European Journal of Business and Management
ISSN 2222-1905 (Paper) ISSN 2222-2839 (Online)
Vol.10, No.14, 2018

Promoting Resilience of the Nigerian Aviation Industry Through Management Information System Capability: A Conceptual Model

Waribugo Sylva Godwin Ikpe Umoh
Department of Management, Faculty of Management Sciences, University of Port Harcourt, Nigeria

Abstract
Organisational resilience commands the attention of scholars and industry gatekeepers due to its attendant outcomes, which include competitiveness, growth, innovativeness and the ability to rebound from crises; and thrive on the edge of a complex and tumultuous business environment. Several studies have been conducted on the nexus between various constructs and organisational resilience. However, there is scant literature that illuminates the path between management information system capability and organisational resilience. Moreover, the concept of resilience has suffered from semantic pluralism, thereby leading to a confusing maze of measures. This paper distills the concept of resilience from literature and concludes that anticipatory ability, robustness, adaptability and agility capture the nuances of organisational resilience. Finally, this paper proposes a theorising logic that infrastructural operation capability, systems development capability, service support maturity and managerial skills are facets of management information system capability which holds the promise of amplifying the resilience of the Nigerian Aviation Industry. The theorising logic of this paper is presented as a conceptual model which opens several windows for testing.
Keywords: Management information system capability, organisational resilience, Nigerian aviation industry

1. INTRODUCTION

Organisational resilience is the capacity of a business entity to continue to function and prosper despite the challenges it faces in a highly complex, dynamic and non-linear environment. High levels of organizational resilience amplify business stability, competitiveness, profitability and shareholders' value (Hamel & Valikangas, 2003). Without organizational resilience, the capacity of the firm to remain in business cannot be guaranteed (Annarelli & Nonino, 2016).

Moreover, scholars (e.g. Riolli & Savicki, 2003, Tierney, 2003; Vogus & Sutcliffe, 2007; Lengnick-Hall & Beck, 2005) contend that for organisations to thrive in the harsh corporate environment, they need to foresee forces of disequilibrium, maintain their functions, adjust their internal processes, and respond briskly to changing contexts. Such virtues are reflected in anticipatory ability, robustness, adaptability and agility (Chu, 2015; Kantur & Iseri-Say, 2015).

These above stated polymorphs of organisational resilience enhance organisational innovativeness, stakeholders' satisfaction, competiveness and survival (Adger, 2003; Olsson, Folke & Hahn, 2004; Volberda, 1996; Zamenopoulos & Alexiou, 2007; Bahrami, 1992; Conboy, 2009 van Oss & van't Hek, 2011).

Management information system capability is a measure of the extent to which an organisation develops and deploys its information resources to deliver desirable results. By building management information system capability, organizations are able to provide accurate, timely reliable and secure information for users to achieve strategic goals (Marchand, Kettinger & Rollins, 2000). Management information system capability comprises infrastructure operation capability, systems development capability, service support maturity and managerial skills (Ravichandran & Lertwongsatien, 2005; Chen & Chi, 2010).

These four facets of management information system capability empower organisations to successfully coordinate activities, reconfigure assets, improve developmental routines and competitive advantage, enhance individual manager's performance on the job and amplify manager's cognitive faculties for goal oriented decision-making in a changing business context (Gorla, Somers & Wong, 2010; Helfat & Winter, 2011; Jifri, 2016).

Industry watchers and scholars have continued to emphasize the importance of the aviation industry in creating socio-economic value globally. Specifically, the aviation industry propels growth in employment, revenues of governments and exchanges in international business (Perovic, 2013; Uysal & Söğüt, 2016; Pearce, 2017). For the past few years, the airline industry in countries such as the United States of America, Canada, South Africa, Malaysia and Ethiopia have recorded yearly net profit after tax between 2% to 8.5% (Oxford Economics, 2017).

However, the Nigerian aviation industry could only struggle to make net profit of 0.4% in 2017 (Daramola, 2014; Olukoya, 2017). According to the Federal Airports Authority (2017), the Nigerian airline sector is grappling with decline in operations, evidenced by low number of landing and departures. In fact, majority of the domestic airlines in Nigeria are on the brink of collapse as they are unable to pay their workers (Faajir & Zidan,

2016) and continue to record loss due to flight delays and cancelations, managerial inefficiencies and external factors (Eke, 2016; Ripples Nigeria). Moreover, only 9 out of the 150 local air operators that registered with the Nigerian Civil Aviation Authority are currently in business. This situation suggests that the Nigerian Aviation industry is not as resilient as it ought to be.

Recent literature indicates that management information system is linked to several organizational variables (see Perez-Mendez & Machado-Cabezas, 2015). However, there is scant scholarly contribution on the nexus between management information system capability and organizational resilience. This gap was particularly mentioned by Koslowski, (2014) who submitted that management information system holds the assurance of ushering "new streams of resilience research in an organizational context". Hence, the purpose of this paper is to develop a conceptual model that explains the potential of management information system capability in improving the resilience of domestic airlines in Nigeria.

2. LITERATURE REVIEW

2.1: Overview of the Aviation Industry

The aviation industry is a collection of airlines and related firms that transport people and goods from one point to another by air, involving activities such as flight, scheduling, aircraft maintenance, air traffic control and regulation, baggage check-in and handling, as well as on-site retail and catering (OEF, 1999). For the past decades up till now, the aviation industry has assumed the status of the most popular and fastest mode of transportation and travels (Maishamu & Kadiri, 2012). This has become more pronounced with the advent of globalization, thereby contributing to the growth and prosperity of both developing and developed nations (Cooper, 2017).

According to Oxford economics (2017), the global airline industry is a key driver of international trade, tourism, economic growth and socio-cultural integration. The industry is responsible for over 60 million jobs worldwide with a yearly freight of approximately 52 million tones and over 3 billion passengers transported across countries. In fact, more than two billion passengers are flown yearly in the world (Oxford Economics, 2017). Moreover, the aviation industry contributes more than $3 trillion to global GDP and transports over 30% of manufactured goods worldwide. Its contribution to world GDP is higher than those of pharmaceutical, textile and automotive industries. According to The International Air Transport Association (IATA), airlines in North America recorded the highest net profits of over $13 billion USD as compared to African airlines which struggled to make returns of a paltry $200 million USD in 2015.

For Africa, the aviation sector in the continent generates approximately $10 billion USD of Africa's aggregate GDP and is expected to create more than 4 million jobs in the next two decades. Despite the relatively low performance of airlines in Africa, a few of them are expected to slowly improve on their load factors from 2018 upwards (Oxford Economics, 2017).

