Issues in the Transition to CIO Role in the Public Sector of Developing Countries

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Abstract

The chief information officer (CIO) is pivotal in enabling public sector organizations of developing countries to gain the full potential of information and communication technologies. Extant literature studied important aspects related to CIOs, such as competencies, roles, and relationship with CEO, yet it is fragmented and insufficiently comprehensive to offer an effective pathway or model to guide the transition to the CIO role. Studies on how public organizations in developing countries can create a transition to accommodate CIOs in their existing structures are necessary. This research, based on secondary data, identifies key issues that delineate the transition to CIO role anchored in institutional theory and the context of developing countries, including perceived organizational readiness, human capacity, strategic orientation, and organizational culture. Their interrelationships with proper institutional interventions and adaptation to contextual characteristics establish the foundation for a process map for the transition to the CIO role.

1. Introduction

Information and communication technology (ICT) is no longer viewed as a support function for organizations. Nowadays, ICT is considered an integrated function in the core business processes and a driver of business strategy [1]. A chief information officer (CIO) has the crucial role of managing ICT and using it innovatively to achieve the business goals of the organization [2, 3]. The CIO creates value for the organization by providing technical support, managing outsourced resources, controlling quality, managing the budget, monitoring the legal performance, and managing innovations [4].

The role of the CIO has evolved and traversed from the commercial sector into the public sector because of the need to provide necessary leadership to government agencies in the context of large data repositories, greater security, and stringent administrative scrutiny [5, 6]. As a heavy user of information, the public sector or government is increasingly incorporating ICT in its transactions with citizens and other entities in a range of activities, from providing information and services to performing transactions through an e-government platform [7]. However, public organizations differ from their commercial counterparts in terms of ownership, scope, client relationship, user expectations, goals, evaluation metrics, and organization structure. Hence, a different approach with regard to ICT innovation implementation is necessary [7-9].

Prior research on the CIO role investigated important areas, such as the relationship between CEO and CIO [10, 11], CIO capabilities and competencies [12-14], and CIO roles and leadership styles [2, 15-17]. These studies were conducted mainly in developed countries. By contrast, research on the CIO role in developing countries is scant and merely investigates the role and profile of the CIO [3, 5] or discusses the structural location of CIO [18] without incorporating theoretical underpinning and the effect of contextual factors. The context of developing countries is a complex web of actors, agencies, and issues, including social, cultural, and political matters together with slow reform processes, which requires an understanding of contextual issues while implementing ICT for development [19-23]. Understanding the transition process to the CIO role in the public sector of developing countries is important given the distinctiveness of the public sector and the uniqueness of the context of a developing country.

At present most of the developing countries do not have a CIO role in its public administration. ICT is regarded as a support function merely providing service to the organization. As such, ICT department is headed by ICT director or senior systems analyst who has more technical orientation rather than strategic focus. This head reports to the commissioner or Secretary [82]. Few developing countries that adopted CIO role in its public organizations followed a different path compared to the developed countries.
For example, in 1996, the United States passed the Information Technology Management Reform Act (ITMRA) popularly known as Clinger-Cohen Act detailing roles and responsibilities of CIOs that were already present in the majority of public sector organizations. The Clinger-Cohen Act also created the CIO council to recommend to government ICT management policy and ICT human resources and to assist government chief information officers (GCIOS). In contrast, Thailand, a developing country, proposed a CIO program to its cabinet and upon approval in 1998, appointed a CIO for every ministry, department and state enterprise to oversee ICT for the first time [4]. In short, while developed countries’ governments, through their maturity of ICT coupled with economic progress and private sector influence created the CIO roles through a bottom-up approach, developing countries have created the CIO position by decree through a top-down approach to lead ICT for development (ICT4D) initiatives [4].

This study investigates the following research question: How will the public sector organizations of developing countries shift away from their existing structure and implement the CIO role in their organogram? Present research attempts to list and explain the likely key issues/factors that contribute to the transition of public sector organizations to the CIO role. To address the CIO transition, an institutional lens [24] is considered the most suitable approach. This theory is widely used for innovations in organizations [25, 26] and has the potential to address the multi-level complexity in the structure of institutions such as the public sector in developing countries. The paper is organized into sections. The next section outlines the research method, followed by a discussion of the key issues/factors discovered in the literature. The final section provides the conclusion and directions for future research.

