountid=13360

Singh, H. P., Bhisikar, A., & Singh, J. (2013). Innovative ICT through cloud computing. *IUP Journal of Computer Sciences*, *7*(1), 37-52. https://iupindia.in/1301/Computer%20Sciences/Computer_Sciences.asp?mag=https://iupindia.in/1301/Computer%20Sciences/Computer_Sciences_sub.asp

Singh, N., & Hong, P. (2017). From local to global: Developing a business model for Indian MNCs to achieve global competitive advantage. *Journal of Asia-Pacific Business*, *18*(3), 192-219. https://doi.org/10.1080/10599231.2017.1346409

Software World Intelligence. (2018). Business are spending more on cloud, but need better guidance on how to migrate effectively. *Software World*, *49*(4), 23-24.

Software World. (2018). Barriers to public cloud adoption are fading, but the perils of simply 'lifting and shifting' servers remain. *Software World*, *49*(1), 26. https://link.gale.com/apps/doc/A528710595/ITOF?u=purdue_main&sid=ITOF&xid=51a6ed82

Soltani, E., & Wilkinson, A. (2011). The Razor's edge: Managing MNC affiliates in Iran. *Journal of World Business*, *46*(4), 462-475. https://doi.org/10.1016/j.jwb.2010.10.007

Stavinoha, K. (2013). Cloud computing update: Trends, risks, and mitigations. *Petroleum Accounting and Financial Management*, *32*(3), 1-16. https://cob.unt.edu/ipa/journal/2013/3

Stieninger, M., & Nedbal, D. (2014). *Drivers for the actual usage of cloud services: An examination of influencing factors for digital natives*. In M. Kurosu (Ed.), *Human-computer interaction theories, methods, and tools: 16th International Conference, HCI international 2014, Heraklion, Crete, Greece, June 22-27, 2014, proceedings* (pp. 69-79). Springer. https://www.springer.com/gp/book/9783319072326

Strategic Innovation Group. (2002). *A framework for strategic innovation - From breakthrough inspiration to business impact*. Author. http://www.raumer.com/articles%20and%20presentations/Strategic%20Innovation%20White%20Paper.pdf

Subramanian, K. (2011, March 15). *Global cloud computing - cultural issues*. CloudAve. Retrieved April 19, 2020, from https://www.cloudave.com/10864/global-cloud-computing-cultural-issues/

Sultan, N., & Van de Bunt-Kokhuis, S. (2012). Organisational culture and cloud computing: coping with a disruptive innovation. *Technology Analysis & Strategic Management*, *24*(2), 167-179. https://www.tandfonline.com/doi/abs/10.1080/09537325.2012.647644

Supramaniam, V., & Teoh, A. P. (2019). The roles of uncertainty avoidance and strategic agility in cloud storage adoption among multinational manufacturing companies in Malaysia. *International Journal of Sustainable Strategic Management*, *7*(1/2), 131-151. https://doi.org/10.1504/ijssm.2019.10020494

Taft, D. K. (2013). *IBM Secure Cloud migration tool released*. EWeek. eweek.com

Taguchi, N. (2018). Description and explanation of pragmatic development: Quantitative, qualitative, and mixed methods research. *System*, *75*(2018), 23-32. https://doi.org/10.1016/j.system.2018.03.010

Tan, D., Su, W., Mahoney, J. T., & Kor, Y. (2020). A review of research on the growth of multinational enterprises: A Penrosean lens. *Journal of International Business Studies*, *51*(4), 498-537. https://doi.org/10.1057/s41267-020-00328-8

Tanner, J. C. (2012, February/March). The carrier case for the cloud: Tier-1 carriers in Asia see plenty of opportunity and value in the cloud - now they just have to convince MNCs and regulators. *Telecom Asia*, *23*(1), 18+. https://link.gale.com/apps/doc/A288055117/ITOF?u=purdue_main&sid=ITOF&xid=1cb7b720

Telecom Asia. (2017). *Public cloud adoption growing globally*. https://search.proquest.com/docview/1913973947?accountid=13360

Thompson, N. (2017). *Organizational leadership challenges in adopting cloud computing: A systematic literature review* (10608707) [Doctoral dissertation]. ProQuest Dissertations and Theses Global.