2.2: The Nigerian Aviation Industry

In 1957, the British Overseas Airways Company, Cider Dempster, and the Nigerian government established the West African Airways Corporation, which was later acquired solely by the Nigerian government in 1959 and registered as Nigeria Airways Limited. The Nigeria Airways remained the only domestic airline licensed to operate as scheduled carrier until the sector was deregulated in 1989.

The deregulation policy of the aviation industry in Nigeria took full implementation in 1990, thus ending the monopoly of the Nigeria airways. In 1994, 14 passenger private airlines, 7 cargo airlines and 7 airlines for charter were licensed to operate. Since then, the proliferation of private airlines has warranted the construction of more aviation infrastructure. Currently, there are over 70 landing fields, nearly half of which belong to private firms. As at 2015, the Nigerian Civil Aviation Authority listed 28 air operators as active ones among 30.

At present, there are 30 airports in Nigeria, of which 26 are under the management of the Federal Airports Authority of Nigeria. Five of the 26 airports controlled by the Federal Airports Authority of Nigeria are international airports. There is also an airport built and managed by the Akwa Ibom State government likewise several airstrips and fields that traverse the country which are built and manage by either multinational oil firms or the Nigeria Air Force.

2.3: Pathology of the Nigerian Aviation Industry

For the past few years, the airline industry in countries such as the US, Canada, South Africa, Malaysia and Ethiopia have recorded yearly net profit after tax between 2% to 8.5%. However, the Nigerian aviation industry could only struggle to make net profit of 0.4% in 2017 (Daramola, 2014; Olukoya, 2017). According the Federal Airports Authority (2017), the Nigerian airline sector is grappling with decline in operations evidenced by low number of landing and departures. In fact, majority of the domestic airlines in Nigeria are on the brink of collapse as they are unable to pay their workers (Faajir & Zidan, 2016) and continue to record loss due to flight delays and cancelations, managerial inefficiencies and external factors (Eke, 2016; Ripples Nigeria). Moreover,

only 9 out of the 150 local air operators that registered with the Nigerian Civil Aviation Authority at the start of the millennium are currently in business.

Factors such as the state the economy, inaccessibility to foreign exchange, multiple taxation, stiff competition and harsh government policies have been mentioned as what constitute barriers to the prosperity of the sector (Faajir & Zidan, 2016).

However, due to the importance of the aviation industry to the socio-economic development of the country, the federal government of Nigeria has given substantial amount of funds to the domestic airlines, as bail-out funds, in order to prevent them from collapse. Yet, authorities of the Nigerian domestic aviation sector reported that output of the sector declined by nearly 4.9% from 2015-2016, while flight operations declined by 33% in the first quarter of 2017, compared to the same period in 2016 (Olawoyin, 2017).

Moreover, the local air operators are not delivering services that meet the expectations of consumers (Rahim, 2015) thereby questioning their operational effectiveness. Particularly, the notable challenges are overcrowded hall and traffic, antiquated and dysfunctional equipment, poor ticket issuance process, protracted baggage delays, flight delays and cancellations coupled with unabated plane crashes since the inception of the industry (Daramola, 2014).

In line with this, Sylva (2018, p. 14) provides figures from relevant sources that "1,731 persons died in 41 plane crashes between 1969 and 2012. Out of 43,196 flights operated by the eight domestic airlines between January and September 2016, 24,075 cases of flights were delayed, while 854 were cancelled. Also, out of the 10,366 flights operated quarter one of 2017, there were 6,789 delays and 318 cancellations". What could be more worrisome is that the airlines are tottering on the precipice. This signifies low level of resilience of the Nigerian aviation industry.

2.4: The Concept of Resilience

The word “resilience” emanates from the Latin words *resilire* or *salire*, which means to bounce or flow again, return to normalcy, spring back (Alexander, 2013). Generally, resilience reflects an entity's response to internal perturbations or external disturbances. However, resilience has varying connotations across disciplines.

The term resilience was introduced into academic literature in 1807 by Thomas Young who conducted a study on the elastic property of steel in withstanding stress (Pimm 1984; Yunes, 2003; Alexander 2013). Thus, in engineering, resilience is a material’s capacity to "absorb shocks and maintain function" (Holling, 1973, 1996; Folke 2006). In psychology, resilience is viewed as a personality trait characterised by the ability to survive difficult times, "negative life events, trauma, stress and other forms of risk" by rejuvenating oneself, thus remaining unperturbed (Wolin & Wolin, 1993; *Garmezy,* Masten, & Tellegen, 1984; Higgins, 1994; Henderson & Milstein, 1996; Glantz & Johnson 1999; Werner & Smith, 2001). In ecology, it is the “the capacity for renewal, re-organisation and development” (Holling, 1996; Gunderson, 2000), or “the capacity of a system to experience shocks while retaining essentially the same function, structure, feedbacks, and therefore identity” (Walker, Anderies, Kinzig & Ryan, 2006). In change management, it is the ability to be flexible and maintain strength and functions (Conner, 1993). In medicine, resilience is the ability to feel pain, understand the reason behind the pain and accept it until the condition improves (O’Leary & Ickovics, 1995).

Furthermore, according to the Stockholm Resilience Centre (2009) resilience is “the capacity of a social-ecological system both to withstand perturbations from, for instance, climate or economic shocks and to rebuild and renew itself afterwards", whereas The European Commission states submits that resilience is the ability of an individual, a household, a community, a country or a region to withstand, to adapt, and to quickly recover from stresses and shocks.

2.4.1: Organizational Resilience

Resilience emerged as an organisational concept when Staw, Sandelands and Dutton (1981), and Meyer (1982) used Campbell's (1969) "variation and selection retention theory in evolution" to explain how organizations react to external threats. Since then, the term ‘resilience’ has been used at the organisational level to describe the inherent characteristics of those organisations that are able to respond quicker, recover faster, or develop more unusual ways of doing business under perturbations than others (Vogus & Sutcliffe 2007). Organisational resilience is a process of continuous reconstruction, productive adaptation and management of environmental variability (Horne and Orr, 1998; Hamel and Valikangas, 2003; McDonald, 2006).

Furthermore, resilient organizations have reliable process of gathering intelligence, resisting failure, restructuring themselves (Nishikawa, 2006), and are able to respond briskly to changes while enduring discomfort (Seville, Brunsdon, Dantas, Le Masurier, Wilkinson & Vargo, 2008). Moreover, Lengnick-Hall and Beck (2003) opine that organizational resilience is an amalgam of factors that are developed and deployed to effectively respond to changing business scenarios.