2. Method

The CIO in the public sector in developing countries is an emerging concept, and the extant literature is inadequate in addressing issues to elucidate the transition to the CIO role. Hence, this research is based on available secondary data. We followed the hermeneutic approach [27] to draw a comprehensive picture of CIO research. According to the principles of this approach, we used the keywords “CIO” and “chief information officer” to limit our search to the title, abstract, and keywords in the Senior Scholars’ Basket of Journals and leading IS proceedings, namely, ICIS, PACIS, ECIS, AMCIS, and HICSS, and found 45 papers. We also used citation tracking and citation analysis techniques to review the papers, as suggested in the hermeneutic approach of [27], to find relevant papers. As a result, we found an additional 24 papers, mostly from Information & Management and MIS Quarterly Executive.

3. Key issues/factors that contribute to the transition of public sector organizations to CIO role

The term “chief information officer” was first described by [28, p66] as “a senior executive responsible for establishing corporate information policy, standards, and management control over all corporate information resources.” Other scholars also viewed the CIO as less a technical person who provides service function and more a manager/executive who plans strategies for the firm’s overall information systems function [29, 30, [31] offered insights by articulating critical success factors for the new role, providing some factors to contribute to the transition to the CIO role.

Areas covered in the extent research investigated chiefly the CIO role, leadership style and its effect, the required competencies and capabilities, and the dynamics of structural relationships among the CIO, CEO, and top management. These studies are grouped into the categories shown in Table 1.

Although previous research clearly described the role, a gap exists in understanding how the role is successfully implemented in an organization. No cohesive framework could provide a rich understanding of how the role and its dynamics fit with and affect the information technology of an organization and its management.

Moreover, most of these studies used a commercial sector perspective in a developed country context. Hence, holistically mapping the chemistry of interrelating factors that optimize the value from the CIO role is challenging for researchers and practitioners.

Furthermore, the scattered issues covered by the literature, if summarized, can provide only a fragmented view of the disparate factors tested on various issues in different periods [1]. Nonetheless, a few papers established the CIO role in the public sector, and at least one of them offered a framework to adopt the CIO role, outlining seven steps [57]. This framework is based on a brief discussion that incorporates developed, emerging, and developing countries. However, the contexts of these three types of countries are quite dissimilar, and the framework is unable to offer a focused explanation of the key issues. Moreover, the steps were unsupported by the literature;
no theoretical lens was used. Instead, a CIO system framework was proposed in descriptive terms.

**Table 1. Χαρακτηριστικές λίτερατορίες της προσωπικότητας του ΚΟΠ**

<table>
<thead>
<tr>
<th>Category 1</th>
<th>CIO Roles and Leadership Styles</th>
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<tbody>
<tr>
<td><strong>Theme</strong></td>
<td><strong>Examples</strong></td>
</tr>
<tr>
<td>CIOs play versatile roles and adopt leadership styles, such as hybrid manager, leader, liaison, monitor, spokesman, entrepreneur, resource allocator, landscape cultivator, triage nurse and firefighter, opportunity seeker, innovator and creator, IS strategist, information strategist, IT manager, integrator, IS contract oversight, utility IT director/provider, evangelist CIO, innovator CIO, facilitator CIO, agility IT director/CIO, business architect, information steward, educator, informational role, decisional role, interpersonal role, supply side leadership, and demand side leadership to drive business transformation and innovation to create competitive advantage.</td>
<td>[2, 15-17, 29-42]</td>
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<table>
<thead>
<tr>
<th>Category 2</th>
<th>CIO Capabilities and Competencies</th>
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<tr>
<td><strong>Theme</strong></td>
<td><strong>Examples</strong></td>
</tr>
<tr>
<td>CIOs need to possess organizational, personal, technical, business, and communication skills to bridge technology and business to create value through IT.</td>
<td>[12-14, 43, 44]</td>
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<th>Category 3</th>
<th>CIO in the Organizational Structure</th>
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<td><strong>Theme</strong></td>
<td><strong>Examples</strong></td>
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<tr>
<td>CIOs should be included in the &quot;C-suite&quot; executives, ensuring top management team membership with the delegation of structural power and authority to allocate resources, as well as to strategically align IT with business and improve firm performance.</td>
<td>[10, 11, 37, 45-56]</td>
</tr>
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</table>

