

Smart city dynamics and multi-level management accounting: unfolding a case of sustainable enterprise resource planning

Alsaid, L.

Author post-print (accepted) deposited by Coventry University's Repository

Original citation & hyperlink:

Alsaid, L 2021, 'Smart city dynamics and multi-level management accounting: unfolding a case of sustainable enterprise resource planning', Sustainability Accounting, Management and Policy Journal.

<https://dx.doi.org/10.1108/SAMPJ-08-2020-0283>

DOI 10.1108/SAMPJ-08-2020-0283

ESSN 2040-8021

Publisher: Emerald

Copyright © and Moral Rights are retained by the author(s) and/ or other copyright owners. A copy can be downloaded for personal non-commercial research or study, without prior permission or charge. This item cannot be reproduced or quoted extensively from without first obtaining permission in writing from the copyright holder(s). The content must not be changed in any way or sold commercially in any format or medium without the formal permission of the copyright holders.

This document is the author's post-print version, incorporating any revisions agreed during the peer-review process. Some differences between the published version and this version may remain and you are advised to consult the published version if you wish to cite from it.

Smart city dynamics and multi-level management accounting: Unfolding a case of sustainable enterprise resource planning

Accepted Manuscript: 21 March 2021

Citation

Alsaid, L.A.Z.A. (2021), "Smart city dynamics and multi-level management accounting: unfolding a case of sustainable enterprise resource planning", *Sustainability Accounting, Management and Policy Journal*, Vol. ahead-of-print No. ahead-of-print. <https://doi.org/10.1108/SAMPJ-08-2020-0283>.

Loai Ali Zeenalabden Ali Alsaid¹

School of Economics, Finance and Accounting, Research Centre for Financial and Corporate Integrity, Coventry University, Coventry, UK and Department of Accounting, Faculty of Commerce, Beni-Suef University, Beni-Suef, Egypt

About the author:

Loai Ali Zeenalabden Ali Alsaid is a Lecturer in the Department of Accounting, Faculty of Commerce, Beni-Suef University, Beni-Suef, Egypt and currently Assistant Professor in accounting at the School of Economics, Finance and Accounting (EFA) and Associate at the Faculty Research Centre for Financial and Corporate Integrity (CFCI), Coventry University, Coventry, UK. His current research focusses on emerging and developing African countries, specifically in relation to smart sustainable cities, management accounting and performance measurement, sustainability governance and social accountability. Loai Ali Zeenalabden Ali Alsaid can be contacted at: alsaid.loai@gmail.com

¹ Corresponding author.

Postal address: Coventry University Business School, William Morris Building, Gosford Street, Coventry, CV1 5DL, UK.

Abstract

Purpose - This study explores the complex, multi-level institutional dynamics of smart city reforms and projects, and their potential sustainability pressures on the implementation of a management accounting system in an Egyptian state-owned enterprise (SOE), which has a politically sensitive institutional character.

Design/methodology/approach - This study adds to institutional management accounting research using a multi-level perspective of institutional dynamics in the smart city context. Data were collected from an interpretive case study of an Egyptian SOE that was under socio-political sustainability pressures to implement a smart electricity network project in New Minya city.

Findings - Smart city projects have formed social and political sustainability pressures, which introduced the enterprise resource planning (ERP) network as a new management accounting system. A new (complex, multi-level) management accounting system was invented to reinvent the sustainable city as an ‘accounting city’ (which appeared rhetorically as a ‘smart city’). ‘Smart’ being the visibility and measurability of the sustainability performance of the collective body which calls the city and its connectivity to different institutional levels brought out in a city network project for the ERP-enabled electricity distribution.

Research limitations/implications - This study examines a single case study from a single smart city and identifies the accounting community’s need for multiple and comparative case studies in order to further analyse the potential impact of smart city reforms and projects on the sustainable implementation of management accounting systems.

Practical implications - City policy-makers and managers may benefit from the practical findings of this interpretive field-based case study in planning, implementing and monitoring smart city projects and objectives.

Social implications - Individual and collective well-being may be enhanced through new management accounting forms of multi-level local governance and increased political, field and organisational sustainability.

Originality/value - This study provides important insights into the sustainability dynamics of management accounting in achieving smart city reforms. The achievement of sustainability management accounting systems has connected to multiple ERP roles at different institutional levels, which resulted in accommodating the socio-political objectives of smart city projects.