2.5: Measures of Organisational Resilience

Due to its semantic variability, organisational resilience has diverse conceptualisations and measures. Horne and

Orr (1998) proposed that organisational resilience consists of community, competence, connections, commitment, communication, coordination, and consideration. Fiksel (2003) used the system approach to conceptualise resilience as a characteristic which comprises four essential measures, viz: diversity, efficiency, adaptability and cohesion, while Vogus and Sutcliffe (2007) submit that competence, flexibility, malleability, convertible and restorative efficacy are the key qualities of resilient organisations. Moreover, Tierney (2003) posits that organisational resilience can be decomposed into robustness, redundancy, resourcefulness and rapidity.

McManus, Seville, Brunsdon and Vargo's (2008) grounded theory study on New Zealand organisations indicate that organisational resilience comprises "situation awareness, management of keystone vulnerabilities, and adaptive capacity". Furthermore, Lengnick-Hall, Lengnick-Hall and Beck (2011) submit that organisational resilience could be disaggregated into cognitive, behavioural and contextual dimensions. Lee, Vargo and Seville (2013) extended McManus et al''s (2008) model and bifurcated organisational resilience into adaptive capacity and planning. Furthermore, Akgün and Keskin (2014) contend that organisational resilience is expressed as "competence orientation, deep social capital, original/unscripted agility, practical habits, behavioural preparedness and broad resource networks". Lastly, Kantur and Iseri-Say (2015) identified robustness, agility and integrity as measures of organisational resilience, while Chu (2015) extracted anticipatory ability, agility, adaptability and flexibility form the works of other scholars (see Oktemgil & Greenley, 1997; Overby, Bharadwaj & Sambamurthy, 2006; Zhou & Wu, 2010;Tallon & Pinsonneault, 2011).

Despite the plural conceptualisations of resilience in management literature, there are four most repeated measures of organisational resilience. These measures include anticipatory ability, robustness, adaptability and agility (Sylva, 2018).

2.5.1: *Anticipatory Ability*

Anticipatory ability is a facet of resilience which pertains to the management of sudden shocks and uncertainty through forecast and effective decision making, in order not to collapse (Wildavsky, 1988; Zamenopoulos & Alexiou, 2007). Thus, through anticipation, organisations act not only based on history but also due to the possibility of a future occurrence in the business environment. Weick and Sutcliffe (2001) contend that organisations employ monitoring, scanning, knowledge acquisition and simulating methods to foretell events and detect sudden changes in business conditions, then act in advance. Organisations with high levels of anticipatory ability are able to manage business risk as they create foresight, which is to anticipate the changing shape of risk and detect random events before failure and harm occurs (Kaplan 2002; Woods, 2005). Moreover, anticipatory ability empowers firms to detect and identify emerging opportunities in order to gain competitive edge (El Sawy, 1985).

2.5.2: *Robustness*

The concept of robustness has varied interpretations across different fields of management. In supply chain management, it is viewed as the ability of a system to remain functional despite damage (Waters, 2007). According to Asbjørnslett and Rausand (1999), robustness is “a systems ability to resist an accidental event and return to its intended mission and retain the same stable situation as it had before the accidental event”. In organisational studies, robustness is the “ability to withstand or survive external shocks, to be stable in spite of uncertainty” (Bankes, 2010). Robustness empowers organisations to maintain their core characteristics, processes and structures amid changing business contexts (van Oss & van’t Hek (2011). A robust organisation may experience damage due to external perturbations but will not cease to function (Jen, 2003; Meepetchdee & Shah, 2007). Being robust is not about adjusting to shocks but withstanding shocks (Wallace & Choi, 2011). Robustness enhances innovation, which a precursor to the strategic advancement of organisations.

2.4.3: *Organizational Adaptability*

Adaptability is the learned capacity of a system to adjust its "strategy, operations, management systems, governance structure and decision-support capabilities" to be congruent with environmental requirements (Starr, Newfrock & Delurey, 2003; Holling, Carpenter & Kinzig, 2004); thereby leading to innovation and competitiveness (Adger, 2003; Olsson, Folke & Hahn, 2004). Firms which are adaptive show uncommon capacity to acknowledge contingent threats and opportunities (Moorman & Miner, 1997), adjust their resources both in volume and allocation patterns in line with the overall corporate strategy (Ford, 1982).

However, adaptability does not only mean adjusting to the business environment, but also connotes the ability to synthesize a new environment that is clement to the internal operations of the organisation (Child, 1997). Adaptive firms see disequilibrium as medium for progress (Tuominen, Rajala & Möller, 2004). They may change functional structure to matrix structure; centralized structure to decentralized structure; autocratic leadership style to democratic style; product layout to process layout; or reactive regulatory mechanism to proactive posture, in order to meet stakeholders’ expectations in a chaotic environment. Adaptability as a corporate virtue promotes competitive advantage (Powell, 1992), growth (Tuominen et.al, 2004) and aids in the development of quality relationships with partners and consumers (Hallen, Johanson & Seyed-Mohamed, 1991).

2.4.4: *Organizational Agility*

Agility is organisation's capacity to generate varieties by reacting quickly, mitigating threats, or taking advantage of emerging opportunities (Bahrami, 1992; Conboy, 2009). It is an array of processes that enables an organisation to identify changes and act within optimum time and cost in order to maintain cybernetic integrity and enthrone prosperity (Seo & Paz 2008).

Furthermore, scholars contend that agility is a strategic response to douse risk and the negative effect of change (Sharifi & Zhang 2001), and that nimbleness and flexibility are at the root of agility (Sarhadi & Gunasekaran, 1999). Thus, agility transcends flexibility and adaptability (Christopher & Towill, 2001). Agile firms not only adapt through flexibility, but also respond rapidly to surprises (Oosterhout, Waarts & Hillegersberg, 2006).

Owing to the dizzying pace of technological innovations, competitive forces, volatile markets, regional uncertainties, supply chain distortions and increasingly complicated demands from consumers and employees, organizations are compelled to not only retool their structures and mechanisms, but also to act briskly, in order to survive radical change (Volberda, 1996).

2.6: The Concept of Management Information System Capability

Management information system capability is the capacity of an organisation to organise, coordinate and allocate its information resources to actualise its corporate goals. It is the learned dynamic capability (Teece, Pisano & Schuen, 1997) that provides accurate, timely, reliable and secure information for managerial decision-making (Marchand, Kettinger & Rollins, 2000). According to Bharadwaj, Bharadwaj & Bendoly (2007), information system capability is a matrix of social routines geared towards the acquisition and deployment of Information Technology resources which culminates in business support and value delivery. Moreover, Mithas, Ramasubbu and Sambamurthy (2011) contend that management information system capability acts as a catalyst to other capabilities that promote organisational performance.