The CIO role is an administrative innovation [58] that incorporates change in management, structure, administrative processes, and human resources of the organization [59]. According to organizational development literature, an effective change in organizations should follow a number of steps, including motivating or overcoming resistance to change, creating a vision, gaining political support or the support of the key stakeholders, designing appropriate structure, and providing resources (human, financial, and technical) [60]. These steps are important as they are similar to the factors or issues discussed with regard to e-government adoption. Factors that either facilitate or hinder e-government adoption include infrastructure, human capacity, strategic orientation, legislation, and culture [26, 61-64]. Although these factors are related to e-government, they may also reveal the adoption of the CIO role because the role is not typically separate from e-government implementation. The CIO builds and manages ICT capabilities for government organizations, strategically aligns ICT with business objectives, delivers promises, and creates innovations [65]. According to [66], the CIO or its equivalent, through the institutional level and role, affects the entire government, creating a unified and centralized agency to design, implement, and disseminate e-government throughout the entire public administration in a seamless manner.

Based on the CIO and e-government research, we presume that the transition to the CIO role requires various factors or issues, including perceived organizational readiness, a legal framework, human capacity, management structure, infrastructure support, partnership and collaboration, strategic orientation, organizational culture, and political support [26, 57, 61-64, 67]. The issues are important in the sense that they will guide governments to establish, operate and sustain CIOs in the public sector and part of which is reflected as Government Chief Information officer (GCIO) readiness assessment in [57]. To delineate the process of transition to the CIO role, we provide a thorough discussion of organizational and contextual factors. Contextual factors interact with institutional pressures and exert influence on the implementation of the CIO role in public organizations through the different phases of institutionalization (for instance, internalization, objectification, and sedimentation). Table 2 lists the issues/factors that enable CIO adoption followed by a discussion of the issues.

**3.1. Perceived organizational readiness**

The current level of resources (human, technical, financial), employee perception of change, top management support, and the current laws of the public sector organization affect the readiness of the organization to implement change, particularly the implementation of the CIO role [57, 67]. Perceived organizational readiness assesses the organization’s
capability by identifying the areas and extent of improvement needed to assimilate the innovation [63]. An organization may have technical and financial resources, but the absence of skilled human capital may jeopardize the transition process. Research indicates that in developing countries, a lack of human capacity is regarded as a more severe barrier than technological or other barriers [62]. Moreover, in the public sector of developing countries, lack of awareness and knowledge of senior officials and decision makers obstruct any ICT-related adoption [62, 68].

Table 2. Κεντρικοί ζητήματα/φακτοί διενέργειας προσανατολισμού της Ψηφιοποίησης του XIO role

<table>
<thead>
<tr>
<th>Key issues/factors</th>
<th>Description</th>
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<tbody>
<tr>
<td>Perceived organizational readiness</td>
<td>Current level of resources, employee perception, top management support, and current laws</td>
</tr>
<tr>
<td>Legal framework</td>
<td>Rules, policies, and laws stipulating CIO role, responsibilities, and authority</td>
</tr>
<tr>
<td>Human capacity</td>
<td>Right mix of skills and capabilities for CIO role, as well as the people who support the CIO</td>
</tr>
<tr>
<td>Management structure</td>
<td>Proper hierarchical position to be functional in the role</td>
</tr>
<tr>
<td>Infrastructure support</td>
<td>Technological and financial resources</td>
</tr>
<tr>
<td>Partnership and collaboration</td>
<td>Inter-agency collaboration, public/private partnership, collaboration with academia and international organizations</td>
</tr>
<tr>
<td>Strategic orientation</td>
<td>Long-term focus: vision and mission</td>
</tr>
<tr>
<td>Organizational culture</td>
<td>Hierarchical, bureaucratic, resistance to change, slow reformation process</td>
</tr>
<tr>
<td>Political support</td>
<td>Role of political leaders</td>
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</table>