Keywords: Smart city dynamics; multi-level management accounting; sustainable enterprise resource planning; institutional sustainability pressures; state-owned enterprises; Egypt

JEL Classification: M41; M48; O2; O33; O55; R5

Paper type: Research paper

1. Introduction

Smart cities are an important sustainable urban development discussed in the current management accounting literature (Alsaid, 2021; Alsaid and Mutiganda, 2020; Drapalova and Wegrich, 2020; Argento et al., 2019; Ferry et al., 2019; Eckersley et al., 2018). Despite the theoretical debate about the ‘smart city’ definition, the current literature has provided a comprehensive picture of the basic characteristics, defining smart “economy”, “governance”, “living”, and “people”. The term ‘smart city’ refers to innovative infrastructure projects through which institutional sustainability pressures and dynamics between the city government and citizens emerge (Huang-Lachmann, 2019). In an institutionalised sense, ‘smart city dynamics’ and/or ‘institutional sustainability pressures’ refer to the cascading institutional flow between macro- and micro-organisational environments (Lapsley et al., 2010), which connect political, field (a distinct industrial sector) and organisational levels. These dynamics (pressures) at three distinct institutional levels have led to important management accounting reforms in public sector institutions (Westerdahl, 2020), including ‘SOEs’. SOEs have undergone important structural reforms in the new public management (Kurunmäki and Miller, 2011) of smart cities (Grossi et al., 2020) on public administration, accountability, collaborative participation, decision-making and sustainability. These reforms, from the standpoint of political legitimacy and social acceptance, ensure that SOEs enjoy a good public service that governs a “good citizen” and forms a “model city” (Berquier and Gibassier, 2019).

Current management accounting literature has turned into problematising smart city reforms and the way they (re)shape public sector sustainability accounting, management and policy (Alsaid, 2021; Argento et al., 2019; Lapsley and Miller, 2019; Brorström et al., 2018). These attempts, which presented a variety of qualitative case studies in developed and developing countries, have used ‘urbanisation’, ‘governmentality’, ‘power dynamics’ as well as ‘institutional dynamics’ as theoretical frameworks to analyse ‘what’, ‘why’ and ‘how’ smart city projects at the city-field level were recognised in implementing organisational-level performance measurement practices (broadly, management accounting). Although these attempts have contributed with meaningful theoretical frameworks and methodologies, they have only covered both the city-field and organisational levels of public institutions. The present study contributes to this kind of previous literature by adding the ‘political level’ of smart city projects, and how political-level institutions have imposed sustainability accounting pressures at the city-field and organisational levels to implement a complex, multi-level management accounting system. More so, previous literature focused on public enterprises with marked ignorance for SOEs, which have politically sensitive institutional sustainability characteristics especially in the distinct context of developing and emerging countries. The special sustainability nature of these SOEs, which was not yet covered in institutional management accounting case studies on smart cities, stems from being subject to the state governance and funding as well as continuous auditing by public accountability agencies (Lapsley and Miller, 2019; Miller et al., 2008).

This study seeks to reinforce previous literature by exploring how politically sensitive SOEs, which are subject to the state and public accountability pressures, respond to the multiple and different sustainability pressures of smart city projects. It focuses on how SOEs, in their social and political guise, use a ‘complex, multi-level’ (Cooper et al., 2019) management accounting system (ERP) to comply with socio-political sustainability goals and smart city reforms (smart electricity network project) across distinct but interconnected institutional levels. The overarching research question is: how do smart city reforms/projects, which created institutional sustainability demands/

pressures, influence the complex, multi-level implementation of a management accounting system in a politically sensitive SOE? This overall question divides into two sub-questions: how do smart city projects impose specific institutional sustainability pressures at the field and organisational levels? Importantly, how can politically sustainable SOEs respond to these pressures by implementing ERP (which imagines the smart city discourse as an interconnected system of management accounting) to maintain legitimacy and social acceptance?

This study espouses institutional theory, in particular Dillard, Rigsby, and Goodman (2004) institutional framework (hereinafter referred to as DRG). Previous management accounting literature on smart cities indicate that two schools have used so far to develop a theory of the potential relationship between management accounting and smart cities. The first is the critical approach that emerged in using the governmentality perspective (Stafford et al., 2020; Alsaïd and Mutiganda, 2020; Argento et al., 2019). Using this perspective, management accounting has mapped as a technology of government in smart city discourses. The second school is institutional approach, which theorised the role of management accounting as a mediating instrument in smart city governance (Alsaïd, 2021; Westerdahl, 2020; Lapsley et al., 2010). The present study adds to this kind of institutional management accounting research through the accreditation of DRG's work. As Alsaïd (2021) showed, the value of utilising DRG's special wok lies in the 'multi-level' institutional analysis to develop a theory of the potential influence of smart city projects (sustainability) on a management accounting system (ERP) in a politically sensitive SOE. The DRG interprets the cascading institutional dynamics between smart city pressures at the macro level and the micro level use of a management accounting system (ERP) in the case SOE, which interconnects 'three' different institutional 'levels': "political", "field" and "organisational" (Dillard et al., 2004).