Furthermore, Hayes and Upton (1998) opine that information systems possess the ability to aid organisations foresee changes in the corporate environment, reconfigure processes and structures, and deal with market pressures. Management information system capability enhances monitoring function (Choe, 1996, 2004) and decision quality of managers in numerous foci of organisational activities (Kaplan & Norton, 1996).

2.7: Dimensions of Management Information System Capability

Broadly, information system capabilities could be either internal or external (Hulland, Wade & Antia, 2007; Goh, Prakash & Yeo, 2007).

Internal capability is the capacity to allocate and use information resources which promote the control function and increase synergistic output among work groups and departments. Internal IS capabilities belong to the domains of interdepartmental relationships, information system planning, managerial skill and IT expertise (Hulland, Wade & Antia, 2007).

External information system capability is the capacity to respond to the external environment through adaptation, to synergise with external collaborators (e.g. vendors, suppliers and stakeholders) and to satisfy the array of demands from customers. External information system capability is known to contribute to effective collaboration with partners, responsiveness to market and higher levels of agility (Hulland, Wade & Antia, 2007).

Furthermore, Ravichandran and Lertwongsatien (2005) indicated that information systems capability is reflected in "Information System Planning Sofistication, Systems Development Capability, Information Technology Support Maturity and Systems Operation Capability". However, Sylva (2018) synthesized and validated four dimensions of Management Information System capability based on the inspiration of Ravichandran and Lertwongsatien (2005). These are: Infrastructure Operation Capability, System Development Capability, Service Support Maturity and Managerial Skills.

2.7.1: *Infrastructure Operation Capability*

Information System Infrastructure include the physical IT artefacts, supply networks and other facilities that store, process, retrieve and disseminate information to users within and outside the organisation. There is inherent capability in infrastructure which enables organisations to carry out activities on a routine basis (Helfat & Winter, 2011). Infrastructure supports administrative, tactical and strategic functions which culminate in the accomplishment of tasks (Teece, 2014).

Thus, infrastructure operation capability is the ability to harness, build, develop and utilise infrastructure to organise and coordinate the plethora of assigned tasks and routines to achieve set objectives and targets (Teece, Pisano, & Shuen, 1997; Helfat & Peteraf, 2003). Such tasks in the airline industry include flight scheduling, fleet assignment and timing. Infrastructure operations capability is reflected in "sophistication of the operations processes, such as emergency planning, backup recovery, security control, performance tuning, maintenance, and systems control" (Sylva, 2018). Higher levels of infrastructure operation capability leads to reduction in response time, efficiency in problem solving process, minimization of errors and disruptions, enhanced planning

and control, work flows and system performance (Hayes & Upton, 1998).

Moreover, infrastructure operation capability increases the organisation's ability to manage customer base, monitor and manage fleet, readjust and redeploy resources to meet customer tastes and preferences and forecast market demand (Jifri, 2016). Also, organisational adaptability is enhanced when steady streams of reliable information are dispensed by the information infrastructure, and utilised by managers (Fink & Neumann, 2007).

2.7.2 *Systems Development Capability*

Systems development capability is the capacity of an information system to furnish reliable and cost effective delivery process through well planned developmental procedures in order to support the socio-technical requirements of the organisation (Heller, 1987; Klein & Hirschheim, 1987; Mursu, Soriyan, Olufokunbi & Korpela, 2000). System development includes design, analysis and introduction of agile systems (Korpela, Soriyan, Olufokunbi & Mursu, 1998) which satisfy the information needs of the organisation and its stakeholders. Activities which improve the quality of software are also fundamental in systems development.

Furthermore, higher levels of systems development capability enables organisations to produce output in line with original design and management expectations (Kingman-Brundage, 1991). Such expectations include reduction in costs, increase in operational efficiency, improved service quality and customer experience (Armistead, 1990; Walley & Amin, 1994). Moreover, McDonald (2006) contends that firms foresee disturbances and proactively take decisions to sustain their internal processes and competitive positions when their systems are developed with a high level of adaptation.

2.7.3: *Service Support Maturity*

Mettler (2009) defines maturity as “an evolutionary progress in the demonstration of a specific ability or in the accomplishment of a target from an initial to a desired or normally occurring end stage”. Maturity is a process that has various phases characterized by increase in quality of a positive attribute in a particular area of interest (Schroeder & Teuteberg, 2005), while service pertains to provision of value to consumers, users and stakeholders in exchange for organisational reward (Davenport, 2013). Every service level has to be mature before the next service level is developed.

Service support maturity for management information system is observed in the maturity of the Information Technology in use, and the degree of responsiveness of vendors/ providers coupled with issues bordering on the reliability, service orientation, empathy and capability to honour contractual agreements (Argyropoulou, Ioannou & Prastacos, 2007; Gorla, Somers & Wong, 2010). Moreover, most asset intensive and high reliability companies farm out their MIS services to contractors or vendors, who plan and implement the Information System (Lacity & Willcocks, 1998). This outsourcing decision is done because the MIS deployed by such organisations is sophisticated and requires the collaboration of external firms that possess special skills, which are mostly unavailable to the organisations (Chen & Soliman, 2002).

Furthermore, the provision of provide specialised software packages by service support organisations to carry out core operations promotes organisational robustness (Gattiker, Chen & Goodhue, 2005).

2.7.4: *Managerial skills*

According to Petersen and Van Fleet (2004), skill is “the ability to perform some specific behavioural task or the ability to perform some specific cognitive process that is functionally related to some particular task”. Thus, Managerial skills are sets of conceptual characteristics expressed, and complementary actions performed, which causes desirable results. It is assumed that for an organisation to possess managerial skills, there must be a peculiar knowledge domain, mechanism for knowledge acquisition, and the capacity to act in line with the acquired knowledge (Petersen & Van Fleet, 2004).

Furthermore, Managerial Skills could be decomposed to Technical, Human and Conceptual skills (Katz, 1974). Technical skills require understanding and efficient use of specialized equipment, methods and techniques in a chosen work designation (Byrd, Lewis & Turner, 2004). Employees are promoted to be managers when they have demonstrated sufficient levels of technical skills (Maimon, 1986). Workers who have human skills or people skills (Analoui, 1998) can cooperate with others through effective communication, conflict resolution, motivation and team-playing disposition. A great deal of human skill is required in providing performance feedback, coaching and counseling of subordinates. Lastly, conceptual skill is the ability to envision (Collins & Porras, 1996) the organization as a single entity despite its constituent nature, and taking decisions that improve interaction among work groups and the overall organisational health in a changing and complex environment. Conceptual skill is a futuring skill (Mackinnon, 1984) that falls within the boundaries of systems thinking (Senge, 1990). By contrast, technical skills are for "things", human skills for "people", whereas conceptual skills bring about favourable outcomes through ideas, concepts and the audacity of creative imagination (Yukl, 2002).