### 3.3. Human capacity

The lack of skilled human resources is a chronic problem that hinders ICT implementation in the public sector of developing countries [26, 61, 63]. For example, most African countries lack basic information technology and management skills, which obstruct the progress of e-government in these countries [61]. This skill gap occurs not only in African countries, but also in many other developing countries. In Bangladesh, for example, inadequate ICT education at the broad level cannot provide the required human resources to implement and sustain innovation [62]. Research on the CIO role articulates the necessity of technical, management, and communication skills for the success of CIO [12, 13, 32]. Therefore, human capacity in terms of IT capability, knowledge, and skills is the most vital resource within the organization to expedite the transition to the CIO role [65]. Moreover, human capacity is not only required to create the CIO role, but also to create a band of people who will assist the CIO in establishing a strong foothold in the organization [40, 69]. Continuous learning processes and collaboration with academia support the development of human capacity [64]. For example, Thammasat University’s College of Innovative Education in Thailand offers human capacity building courses for CIOs [57].

### 3.4. Management structure

The laws and regulations of a country play an important part in the management and control of ICT in the public sector of developing countries [61]. Adopting the CIO role requires a set of new rules, policies, and laws to define the activities, roles, responsibilities, scope of work, power, and authority in the new role [57]. A proper legal infrastructure eases administrative reform and ensures the privacy and security of ICT-related functions, decisions, and outcomes [58, 63, 64]. However, implementing changes in laws is slower in developing countries compared with the rapid progress of ICT because of the bureaucratic process [62, 69]. Moreover, awareness and knowledge about the new legislation should be created at all levels of management hierarchy to ensure strict adherence [58]. Hence, the presence of a suitable legal framework is a prerequisite of CIO role implementation in the public sector. The Computer Crime Act and the Electronic Transactions Act in Thailand are worth mentioning here [81].
the organization [32]. A strong relationship between the CIO and the TMT can develop a shared vision between them and create value for the organization [40,54]. The CIO reporting and supporting structure (for instance, CIO council) and the structural position within the organogram will obviously affect the CIO’s IT management intention and capability significantly. Moreover, the structure will embody his/her roles and responsibilities [10,60]. For Example, in Thailand CIO position is created to oversee and manage IT for corporate purpose under the “Policy and Planning” business unit (PPBU) who directly reports to the CEO [81].

3.5. Infrastructure support

Infrastructure refers to the availability of computers, networking capability and capacity, Internet capacity, telecommunication facilities, and resources of that kind [62,63]. Infrastructure support in terms of guiding principles, models, and standards is essential to transition into ICT innovation [64]. Developing countries suffer from the digital divide in their infrastructure availability and accessibility, which obstructs ICT implementation [61]. Based on prior research, the transition to the CIO role will be affected by the inadequacy of technological infrastructure in the public sector of developing countries. A common concern that may arise is what the CIO will do in a public office when the infrastructure is inadequate. Therefore, ensuring adequate infrastructure in terms of architectural interoperability is a precondition for the transition to the CIO role. For example, before establishing CIO role in the municipal office, the Mexican city Merida ensured the rapid expansion of its technological infrastructure in terms of a 100% increase in the number of its PCs and a four times increase in the number of its servers [69]. Technological infrastructure development largely depends on the availability of financial resources. Although many studies have not mentioned the importance of financial issue, ICT projects often suffer from lack of funding, delayed funds, or conditional funds [63].

3.6. Partnership and collaboration

ICT innovation implementation in the public sector calls for collaboration and cooperation of various government agencies and between public and private sector organizations [64]. Collaboration between public and private organizations is vital as the private sector can assist the public sector by providing the necessary resources, skills, and capabilities [64]. Collaboration with international consulting houses may provide knowledge about current CIO trends and opinions and the views of professionals, as well as CIOs. Collaboration among government agencies for the successful implementation of the CIO role is mentioned in the literature. For example, the UK CIO Council analyzes and solves common problems across different government agencies, and works to maintain cross-agency collaboration. Similarly, Singapore’s Information Technology Management Association brings public and private sector CIOs together in one forum to share their know-how and experiences in ICT management [57]. Similarly, in Thailand international collaboration among the CIOs is promoted through National Electronics and Computer Technology Center (NECTEC) which represents International Academy of CIO (IAC) [57].