Tidal Migrations. (n.d.). *Discover your applications*. Retrieved June 11, 2020, from https://tidalmigrations.com/tour/discover/

Travers, M. (2001). *Qualitative research through case studies*. SAGE. https://dx-doi-org.ezproxy.lib.purdue.edu/10.4135/9781849209724.n1

Trigueros-Preciado, S., Pérez-González, D., & Solana-González, P. (2013). Cloud computing in industrial SMEs: Identification of the barriers to its adoption and effects of its application. *Electronic Markets*, *23*(2), 105-114. https://doi.org/10.1007/s12525-012-0120-4

Tripathi, S. (2017). Determinants of cloud computing intentions to use: role of firm's size, managerial structure and industrial sector. *Journal of International Technology and Information Management*, *28*(2), 51-92. https://scholarworks.lib.csusb.edu/jitim/

Tripathi, S., & Nasina, J. (2017). Adoption of cloud computing in business: A multi-case approach to evaluate the Fit-Viability Model (FVM). *International Journal of Business and Information*, *12*(1), 39-64. https://doi.org/10.6702/ijbi.2017.12.1.2

Turner, M. J., & Grieser, T. (2017). *Critical application and business KPIs for successful cloud migration* (US42919317). IDC. https://cloud.kapostcontent.net/pub/f0124c8b-037e-448a-a888-179f2a1e3ee8/idc-critical-application-and-business-kpis-for-successful-cloud-migration.pdf

txture. (n.d.). *Cloud Center of Excellence: The ultimate platform for the CCOE*. txture.io. https://cdn2.hubspot.net/hubfs/3001050/One%20Pager/CCoE_Txture.pdf

UNDP. (2019). *Human development report 2019: Inequality in human development in the 21st century*. Author. http://hdr.undp.org/sites/default/files/hdr2019.pdf

UNDP. (n.d.). *Human development index (HDI)*. Human Development Reports | United Nations Development Programme. Retrieved April 16, 2020, from https://hdr.undp.org/en/content/human-development-index-hdi

UNEP. (n.d.). *Why does technology matter?* https://www.unenvironment.org/explore-topics/technology/why-does-technology-matter

United States Department of Defense. (2018). *DoD cloud strategy*. Washington, DC: Author. https://media.defense.gov/2019/Feb/04/2002085866/-1/-1/1/DOD-CLOUD-STRATEGY.PDF

USC Libraries. (2020, June 25). *Research guides: Organizing your social sciences research paper: Qualitative methods*. USC. Retrieved July 19, 2020, from https://libguides.usc.edu/writingguide/qualitative

Van Hove, S., De Letter, J., De Ruyck, O., Conradie, P., All, A., Saldien, J., & De Marez, L. (2018). Human-computer interaction to human-computer-context interaction: Towards a conceptual framework for conducting user studies for shifting interfaces. *Design, User Experience, and Usability: Theory and Practice*, 277-293. https://link.springer.com/chapter/10.1007%2F978-3-319-91797-9_20

Wang, L., James, K. T., Denyer, D., & Bailey, C. (2014). Western views and Chinese whispers: Re-thinking global leadership competency in multi-national corporations. *Leadership*, *10*(4), 471-495. https://doi.org/10.1177/1742715013510340

Wani, H. (2020, November 13). *Planning cloud migration? Check out these best practices*. Leading Global IT Consulting & Digital Solutions | Hexaware. Retrieved November 17, 2020, from https://hexaware.com/blogs/planning-cloud-migration-check-out-these-best-practices/

Warren, K. (2018). *Enterprise cloud adoption framework (ECAF)* (18-2385). Mitre Corp. https://www.mitre.org/sites/default/files/publications/pr-18-2385-enterprise-cloud-adoption-framework%20for%20PR%20Case%20number%2018-2385.pdf

White, D. (2020, July 16). *Top 15 cloud migration tools in 2020 | TechFunnel*. Techfunnel. Retrieved November 15, 2020, from https://www.techfunnel.com/information-technology/cloud-migration-tools/