Helfat and Martin (2015) conclude that firms develop coping strength and competitiveness when managers have high level of conceptual and collaborative skills in line with the information needs of the organisation.

2.8 Environmental Turbulence

Environmental turbulence is the lack of predictable pattern in the business environment which depicts its

dynamic nature (Dess and Beard, 1984; Vorhies, 1998). It is reflected in dizzying and sudden changes in technological, customer and competitive environments as well as imponderable changes in government regulations and product innovation (Nashirudin, 2014).

Turbulence may lead to incongruities between the organisation and external factors, which could in turn impede the performance (Miller and Friesen, 1983) and resilience quotient of the organisation (Aldrich & Ruef, 2006). On a positive note, environmental turbulence could supply opportunities for exploitation and exploration (March, 1991) and spur organisations to be resilient (Sambamurthy et al. 2003) or achieve strategic fit through the reconfiguration of internal and external factors (Eisenhardt & Martin, 2000). However, the process of reconfiguration and strategic adjustments is costly and time consuming (Maritan, 2001).

2.9: Conceptual Model

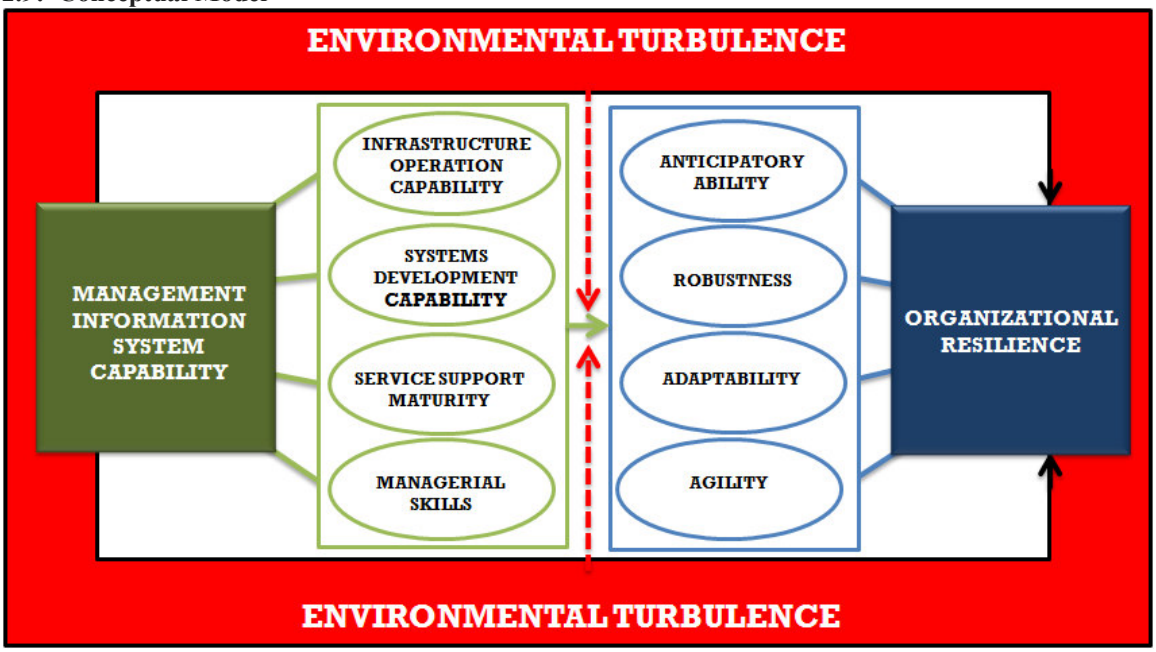

Figure 1.1: Conceptual Framework of the study. *Dimensions of Management Information System Capability adapted from Ravichandran and Lertwongsatien (2005); Argyropoulou (2012). Measures of Organizational Resilience adapted from Chu (2015); Kantur & Iseri-say(2015). Moderating variable adapted from Jaworski & Kholi (1993); Oh & Teo (2006); Carmeli, Friedman & Tishler (2013).* **Source:** *Sylva (2018)*

According to Miles and Huberman (1994), "a conceptual framework explains either graphically or in a narrative form, the main things to be studied- the key factors, constructs or variable – and the presumed relationships among them. Frameworks can be rudimentary or elaborate, theory-driven or commonsensical, descriptive or casual". Similarly, a conceptual model is defined as a "network, or "a plane," of interlinked concepts that together provide a comprehensive understanding of a phenomenon or phenomena" (Jabareen, 2009). Although it may not theoretically explain its constituent parts, a conceptual model shows the interconnections between variables of interest by placing them in the general subject of inquiry.

Based on the literature discussed, a conceptual model (see figure 1.1) for the Nigerian Aviation Industry, which shows the relationship between the identified dimensions of Management Information System Capability and Organisational Resilience, and bounded by environmental turbulence is hereby presented.

It is recommended that this model be adopted and tested empirically in other sectors such as banking, telecommunications and manufacturing.

References

Adger, N. W. (2003). Social capital, collective action, and adaptation to climate change. *Economic Geography* 79(4), 387-404.

Akgün, A. E. & Keskin, H. (2014). Organizational resilience capacity and firm product innovativeness and performance. *International Journal of Production Research,* 52(23), 6918-6937.

Aldrich, H. E. & Ruef, M. (2006). *Organizations evolving.* London: Sage Publishing.

Alexander, D. E. (2013). Resilience and disaster risk reduction: An etymological journey. *Natural Hazards and Earth System Sciences,* 13(11), 2707-2716.

Annarelli, A., Nonino, F. (2016). Strategic and operational management of organizational resilience: Current state of research and future directions. *Omega*, 62: 1–18. https://doi.org/10.1016/j.omega.2015.08.004

Argyropoulou, M. (2012). *Information System's effectiveness and organisational performance* (PhD Thesis, Brunel University, London UK).

Argyropoulou, M., Ioannou, G. & Prastacos, G. P. (2007). ERP implementation at SMEs: an initial study of the Greek market. *Int. J. of Integrated Supply Management*, 3(4), 406-425.

Armistead, C. G. (1990). Service operations strategy: Framework for matching the service operations task and the service delivery system. *International Journal of Service Industries Management,* 1(2), 6-16.

Analoui, F. (1998). *Human resource management issues in developing countries*, (Eds). Aldershot: Ashgate.

Asbjørnslett, B. E. & Rausand, M. (1999). Assess the vulnerability of your production system. *Production Planning & Control*, 10(3), 219-229.