Data were obtained from an interpretive single-case study of an Egyptian SOE (given the pseudonym MAAD for confidentiality). MAAD is a leading SOE in the electricity distribution field and has about twelve branches in different cities. It is a state government agency responsible for the smart electricity network project in New Minya city, based on the ministerial decision from the ministry of electricity and energy (line management). Its choice -as a case study- was reasoned, given its politically sustainability character as a SOE. Besides the facilities granted to access the field, MAAD affected by smart city reforms that created local government and accountability pressures on its internal management accounting systems. ERP was a political management accounting system for institutionalising sustainable distribution networks across interconnected institutional levels. In this smart city context, evidence were triangulated between semi-structured interviews, observations and documents to gain a comprehensive understanding of sustainability pressures and their potential influences on the "cascading institutionalisation process" (Dillard et al., 2004) of a management accounting system (ERP) in the case company.

This study adds the following findings to institutional management accounting literature. It expands institutional analyses within organisations to include 'three' interconnected 'levels' of institutionalisation (Alsaïd, 2021; Dillard et al., 2004) rather than two-dimensional organisational analyses widely presented by previous literature. In addition, this study has not only confirmed previous literature that institutional sustainability pressures from smart city projects may push SOEs to reshape management accounting practices. However, it has also presented detailed field-based evidence on the way (how) management accounting is implemented in the smart city context, which characterises by a different political nature and different institutional pressures

(Martins et al., 2020). Furthermore, this study has politically explored ‘why’ a management accounting system (ERP) works in specific sustainability ways within MAAD, thus shedding a more general light on the ‘circumstances’ under which a management accounting system is implemented in sustainable SOEs. SOEs, like MAAD, fuels previous literature with a suitable institutional sustainability setting to explore how the complex, multi-level implementation of a management accounting system has guided by the interaction of different beliefs, rationales and expectations arising from the institutional environment of the city project.

The rest of this study continues as follows. Section 2 explains three unique but interconnected levels of the DRG’s cascading institutionalisation process. Section 3 presents the sustainability characteristics of the institutional smart city context studied. Section 4 describes the research methods to collect and analyse data. Section 5 analyses the main findings in line with the DRG’s different levels of cascading institutionalisation. Section 6 provides a discussion accompanied by an ongoing debate in previous studies about the potential relationship between management accounting and smart cities. Section 7 concludes and ends the study with some future research ambitions that go beyond the obvious in the literature.

2. DRG (2004) multi-level institutional dynamics

This study presents the institutional work of DRG in its second appearance in the current management accounting literature on smart city reforms, following the recent study of Alsaïd (2021) that deals with the role of performance measurement in smart city governance. However, DRG’s institutional work has appeared frequently in previous (especially critical) management accounting literature on structural and neoliberal reforms (Alawattage and Alsaïd, 2018; Alsaïd and Mutiganda, 2018; Wanderley and Cullen, 2012; Hopper and Major, 2007). In line with the Egyptian case observations in the smart city context, DRG’s institutional work adds to other theoretical frameworks in current management accounting research such as governmentality, neoliberalism, institutionalisation, and instrumentation (Cooper et al., 2019; Cooper and Ezzamel, 2013; Kurunmäki and Miller, 2011; Quattrone and Hopper, 2005). Compared to these valuable theoretical perspectives, DRG’s institutional work argues that different (management) accounting practices are institutionalised within organisations due to “significant influences” or “pressures imposed” by higher institutional levels such as political, economic, cultural and social levels. These institutionalisation processes of (management) accounting practices within organisations are in a cascading (macro-micro) form of institutional flow at ‘three’ distinct but interconnected ‘levels’ (Dillard et al., 2004): political, field, and organisational (see below).