3.7. Strategic orientation

A holistic vision together with long-term focus and objectives is pivotal to successfully implement any ICT innovation [63,64]. However, developing countries lack the proper strategic vision and mission, and they work on an ad hoc basis most of the time [62]. Having a clear strategic orientation that embodies a vision and mission is imperative to establish the CIO role in the public sector of developing countries. The reasons for change and the desired future state will be conveyed through the vision and mission. The strategic orientation ensures both physical and psychological commitment and motivates all stakeholders toward change [60,61]. For example, based on the ICT master plan of Thailand (strategic vision), the cabinet defined and established the CIO role at different levels of the government structure [5,57].

3.8. Organizational culture

Culture is fundamental to the change process in public administration and the realization of organizational goals and objectives [71]. According to [72], culture consists of three things, namely, assumptions, values, and artefacts. They affect the ability of an organization in varying degrees to adopt change [71]. Managing change in terms of adopting the CIO role in the organization should be culturally congruent. Public sectors in developing countries typically have hierarchies coupled with persistent bureaucracy and slow reformation process [63,64]. Bringing a CIO role into this environment may challenge the hierarchies. The public sector’s deeply entrenched culture of resistance to change [70,73] may not allow the transition to the CIO role. Resistance
may come in two ways. One, employees may fear that a new role would eliminate their jobs and put more pressure on them, among others, and two, high-ranking public officials, particularly decision makers, might fear losing power and authority, and hesitate to embrace change, thus maintaining the status quo [62]. Thus for instance, in city council of Merida, handbook of guidelines and policies was developed to create awareness among the decision makers who then in turn cascaded the culture throughout the organization [69].

3.9. Political support

The involvement of top leaders in change management may be critical to overcome organizational resistance to change and to provide the necessary resources and uplift commitment across the organization to be receptive to change [26,64,70]. Gaining political support for the adoption of the CIO role is pivotal for actions of the top-level management. Without political commitment and support, initiating any kind of change is difficult. The literature indicated that change management should follow a top-down approach, and this approach is particularly true for the public sector of developing countries [5]. Moreover, political leaders are the powerful individuals and the groups who may either block or promote change, as they have vested interest in any change [62]. For example, a new generation of politicians played a significant role while the CIO role was implemented in the city council of Merida. They were aware of the power of ICT-related change, and from their growing concern for community development, they initiated the change [69].

The mere consideration of these issues/factors cannot provide a complete understanding of the transition of the public sector to the CIO role as it is affected by the distinct conditions and circumstances of developing country context. The transition calls for an understanding of the interplay of key organizational issues and contextual characteristics through an institutional interface [58,62]. Research showed that a number of ICT innovations failed in developing countries, as they ignored the effect of the characteristics of their unique contexts [74]. Although selecting an innovation from a developed country and imposing it on a developing country is common, real results often fail, and those projects impede further adoption of innovations. Technology is not independent of social change, and socio-technical discourse argues that technology, social construction, and other factors provide a novel conceptual perspective to consider the chemistry between technology and the simultaneous changes brought about by people, institutions, or other socio-technical hybrids [75]. Hence, innovations in developing countries should create a practical balance between universal standards and local context through a tailored approach to meet local needs [20,76]. In the absence of a process map to enable CIO adoption, institutional interventions are a likely solution to sustain the relationships between organizations and contextual characteristics, and to establish the structure to guide the transition [26].

Institutional theory has been widely used to understand both technological and administrative innovations [25,26,77]. According to [24, p48], “Institutions are comprised of regulative, normative and cultural-cognitive elements that, together with associated activities and resources, provide stability and meaning to social life”. Theory of [24] builds upon three mechanisms, namely, coercive, mimetic, and normative isomorphism, as suggested by [78]. Although the definition emphasized stability, it also acknowledged the change process [24]. Institutional pressures may stem from competition, rapid technological change, pressure from global community, and government legislation [79]. Institutional theory posited that through appropriate type and magnitude of pressures, organizations adopt and transfer change to other organizations. Moreover, institutional theory assumes that organizations are motivated or pressured to show allegiance to external formal and informal pressures [24,80]. Organizations are rational actors that interact with values, norms, rules, and beliefs, as well as decide by conforming to incentive or punitive structures defined by institutions [78]. This pressure is more prevalent and strong in the public sector because of their rigid hierarchical contexts [26].