Bahrami, H. (1992). The emerging flexible organization: Perspectives from Silicon Valley. *California Management Review,* 34 (3), 33-51.

Bankes, S. (2010). Robustness, adaptivity, and resiliency analysis. *Association for the Advancement of Artificial Intelligence,* Papers from Fall Symposium.

Bharadwaj, S., Bharadwaj, A. & Bendoly, E. (2007). The performance effects of complementarities between information systems, marketing, manufacturing, and supply chain processes. *Inf. Syst. Res.,* 18(4), 437-455.

Byrd, T. A., Lewis, B. R. & Turner, D. E. (2004). The impact of IT personal skills on IS infrastructure and competitive IS. *Information Resource Management Journal*, 17(2), 38-62.

Campbell, D. (1969). Variation and selective retention in socio-cultural evolution. *General Systems,* (16), 69-85.

Carmeli, A., Friedman, Y. & Tishler, A. (2013). Cultivating a resilient top management team: The importance of relational connections and strategic decision comprehensiveness. *Safety Science*, 51, 148-159.

Chen, C. H. & Chi, J. (2010) Skill requirements of IT professionals in an outsourced environment. *Service Science,* 1(2), 25-31.

Chen, L. & Soliman, K. S. (2002). Managing IT outsourcing: A value-driven approach to outsourcing using application service providers. *Logistics Information Management*, 15(3), 180-191.

Choe, J. M. (1996). The relationships among performance of accounting information systems, influence factors and evolution level of information systems. *Journal of Management Information Systems*, 215-239.

Choe, J. M. (2004). The consideration of cultural differences in the design of information systems. *Information & Management*, 41, 669-684.

Christopher, M. & Towill, D. (2001). An integrated model for the design of agile supply chains. *International Journal of Physical Distribution & Logistics Management*, 31(4), 235-246.

Chu, H. (2015). Research methods in library and information science: A content analysis. *Library & Information Science Research,* 37(1).

Collins, J. C. & Porras, J. I. (1996). Building your company's vision. *Harvard Business Review*, 74(5), 65-77.

Conboy, K. (2009). Agility from first principles: Reconstructing the concept of agility in information systems development. Information Systems Research, 20, 329-354.

Conner, D. R. (1993). *Managing at the speed of change: How resilient managers succeed and prosper where others fail.* New York, NY: Villard Books.

Cooper, A. (2017). *Economic outlook*. UK: Oxford Economics.

Daramola, A. Y. (2014). An investigation of air accidents in Nigeria using the human factors analysis and classification system (HFACS) framework. *Journal of Air Transport Management*, 35, 39-50.

Davenport, T. (2013). Analytics 3.0. *Harvard Business Review*, 91(12), 64-72.

Dess, G. G. & Beard, D. W. (1984). Dimensions of organizational task environments. *Administrative Science Quarterly*, 29: 52-73.

Eisenhardt, K. M. & Martin, J. A. (2000). Dynamic capabilities: What are they? *Strategic Management Journal*, 21(10-11), 1105-1121.

Eke, E. (2016). How Nigeria lost $450.4 million in Aviation sector in 2016-NCAA. *Ripples Nigeria.* Retrieved from https://ripplesnigeria.com

El Sawy, O. (1985). Personal information systems for strategic scanning in turbulent environments: Can the CEO go go-line? *MIS Quarterly*, 9(1), 53-60.

Faajir, A. & Zidan, Z. H. (2016). An analysis of the issues and challenges of transportation in Nigeria and Egypt. *The Business and Management Review*, 7(2), 18-29.

Fiksel, J. (2006). Sustainability and resilience: Toward a systems approach. *Sustainability: Science, Practice, and Policy,* 2(2), 14-21.

Fink, L. & Neumann, S. (2007). Gaining agility through its personnel capabilities: The mediating role of IT infrastructure capabilities. *Journal of the Association of Information Systems,* 8(8), 440-462

Folke, C. (2006). Resilience: The emergence of a perspective for social ecological systems analyses. *Global Environmental Change,* 16 (3), 253-267.

Ford, D. (1982). The development of buyer-seller relationships in industrial markets. In, Håkansson, H. (ed.). *International marketing and purchasing of industrial goods.* New York: John Wiley & Sons.