The (*macro*) *political level* constitutes ‘highest-order’ norms, meanings and values at the state (country) level, which politically constitute “sense-making criteria” in the state. At this level, DRG’s institutional work was given an empirical example of highest-order “market capitalism” criteria. These criteria were institutionalised ‘certain’ political-level objectives, structures, policies and strategies such as the state-level emergence of the market-driven structures of private ownership, capital accumulation, shareholder priority, and central markets (Dillard et al., 2004), which were later translated into specific procedures and behaviours in different economic fields in the country. In line with this, according to the case observations (see subsection 5.1), the political level criteria of the present SOE (MAAD) lie in the adoption and utilisation of smart city ideologies, policies and reforms across the country and then the accompanying political sustainability demands and pressures imposed on the state government (various ministries) to

implement and comply with various smart city goals and projects (broadly, sustainable urban developments), each in its economic field.

At the (*macro*) *field level*, a field means a peculiar realm or sector of social activities, behaviours, and actions in which sense-making criteria (stemming from the highest political level) are institutionalised according to the distinct peculiarities and unique characteristics of that specific economic field (industrial sector). At this level, there are so-called “field criteria” (Dillard et al., 2004), which are institutionally shaped (reshaped) through highest values, meanings and norms at the political level of the state. These institutional field criteria are the way (meaning) by which different field actors (as illustrated by DRG’s work, industry sectors, geographic groups, and professional institutes) can gain social acceptance and political legitimacy. In line with this, according to the case observations (see subsection 5.2), the field level criteria of the present SOE (MAAD) lie in establishing a clear management accounting hierarchy of electricity distribution governance and local accountability to communicate different field actors involved in the city project. As below, these institutional field criteria are the fundamental institutional basis for (re)shaping internal practices and operational frameworks within individual organisations that form the “micro level” in the DRG’s view (Dillard et al., 2004).

At the (*micro*) *organisational level*, the practices, processes, and structures of each (individual) organisation shaped (reshaped) according to the institutional criteria (rules, regulations and guidelines) of its economic field. Individual (single) organisations implement specific rules and routines (either as “early innovators” or “late innovators” as described by DRG) to meet the demands of higher field criteria (which mainly stem from highest political values and desires at the overall state level). This internal implementation at the organisational level requires organisational actors (key players/performers) to combine their agential power and actions of encoding, enacting, reproduction, and institutionalisation processes. In line with this, according to the case observations (see subsection 5.3), the institutionalisation process of the present SOE (MAAD) is shaped by the internal application of ‘different’ management accounting ‘practices’ that incorporate ‘multiple’ demands from ‘different’ (field and political) agencies involved in the city project. Then, in the DRG’s view, the “recursive dynamics” will start from the (micro) organisational level to the (macro higher) field level and then the (macro highest) political level. These (micro-macro) recursive dynamics are roughly in the institutional form of regulatory and oversight reports (in the present case, MAAD’s sustainability performance reports, which are assigned quarterly) that individual organisations send to higher (or highest) institutional levels to make appropriate (political) decisions, plans and strategies (Dillard et al., 2004).

Accordingly, this study adds to institutional management accounting research that addressed different level influences. For instance, the institutional work of Quattrone and Hopper (2005) has addressed the Japanese and American company that introduced ERP. The Japanese company was very conservative, and it did not abandon its previous accountability structures and fairly rigid reporting. Quattrone and Hopper (2005) have provided an example of the old system and the new system running together in quite unexpected ways, and certainly in contravention of the normal gospel of ERP. However, the smart city context in the present study adds an interesting (political and state ownership) dimension to this, and perhaps a development perspective. In addition, the present study adds to previous new public management research in the institutional field of management accounting. For instance, Kurunmäki and Miller (2011) have emphasised the institutional complexity of different programmatic contexts that compete in certain areas of

government, such as health. The present study contrasts their idea of the levels of program, technology, and accounting practices with the three DRG levels, and relatedly, how the political perspective pays more attention to norms and normative pressure in these sorts of nested institutional contexts. Furthermore, the seminal works by Cooper et al. (2019), and Cooper and Ezzamel (2013) on the layering of different accounting and reporting systems can relate the dynamics present in these interconnections through the specific (sustainability) dynamics that emerged from the present study. The present study argues that ‘very complex’ interrelationships anticipate when institutional demands of different sorts come together in an organisation, which must somewhere in the operations -in one form or another- accommodate how these different systems operate. Therefore, the present study adds to this valuable kind of literature by showing the particular connections that will be flashed out in the discussion section (see section 6).