White, J., Drew, S., & Hay, T. (2009). Ethnography versus case study - positioning research and researchers. *Qualitative Research Journal*, *9*(1), 18-27. https://doi.org/10.3316/qrj0901018

Wilkers, R. (2017, June 6). *Deloitte picks up German software service outfit innoWake -- Washington technology*. Washington Technology. Retrieved November 26, 2020, from https://washingtontechnology.com/articles/2017/06/06/deloitte-innowake-buy.aspx

Wong MNC Center. (2019, October 18). *MNCs in the news-2019-10-18*. Wong MNC Center | Probing Multinational Corporations in and from East Asia. Retrieved November 23, 2020, from https://mnccenter.org/news/mncs-news-2019-10-18

Wu, D., Hwang, J., Vukovic, M., & Anerousis, N. (2017). *BlueSight: Automated discovery service for cloud migration of enterprises*. In K. Drira, H. Wang, Q. Yu, Y. Wang, Y. Yan, F. Charoy, J. Mendling, M. Mohamed, Z. Wang, & S. Bhiri (Eds.), *Service-oriented computing – ICSOC 2016 workshops: ASOCA, ISyCC, BSCI, and satellite events, Banff, AB, Canada, October 10–13, 2016, revised selected papers* (pp. 211-215). Springer. https://doi.org/10.1007/978-3-319-68136-8_27

Yang, S. J., Tu, C. C., & Lin, J. (2015). *Design issue and performance analysis of data migration tool in a cloud-based environment*. In W. E. Wong (Ed.), *Proceedings of the 4th International Conference on Computer Engineering and Networks. Lecture Notes in Electrical Engineering, vol 355* (pp. 749-759). Springer. https://doi-org.ezproxy.lib.purdue.edu/10.1007/978-3-319-11104-9_87

Yoo, C. S. (2011). Cloud computing: Architectural and policy implications. *Review of Industrial Organization*, *38*(4), 405-421. https://doi.org/10.1007/s11151-011-9295-7

Zhang, R. (2020). The impacts of cloud computing architecture on cloud service performance. *Journal of Computer Information Systems*, *60*(2), 166-174. https://doi.org/10.1080/08874417.2018.1429957

Zhao, F., Scheruhn, H., & Rosing, M. V. (2014). *The impact of culture differences on cloud computing adoption*. In M. Kurosu (Ed.), *Human-computer interaction theories, methods, and tools: 16th International Conference, HCI international 2014, Heraklion, Crete, Greece, June 22-27, 2014, proceedings* (pp. 776-785). Springer. https://www.springer.com/gp/book/9783319072326

Zhao, J., & Zhou, J. (2014). Strategies and methods for cloud migration. *International Journal of Automation and Computing*, *11*(2), 143-152. https://doi.org/10.1007/s11633-014-0776-7

Zhao, M., Park, S. H., & Zhou, N. (2014). MNC strategy and social adaptation in emerging markets. *Journal of International Business Studies*, *45*(7), 842-861. https://doi.org/10.1057/jibs.2014.8

Zheng, X., Nan, Y., Wang, F., Song, R., Zheng, G., Wang, G., Lu, Y., & Zhao, Q. (2019). A data transmission strategy with energy minimization based on optimal stopping theory in mobile cloud computing. *Wireless Communications and Mobile Computing*, *2019*, 1-11. https://doi.org/10.1155/2019/1257150