Garmezy, N., Masten, A. S., & Tellegen, A. (1984). The study of stress and competence in children: A building block for developmental psychopathology. *Child Development*, 55, 97-111.
Gattiker, T. F., Chen, D. & Goodhue, D. L. (2005). Agility through standardization: A Crm/Erp Application. In: F. R. Jacobs and B. E. (Eds.). *Strategic Erp extension and use*, 87-96. Stanford Business Books.
Glantz, M. & Johnson, J. (1999). *Resiliency and development.* New York, NY: Kluwer Academic.
Goh, M., Prakash, S. & Yeo, R. (2007). Resource-based approach to IT shared services in a manufacturing firm. *Industrial Management & Data Systems,* 107(2), 251-70.
Gorla, N., Somers, T. M. & Wong, B. (2010). Organisational impact of system quality, information quality, and service quality. *The Journal of Strategic Information Systems*, 19(3), 207-228.
Gunderson, L. H. (2000). Ecological resilience in: Theory and application. *Annual Review Ecolology System.,* 31, 425-439.
Hallen, L., Johanson, J. & Seyed-Mohamed, N. (1991). Interfirm adaptation in business relationships. *Journal of Marketing*, 55(1), 29-37.
Hamel, G. & Valikangas, L. (2003). The quest for resilience. *Harvard Business Review*, 81(9), 52-63.
Hayes, R. H. & Upton, D. M. (1998). Operations-based strategy. *California Management Review,* 40(4), 8-20.
Helfat, C. E. & Peteraf, M. (2003). The Dynamic resource-based view: capability lifecycles. *Strategic Management Journal,* (24), 997-1010.
Helfat & Winter (2011). Untangling dynamic and operational capabilities: Strategy for the never-changing world. *Strategic Management Journal,* 32(11), 1243-1250.
Henderson, N., & Milsltein, M. (1996). *Resiliency in schools: Making it happen for students and educators.* Thousand Oaks, CA: Corwin Press.
Higgins, G. O. (1994). *Resilient adults: Overcoming a cruel past.* San Francisco, CA: Jossey-Bass.
Holling, C. S. (1996). Engineering resilience versus ecological resilience. In: Schulze, P. (Ed.), *Engineering Within Ecological Constraints.* National Academy Press, Washington DC, pp. 31-44.
Horne, J. F. & Orr, J. E. (1998). Assessing behaviors that create resilient organizations. *Employment Relations Today,* Winter, 29-39.
Hulland, J., Wade, M. & Antia, K. D. (2007). The impact of capabilities and prior investments on online channel commitment and performance. *Journal of Management Information Systems,* 23(4), 109-42.
Jabareen, Y. (2009). Building conceptual framework: Philosophy, definitions and procedure. *International Journal of Qualitative Methods*, 8(4), 49-62.
Jaworski, B. & Kohli, A. K. (1993). Market orientation: Antecedents and consequences. *Journal of Marketing*, 57(3), 53-70.
Jen, E. (2003). Stable or robust? What's the difference? In: *Complexity*. 8(3), 12-18.
Jifri, A.A. (2016). *Dynamic capabilities "now we see them" in the airline industry* (Doctoral dissertation, Graduate School of The University of Alabama, Tuscaloosa, Alabama)
Kantur, D. & Iseri-Say, A. (2015). Measuring organizational resilience: a scale development. *Journal of Business Economics & Finance,* 4(3), 456-472.
Kaplan, R. & Norton, D. (1996). *The balanced scorecard*. Harvard Business School Press, Boston, MA.
Katz, R. L. (1974). Skills of an effective administrator. *Harvard Business Review*, 52(5), 90-102.
Kingman-Brundage, J. (1991). Technology, design and service quality. *International Journal of Service Industry Management,* 2, 47-59.
Klein, H. K. & Hirschheim, R. (1987). Social change and the future of information systems development, in: R.J. Boland, and R.A. Hirschheim, *Critical Issues in Information Systems Research,* Wiley.
Koslowski, T. G. (2014). *Resilience management information systems-Achieving sustainability in turbulent environments* (Doctoral dissertation, Albert-Ludwigs-Universität, Freiburg). Retrieved from https://d-nb.info/1123481008/34
Lacity, M. & Willcocks, L. (1998). An empirical investigation of information technology sourcing practices: Lessons from experience. *MIS Quarterly*, 22(3), 363-408.
Lee, A. V., Vargo, J. & Seville, E. (2013). Developing a tool to measure and compare organizations resilience. *Natural Hazards Review,* 14(1), 29-41.
Lengnick-Hall, C. A. & Beck, T. E. (2005). Adaptive fit versus robust transformation: How organizations respond to environmental change. *Journal of Management,* 31(5), 738-757.
Lengnick-Hall, C. A., Lengnick-Hall, M. L. & Beck, T. E. (2011). Developing a capacity for organisational resilience through strategic human resource management. *Human Resource Management Review*, 21(3), 243-255.
Mackinnon, J. (1984). Futuring, the new managerial skill. *Canadian Manager*, 9(1), 9-10.
Maimon, Z. (1986). Business studies and the development of managerial skills. *Studies in Educational Evaluation*, 6(1), 83-97.
Maishanu, M. M. & Kadiri, I.B. (2012). Promoting workers satisfaction for productivity in the service sector: A

case study of Arik air Nigeria. Kuwait chapter of Arabian *Journal of Business and Management Review*, December 2 (4).

Marchand, D., Kettinger, W. & Rollins, J. (2000). Information orientation: People, technology, and the bottom line. *Sloan Management Review,* 69-80.

Maritan, C. A. (2001). Capital investment as investing in organizational capabilities: An empirically grounded process model. *Academy of Management Journal*, 44, 513-531.

McDonald, N. (2006) Organisational resilience and industrial risk. In Erik Hollnagel, David D. Woods and Nancy Leveson (Ed.). *Resilience engineering. Concepts and precepts*. Ashgate Publiahing Co.

McManus, S.; Seville, E., Brunsdon, D. & Vargo, J. (2008). R*esilience management. A framework for assessing and improving the resilience of organisations*. Christchurch, New Zealand

Meepetchdee, Y. & Shah, N. (2007). Logistical network design with robustness and complexity considerations. *International Journal of Physical Distribution*, 37(3), 201-222.

Mettler, T. (2009). *A design science research perspective on maturity models in information systems*. Working paper, Institute of Information Management, University of St. Gallen, St. Gallen.

Meyer, A. D. (1982). Adapting to environmental jolts. *Administrative Science Quarterly,* 27, 515-537.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Thousand Oaks, CA: Sage Publications, Inc.

Miller, D. & Friesen, P. H. (1983). Strategy-making and environment: The third link. *Strategic Management Journal*, 4, 221-235.

Mithas, S., Ramasubbu, N. & Sambamurthy, V. (2011). How information management capability influences firm performance. *MIS Quarterly,* 35(1), 237-256.

Moorman, C. & Miner, A. S. (1997). The impact of organizational memory on new product performance and creativity. *Journal of Marketing Research*, 34, 91-106.

Mursu, A., Soriyan, H. A., Olufokunbi, K. C. & Korpela, M. (2000). Information system development in a developing country: Theoretical analysis of the special requirements in Nigeria and Africa. *HICSS-33 Minitrack on Information Technology in Developing Countries, Hawaii,* 4-7.

Nashirudin, M. (2014). *Environmental turbulence and dynamic capabilities: Effects on business performance unit through business strategy and competitive advantage*. Disertation, Diponegoro University, Semarang, Indonesia.

Nishikawa, Y. (2006). *Thriving in the face of adversity: Perceptions of elementary-school principals.* La Verne, CA: University of La Verne.

Oh, L. B. & Teo, H. H. (2006). The impacts of information technology and managerial proactiveness in building net-enabled organizational resilience. In Donnellan, B., Larsen, T., Levine, L. & DeGross, J. (Eds.). *The Transfer and Diffusion of Information Technology for Organizational Resilience*, 206, 33-50, IFIP, Boston: Springer.

Oktemgil, M., & Greenley, G. (1997). Consequences of high and low adaptive capability in UK companies. *European Journal of Marketing*, 31(7), 445.

Olawoyin (2017). Nigeria's domestic flight operations declined 33 percent in first quarter 2017. *Premium Times.* Retrieved from https://premiumtimesng.com

O'Leary, V. E. & Ickovics, J. R. (1995). Resilience and thriving in response to challenge: An opportunity for a paradigm shift in women's health. Women's health: *Research on Gender, Behavior, and Policy,* 1(2), 121-142.

Olsson, P., Folke, C. & Hahn, T. (2004). Social-ecological transformation for ecosystem management: the development of adaptive co-management of a wetland landscape in southern Sweden. *Ecology and Society*, 9(4), 2-16.

Oosterhout, V. M., Waarts, E. & Hillegersberg, V. J. (2006). Change factors requiring agility and implications for IT. *European Journal of Information Systems*, 15(2), 132-145.