3. The institutional context of smart sustainable cities

Egypt is currently witnessing massive sustainable urban development plans and projects, as is the case in other developing African countries, especially after the Arab Spring revolutions and European funding for smart city initiatives in Africa (Hamza, 2016). Smart city initiatives in Africa have attracted global attention in recent years (Siba and Sow, 2017). Recently, in 2020, Africa has become the second continent in the world after Asia in terms of sustainable urban planning and development (Tan and Taihagh, 2020). Compared to the past, Africa in 2014/2015 achieved the lowest rates of urban development in terms of urban planning projects. About 60% of its citizens were living in distant villages and remote areas suffering from many diseases, the poor, and an acute shortage of public facilities and services (Siba and Sow, 2017). From 2014 to 2020, with financial support from the World Bank and the European Union, the continent has made tremendous progresses in sustainable urban developments and smart city projects which are expected to increase by 15-16% at the end of 2050 (Slavova and Okwechime, 2016). In response, some smart city initiatives have recently emerged in different African developing countries. For instance, by implementing Chinese parking technology, Addis Ababa (Ethiopia) established smart parking in a steel building with an automatic lift to resolve an obvious shortage of parking spaces. Likewise, in Nigeria, the smart city project emerged in mid-2017 to implement advanced ICT-ERP technologies through which city governments can improve the provision of public facilities and services to their citizens (Alsaïd, 2021; Tan and Taihagh, 2020).

In Egypt, especially after two political revolutions (2011 and 2013), the Egyptian economy has become weak and has suffered from numerous economic constraints and complex investment policies. This has resulted in a quick flight for most local and foreign investors (Hamza, 2016). In the DRG’s view, these high-order economic conditions have created institutional demands and pressures on the political management, and then on city governments to adopt new sustainability policies and urban development projects, with support from the World Bank and the European Union, such as smart city projects and policies (Alsaïd, 2021; Alsaïd and Mutiganda, 2020). These political-level urban development projects started in 2015, which covered so far about 20 cities in Egypt (EUF Report, 2015). Alsaïd and Mutiganda (2020) then Alsaïd (2021) are two recent and early research attempts to explore the Egyptian context of smart cities. In their different case studies, Alsaïd and Mutiganda (2020) have explored the role of accounting in smart city governance. Using governmentality as a theory, they have addressed accounting interventions in establishing smart governance in New Cairo city. The role of accounting discourse has represented in new smart technologies, such as ERP and cost reporting. On the contrary, Alsaïd (2021) has

used the three DRG institutional levels to understand the role of performance measurement in smart city decision making and governance. Unlike Alsaïd and Mutiganda (2020), the findings of Alsaïd (2021) showed that institutional pressures for smart city projects have affected the establishment of a smart governance system of public-private collaboration where performance measures played an important role in (re)making political decisions and military actions in New Cairo city council. Although the present study conducted in the Egyptian context of smart cities, it differed from similar recent works by Alsaïd and Mutiganda (2020), and Alsaïd (2021) in terms of empirical findings (see section 5) and theoretical discussions (see section 6).

Using the DRG, the present study examines the institutional context of a different smart city in Egypt (New Minya city) and a different public electricity company (MAAD), which has a politically sensitive institutional character as a sustainable SOE. As neither two cities nor companies are the same, the findings of the present study, as analysed and discussed below, differ from those in Alsaïd and Mutiganda (2020) and Alsaïd (2021). Unlike these both attempts that focused on management accounting, performance measurement and smart city governance, the present study focuses on institutional dynamics and sustainability pressures to use a complex, multi-level management accounting system (ERP) in SOEs to meet the institutional demands of smart city projects. Comparing two similar studies, the present study adds to this kind of literature by showing the co-presence of different institutional sustainability pressures and how they give rise to different socio-political systems, namely ERP, particular pricing, particular costing, and some other management accounting systems (see sections 5 and 6).

4. Data and Methods

This study is based on an interpretive qualitative single-case study approach. This case study contributes to institutional management accounting case studies on smart cities by providing additional (supportive) evidence on the potential influence of smart city projects (political sustainability pressures) on the multi-level implementation of a management accounting (ERP) system in an Egyptian SOE. Previous studies (Stafford et al., 2020; Argento et al., 2019; Lapsley et al., 2010; Czarniawska, 2010) have explored the relationship between management accounting and smart cities at the macro-city level only. However, the present study examines this potential relationship from a micro-level perspective of a SOE and how organisational management accounting systems (namely ERP, pricing, and costing) were applied to counter institutional sustainability pressures for smart city projects. Especially, in Egypt as an example, mandating SOEs to implement these (sustainable development) projects is part of the post-revolution government's socio-political attempts towards local urban governance and social accountability.