APPENDIX A. ACMT REFERENCES

Provider	Provider Type	Research Score	References
	Scope	Out of 4 (1-2 Red, 3 Yellow, 4 Green)	Access Links
CAST	Migration Tool		https://www.castsoftware.com/products/highlight/cloud-readiness-paas-migration
Cloud Technology Partners	Migration Tool		https://www.cloudtp.com/technology/
Cloudamize	Migration Tool		https://www.cloudamize.com/en/home/
Device42	Migration Tool		https://www.device42.com/
LTI	Migration Tool		https://www.lntinfotech.com/digital-platforms/technology-platforms/rapidadopt/
Micro Focus PlateSpin Migrate	Migration Tool		https://www.microfocus.com/en-us/products/platespin-migrate/overview
Tidal Migrations	Migration Tool		https://tidalmigrations.com
CloudCheckr	Management Tool		https://cloudcheckr.com/
Densify	Management Tool		https://www.densify.com/
Dynatrace	Management Tool		https://www.dynatrace.com
Turbonomic	Management Tool		https://www.turbonomic.com
AppDynamics	M&M Tool		https://www.appdynamics.com/
Cloud Hedge	M&M Tool		https://cloudhedge.io/
Corent SurPaaS	M&M Tool		https://www.corenttech.com
hystax	M&M Tool		https://hystax.com/
Txture	M&M Tool		https://txture.io/en
Alibaba	CSP		https://www.alibabacloud.com/
AWS	CSP		https://aws.amazon.com/
Azure	CSP		https://azure.microsoft.com/
Google	CSP		https://cloud.google.com/
IBM	CSP		https://www.ibm.com/cloud
Oracle	CSP		https://www.oracle.com/cloud/
Deloitte	Consultant		https://www2.deloitte.com/us/en/pages/consulting/topics/atadata-automated-cloud-management-platform.html

APPENDIX B. META-ANALYSIS SAMPLE REFERENCES

#	Citation	#	Citation	#	Citation
1	Ahmad et al., 2018	44	Densify, n.d.c	87	Networks Asia, 2016
2	Ahmed & Singh, 2019	45	Dignan, 2020	88	Networks Asia, 2018
3	Alibaba Cloud, n.d.a	46	Donnelly, 2020	89	Nizam & Vilhi, 2018
4	Alibaba Cloud, n.d.b	47	Evangelista & Neto, 2015	90	Oracle, n.d.a
5	Alibaba Cloud, n.d.c	48	EWeek Editors, 2019	91	Oracle, n.d.b
6	Alibaba Cloud, n.d.d	49	Filatov, 2019	92	Oracle, n.d.c
7	Alibaba Cloud, n.d.e	50	Froehlich, 2017	93	Ostergaard, 2014
8	AppDynamics, n.d.a	51	Galov, 2020	94	Plus Company Updates, 2019
9	AppDynamics, n.d.b	52	Gannon, 2019	95	PR Newswire, 2013
10	AWS, 2017	53	Gogate, 2018	96	PR Newswire, 2020a
11	Axarloglou, 2020	54	Goodwin, 2011	97	PR Newswire, 2020b
12	Bavare, 2017	55	Google Cloud, 2020	98	PR Newswire, 2020c
13	Biswas et al., 2018	56	Gulati, 2021	99	PR Newswire, 2020d
14	Blanchard, 2019	57	H.L. et al., 2018	100	PR Newswire, 2020e
15	Borges et al., 2018	58	Harvey, 2018	101	Preimsberger, 2018
17	Bourne, 2017a	59	HPE, 2019	102	Qasem et al., 2020
16	Bourne, 2017b	60	IBM Cloud, n.d.	103	Rai et al., 2015
19	Bourne, 2020a	61	Information Technology Newsweekly, 2019	104	Reitzel, 2019
18	Bourne, 2020b	62	Infosys, n.d.	105	Riaz & Muhammad, 2015
20	Bourne, 2020c	63	IT Convergence, 2019a	106	Rogers, 2019
21	Chambers, 2018	64	IT Convergence, 2019b	107	Shaw & Luiz, 2017
22	Choudhary & Bhadada, 2020	65	IT Convergence, 2019c	108	Shein, 2018
23	Cidres et al., 2020	66	IT Convergence, 2019d	109	Shubhendu, 2020
24	Cloudamize, 2020	67	IT Convergence, 2019e	110	Singh & Hong, 2017
25	Cloudamize, n.d.	68	IT Convergence, 2020a	111	Software World Intelligence, 2018
26	CloudAtlas, n.d.	69	IT Convergence, 2020b	112	Software World, n.d.
27	CloudCheckr, 2017	70	IT Convergence, 2020c	113	Supramaniam & Teoh, 2019
28	CloudCheckr, n.d.a	71	IT Convergence, 2020d	114	Taft, 2013
29	CloudCheckr, n.d.b	72	IT Convergence, 2020e	115	Tanner, 2012
30	Cloudreach, 2017	73	IT Convergence, 2020f	116	Telecom Asia, 2017
31	Cloudsine, 2019	74	IT Convergence, n.d.	118	Tripathi & Nasina, 2017
32	Computer Weekly News, 2020	75	Jamshidi et al., 2013	117	Tripathi, 2017
33	Contify Banking News, 2020	76	Jasgur, 2019	119	Turner & Grieser, 2017
34	Cooney et al., 2020	77	Johnson, 2017	120	Wani, 2020
35	CSCC, 2018	78	Journal of Engineering, 2017	121	White, 2020
36	Dataquest, 2016	79	Leong & Gittlen, 2011	122	Wilkers, 2017
37	Deloitte, 2019a	80	Leong, 2019	123	Wong MNC Center, 2019
38	Deloitte, 2019b	81	Lichtenthaler et al., 2019	124	Yang et al., 2015
39	Deloitte, 2019c	82	Lukasik, 2020		
40	Deloitte, n.d.	83	Maurya, 2019		
41	Densify, 2020	84	Mitra et al., 2014		
42	Densify, n.d.a	85	Modh, 2020		
43	Densify, n.d.b	86	Network World, 2012		