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

Pearce, B. (2017). Economic performance of the airline industry. *IATA Economics*, 5th December 2017. Retrieved from http://www.iata.org/publications/economics/Pages/index.aspx

Pérez-Méndez, J. A. & Machado-Cabezas, A. (2015). Relationship between management information systems and corporate performance. *Spanish Accounting Review*, 18(1), 32-43.

Perovic, J. (2013). The economic benefits of aviation and performance in the travel & tourism competitiveness. *World Economic Forum - The Travel & Tourism Competitiveness Report 2013.* Retrieved from http://www3.weforum.org/docs/TTCR/2013/TTCR_Chapter1.4_2013.pdf

Petersen, T. O. & Van Fleet, D. D. (2004).The ongoing legacy of R.L. Katz: An updated typology of management skills. *Management Decision,* 42(10), 1297-1308.

Pimm, S. L. (1984). The Complexity and Stability of Ecosystems. *Nature,* 307, 321-326.

Powell, T. C. (1992). Organizational alignment as competitive advantage. *Strategic Management Journal*, 13, 119-134.

Rahim, A.G. (2016). Perceived service quality and customer loyalty: the mediating effect of passenger satisfaction in the Nigerian airline industry. *International Journal of Management and Economics*. 52, 94–117.

Ravichandran, T. & Lertwongsatein, C. (2005) Effect of information systems resources and capabilities of firm performance: A resourced-based perspective. *Journal of Management Information Systems,* 21(4), 237-276.

Riolli, L. & Savicki, V. (2003). Information system organisational resilience. *The International Journal of Management Science*, 31, 227-233.

Senge, P. (1999). *The fifth discipline. The art & practice of the learning organization*. London, UK: Random House.

Seo, D. & La Paz, A. I. (2008). Exploring the dark side of IS in achieving organizational agility. *Communications of the ACM*, 51(11), 136-139.

Seville, E., Brunsdon, D., Dantas, A., Le Masurier, J., Wilkinson, S. & Vargo, J. (2008). Organisational resilience: Researching the reality of New Zealand organisations. *Journal of Business Continuity and Emergency Management,* 2(2), 258-266.

Sharifi, H. & Zhang, Z. (2001). Agile manufacturing in practice-application of a methodology. *International Journal of Operations and Production Management,* 21(5-6), 772-794.

Starr, R., Newfrock, J., & Delurey, M. (2003). Enterprise resilience: *Managing risk in the networked economy. Strategy and Business,* 30(1), 70-79.

Staw, B. M., Sandelands, L. E & Dutton, J. E. (1981). Threat rigidity effects in organizational behavior: A multilevel analysis. *Administrative Science Quarterly,* 26(4), 501-524.

Sylva, W. (2018). *Management information system capability and organisational resilience of the Nigerian aviation industry* (Unpublished Doctoral dissertation, University of Port Harcourt, Rivers State, Nigeria).

Tallon, P. P. & Pinsonneault, A. (2011). Competing perspectives on the link between strategic information technology alignment and organizational agility: Insights from a mediation model. *MIS Quarterly,* 35, 463-486.

Teece, D. J. (2014). A dynamic capabilities-based entrepreneurial theory of the multinational enterprise. *Journal of International Business Studies,* 45(1), 8-37.

Teece, D. J., Pisano, G. & Schuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal,* 18(7), 509-533.

Tierney, K. (2003). Conceptualizing and measuring organizational and community resilience: Lessons from the emergency response following the September 11, 2001 attack on the World Trade Center. Paper presented at the *Third Comparative Workshop on Urban Earthquake Disaster Management,* Kobe, Japan.

Tuominen, M., Rajala, A., & Möller, K. (2004). Market-driving versus market-driven: Divergent roles of market orientation in business relationships. *Industrial Marketing Management*, 33(3), 207-217.

Uysal, M.P & Söğüt, M.Z. (2016). A systematic mapping study on aviation information systems and sustainability. Conference paper. International Symposium on Sustainable Aviation May 29- June 1, 2016 Istanbul, Turkey

Van Oss, L. & Van 't Hek, J. (2011). *Why organizations fail? Robustness, tenacity, and change in organizations*. London: Routledge.

Vogus, T. J & Sutcliffe, K. M. (2007). Organizational resilience: towards a theory and research agenda. Man and Cybernetics. Quebec: Montreal. *IEEE International Conference on Systems,* 7-10.

Volberda, H. W. (1996). Toward the flexible form: How to remain vital in hypercompetitive environments. Organization Science, 7, 359-374.

Vorhies, D. W. (1998). An investigation of the factors leading to the development of marketing capabilities and organizational effectiveness. *Journal of Strategic Marketing*, 6, 3-23.

Walker, B. H., Anderies, J. M., Kinzig, A. P. & Ryan, P. (2006). Exploring resilience in social-ecological systems: comparative studies and theory development, Special feature of *Ecology and Society,* 11.

Wallace, S. W. & Choi, T. M. (2011). Flexibility, information structure, options, and market power in robust supply chains. *International Journal of Production Economics*, 134(2), 284-288.

Walley, P. & Amin, V. (1994). Automation in a customer contact environment. *International Journal of Operations & Production Management,* 14(5), 86-100.

Waters, D. (2007). *Supply chain risk management: Vulnerability and resilience in logistics*. London: Kogan Page Limited.

Werner, E. E. & Smith, R. S. (2001). *Journeys from childhood to midlife: Risk resilience and recovery.* New York, NY: Cornell University Press.

Weick, K. E. & Sutcliffe, K. M. (2001). *Managing the unexpected: Assuring high performance in an age of complexity.* San Francisco: Jossey Bass.

Wildavsky, A. (1988). *Searching for safety*. New Brunswick, NJ: Transaction Press.

Wolin, S. J. & Wolin, S. (1993). *The resilient self: How survivors of troubled families rise above adversity*. New York, NY: Villard Books.

Woods, D. (2005). Creating foresight: Lessons for resilience from Columbia. In M. Farjoun and W.H. Starbuck (Eds), *Organization at the limit*. NASA and the Columbia disaster. Blackwell.

Yukl, G. (2002). *Leadership in Organizations* (5th Ed.). Upper Saddle River Prentice-Hall.

Yunes, M. A. M. (2003). Psicologia positiva e resiliência: o foco no indivíduo e na família. *Psicologia em Estudo*, 8(1), 80-95.

Zamenopoulos, T. & Alexiou, K., (2007). Towards an anticipatory view of design. *Design Studies*, 28 (4), 411-436.

Zhou, K. Z. & Wu, F. (2010). Technological capability, strategic flexibility, and product innovation. *Strategic Management Journal*, 31, 547-561.