Coercive pressures are the perceived formal and informal pressures as a result of the dominant and superior authority, and allegiance to them will either reward or punish the subordinate organization [78]. With regard to the public sector’s CIO role adoption, these pressures may be the demands of citizens and businesses for accurate and timely information and service and global pressure (for instance, UN and donor agencies). Mimetic pressures refer to an organization’s inclination to mimic the behavior of a successful organization. When organizations do not understand the innovation and its effect, they are unable to foresee the results and are mired with environmental uncertainties. They prefer to mimic other organizations perceived to be successful [78]. The public sector of developing countries may learn from its private sector counterpart or from the experience of other countries that have a more mature CIO stature. Normative pressure refers to an organization’s voluntary but unconscious imitation of
attitude, behavior, and practices to show harmony with peer organizations. It is the collective influences that result from the development of professionalization [78]. Public–private collaboration and participation in the professional associations and international organizations may influence the public sector of developing countries to adopt the CIO role.

Transitions to CIOs in the public sector of developing countries need to maintain the notion that this change in the organization’s structure would undergo complexities of interplay between key issues/factors and their magnitude of interrelationships. Most early ICT research emphasized the rationality behind technological innovation or the “content” aspect. However, more recently, ICT research moved and aimed to see technology in the “context” envelope, considering the socio-cultural effect. Adoption of the CIO role is a complex issue, as it is a mishmash of both technology and management dimensions of work processes. Hence, to delineate the public sector’s transition to CIO, we need a novel and comprehensive approach to amplify the interplay of the factors and institutional intervention.

4. Conclusion and future research

With the unprecedented growth of technology, increasing demands from citizens and stakeholders for valued service, and an urge to be a part of the global knowledge society, public sector organizations of developing countries are adopting ICT in their work processes slowly but surely. However, the absence of a leader who can plan and manage information resources for the business goals of the organizations is apparent. Evidence in the developed world suggests that the CIO, as the chief architecture of the organization’s ICT platform, can create sustainable ICT-based service delivery to meet the demands of citizens, businesses, and government organizations. However, developing countries are either unwilling or unable to adopt the CIO role and manage the required change for reasons yet to explore. To address this shortcoming, we identified the key issues or factors that, with proper institutional interventions, would enable the transition to the CIO role. Our initial research revealed a number of key issues, including perceived organizational readiness, legal framework, human capacity, management structure, infrastructure support, partnership and collaboration, strategic orientation, organizational culture, and political support. Our research seeks to establish the interrelationships of these factors and how to manage them. Our findings are important for three reasons.

First, they represent a comprehensive review of the literature on the CIO role and its implementation through the lens of the needs in developing countries for the influence and effect that the CIO role can have on ICT implementation, particularly in the public sector.

Second, they define a scope for the important issues related to the CIO transition in developing countries. Although perceived organizational readiness gauges the extent of preparedness of the organization for the role, other issues, particularly human capacity, strategic orientation, organizational culture, and political support, may guide policy makers when they propose, design, and implement the CIO role.

Third, they offer the foundation for a process map through the interrelationships of the issues. Such a process map will offer a tailored approach to adapt to contextual circumstances.

This research is actually part of a PhD research. At this stage, the research is based on a thorough literature review to present the current status quo of ICT management and transition to the CIO role in public organizations of developing countries. Hence, it is a research in progress paper. Nevertheless, the research identifies and discusses critical issues of transition and provide possible pathway for further investigation. The research is not without limitations. One limitation is that we did not specifically consider non-academic literature, such as CIO magazines and consultant reports, which often provide rich insights, but typically lack academic rigor. Moreover, the research has methodological limitations as it has not been empirically tested to confirm the key issues and their relationships. Our future research will address this limitation through empirical investigation. Notwithstanding the limitations, as the research is the first of its kind, these findings establish a foundation for a new stream of CIO research.

5. References