APPENDIX C. IRB EXEMPTION

From: irb@purdue.edu
Date: February 8, 2021 at 8:49:09 AM EST
To: "Naimi, Linda L" <lnaimi@purdue.edu>; "Sneider, Ethan" <esneider@purdue.edu >
Subject: IRB-2021-187 - Initial: Not Human Subjects Research (NHSR)

PURDUE
UNIVERSITY

This Memo is Generated from the Purdue University Human Research Protection Program System, Cayuse IRB.

Date: February 8, 2021
PI: LINDA NAIMI

CO-PI: ETHAN SNEIDER
Re: Initial - IRB-2021-187
Best Leadership Practices of Multinational Corporations in the Use of Automated Migration Tools in Adoption of Commercial Cloud Computing Platforms: A Meta-Analysis

Through the answers you provided in response to questions in the Cayuse IRB system, Purdue's HRPP has determined that the research does not qualify as Human Subjects Research under federal human subjects research regulations (e.g., 45 CFR 46).
Decision: No Human Subjects Research
Findings: NA
Research Notes: NA

The answers provided in your Cayuse IRB application indicate:

- You will not collect data from human subjects for the purpose of research intended to create generalizable knowledge. Reasons that are not considered research include purposes such as internal programmatic evaluation, quality improvement, or business analysis.
- You will not involve human subjects by collecting data from a living individual through intervention of interaction with the individual and/or identifiable private information.

What are your responsibilities now, as you move forward?

- If you have further questions about this determination, you must contact the Purdue HRPP/IRB.
- You and the members of your research team acknowledge that this study is subject to review at any time by Purdue's HRPP staff, Institutional Review Board, and/or Research Quality Assurance unit. At any time, this project may be subject to monitoring by these Purdue entities to confirm the applicability of this determination. The Purdue IRB has final authority in determining if an activity is Human Subjects Research requiring IRB review.
- This determination is the Purdue HRPP assessment of regulations related only to human subjects research protections. This determination does not constitute approval from any other Purdue campus department or outside agency. The Principal Investigator and all researchers are required to affirm that the research meets all applicable local/state/federal laws and university policies that may apply.
- Finally, if any changes occur with respect to this project, recognize that such changes could change the need for review by HRPP/IRB. Should you change the intent of the activity to involve publication, presentation, or any different application of this work, it is likely that IRB review will be required. Therefore, it is important that you again complete Cayuse IRB to ensure that the IRB review requirements remain the same.

If you need assistance with the submission revisions, please contact irb@purdue.edu for assistance or an appointment. We are here to help!

Sincerely,

Purdue University Human Research Protection Program/ Institutional Review Board

VITA

Ethan M. Sneider
1200 Barton Hills Dr #364, Austin, TX 78704
ethanmsneider@gmail.com
617-752-2367

PROFESSIONAL EXPERIENCE

United States Air Force | DoD Top Secret Clearance SCI 2016 - Present
Cyberspace Operations Officer, 747 Communications Squadron - Hickam AFB, HI

- Manage 24/7 cyber operations security on Hickam AFB's $120 million hardware network
- Lead 50 Total Force Integration personnel driving communications support for 12K users
- Led PACAF CHES migration proj; coordinated with 7 agencies and migrated 14k email/org boxes with 1000% storage increase
- Oversee JBPH-H cyber infrastructure acquisitions; maintain 227 wing and tenant unit equipment accounts/$28.5M assets
- Governed 2 netwk upgrades; linked with 21 agencies/updated 812 systems/eliminated 1.2k threats—cemented $72M enclaves
- 2019 USAF Officer of the Year Award, 3X USAF Team Awards

United States Air Force Undergraduate Cyber Training, Biloxi, MS 2017-2018

- Completed 6-month rigorous multi-domain bootcamp focused on offense and defensive cyber techniques
- Distinguished Graduate, 97% GPA; Student of the month

United States Air Force Air University, Montgomery, AL 2016-2017

- Officer Element Leader and Flight Leader; Advised, educated and mentored 810 students, wrote/implemented 29 policies; hand-selected to lead OTS flight for unprecedented 50% of training

Sales & Technology Support 2010 - 2016
Recruitment Specialist/Sales Engineer- Yael Adventures, Haifa Israel

- #1 ranked recruitment specialist for three consecutive seasons
- Built and maintained strong customer referral network while consistently exceeding management goals and quotas

Sales Agent- Diversified Systems, Boston, MA

- #1 commissioned sales agent during employment
- Developed sales to domestic and international travelers while serving as an Ambassador for Boston, highlighting tourist attractions and entertainment venues

Marketing and Product Specialist- Southern Growth Studios, Memphis, TN - Summer Intern

- Evaluated and identified new products to launch
- Analyzed markets for investment opportunities for e-commerce client

Educational Staff Leader- Awesome Israel, Amherst, MA

- Responsible for team building of 40 member group
- Developed and led programs to foster positive engagement and cultural immersion

EDUCATION

Doctor of Technology, Leadership and Innovation expected May 2021
Purdue University, Polytechnic Institute, West Lafayette, IN

- Dissertation - Best Leadership Practices for Utilizing Automated Cloud Migration Tools

Certifications & Technical Skills 2017 - Present
Certifications - CISSP, USAF Undergraduate Cyber Training, Systems Design Program Certificate - Cornell University, CompTIA Security+ and CompTIA A+
Skills - Conversational in both Spanish and Hebrew (ability to read and write); USAF L.E.A.P Participant; MS Office Suite
Cyber Expertise - Networking Configuration, Networking Fundamentals, ICS, Scripting, OS, Telephony, Network penetration, Scripting languages, Cyber ethics and law, and Network configurations

Master of Arts, National Security Studies March 2016
University of Haifa - Haifa, Israel

- Ministry of Education Graduate Student Education Grant Recipient

Bachelor of Business Administration, Management September 2014
University of Massachusetts, Isenberg School of Management - Amherst, MA

- Top 50 student award

LEADERSHIP & EXTRACURRICULAR ACTIVITIES

Hickam CGOC (Company Grade Officer Council) Membership Chair *(2019-Present)*

- Perform outreach to 350+ Officers across diverse job specialties and leadership levels through event creation, public relations newcomer orientation tabling; foster cross-branch networking; manage CGOC website and mailing distro

Suicide Prevention/Sexual Assault Prevention Facilitator & Coordinator, *(2019-Present)*

- Recognized as outstanding facilitator; dynamically provide teaching, counseling and support on pro-active engagement and resiliency tactics for navigating contemporary social issues; trained 350+ government employees

Unit Voting Assistance Officer and Physical Training Leader, *(2018-Present)*

- Educates, informs and provides voting materials to 110+ member squadron; leads and designs physical readiness training for squadron

INTERESTS

Triathlons, Spin, Video Editing and Production, Zumba, Wrestling