The choice of a SOE from the Egyptian smart city context, in particular, is unique and different compared to those covered in previous management accounting case studies on smart sustainable cities. In the DRG's view, SOEs affected by the political leadership decision to adopt smart city projects, which imposed multiple institutional sustainability pressures on different economic fields (ministries and associated enterprises) then on the institutionalisation of different systems to meet these projects. Public institutions in Egypt, especially SOEs that still contribute, have contributed to the implementation of a large proportion of these projects compared to the private sector, which shuns itself because these projects aim at achieving social aspects, not economic ones (Alsaïd and Ambilichu, 2020). Here and importantly, in the DRG's view, the "political desire" was to improve

the efficiency and effectiveness of SOEs, modernise their operating systems and maintain their governmental legitimacy and societal acceptance as ‘SOEs’.

As a SOE affected by local smart city pressures, MAAD² was selected as an interpretive single-case study. MAAD provided an example of transforming public enterprises, especially politically sensitive SOEs, in smart city projects. In the smart city settings, the Egyptian public sector has significantly contributed to implementing sustainable development projects (Hamza, 2016) which characterise New Minya city as a smart city, including the smart electricity project, the smart water project, the smart healthcare project, etc. MAAD provided rich facilities to fieldwork, especially after obtaining approvals from the government because it is a SOE. The validity and reliability of the data were enhanced through multiple semi-structured interviews with different participants and other documentary evidence (Parker, 2012). In line with DRG’s multi-level dynamics, data were collected from two different but interconnected ‘levels’: the first is the ‘macro’ level, i.e., city-level political sustainability pressures on the electricity field to implement ERP networks as an institutional form of smart city management accounting. The second is the ‘micro’ level, i.e., the organisational implementation of different management accounting practices through which MAAD can reconsider the governance and accountability hierarchy of these networks and maintain societal acceptance and political legitimacy as a ‘sustainable SOE’.

Most relevant macro (city-level) data on political and economic field episodes were originally published and available on the internet as ‘secondary’ materials. These included sustainability and smart city reports, newspapers, journal articles, and websites. Micro (organisational-level) data were obtained through various semi-structured interviews with various organisational and institutional actors in MAAD and city council, and direct observations on their daily ERP implementation practices. Given the overall research question and the work nature of each participant, a separate interview guide was used so that the interview questions and inquiries differed among the interviewees. This helped to gain a better and deeper understanding of what, how and why everyone does and does not (Yin, 2018). Because “participant observations” presented in a Yinian sense, data collection strategies were mostly “observer-to-participant” extensions (Yin, 2018). The participation transcended the level of interviews, as there was an opportunity to ‘walk’ and ‘see’ the day-to-day life of different management accounting (ERP) practices. It also prolonged to involve in decision-making processes through some professional consultations on ERP-backed ‘visual cost management’ to avoid tampering with management accounting data between multi-level city network actors.

The main data collection was from July to October 2017. Then, the follow-up was from July to August 2018 and from February to March 2019. Eleven field visits made to MAAD and New Minya city council; about 2-3 interviews per visit and the author participated for several days in various executive divisions and headquarters. In total, 28 official interviews conducted with 19 different (MAAD and city council) actors: ten accounting officers, four executive managers, two financial consultants, and three societal innovation staff. Each interview lasted between 40 and 75 min, but most of them spent around an hour. Most of the interviews were tape-recorded

² MAAD is also a public sector company that contributed to the public-private collaboration of the New Cairo City Council to implement the smart electricity network project in New Cairo (Alsaid, 2021). MAAD in New Minya city has played the same role as MEEDCO in implementing smart electricity networks in New Cairo city (Alsaid and Mutiganda, 2020), but with different institutional dynamics and sustainability pressures to implement a multi-level management accounting system (ERP) as discussed below (see sections 5 and 6).

(Arabic/English) and transcribed. Two joint meetings were undertaken (Gioia et al., 2013): for example, the first meeting consisted of the MAAD community innovation manager, the chief financial adviser, the city societal innovation manager and the junior accountant. The second meeting conducted with the MAAD social and environmental accountability chief, the IT/ERP manager, the city sustainability director and the senior accountant. These (multi-level) meetings brought a clear understanding of sustainability performance, social accountability, smart city projects, electricity distribution networks and the ERP implementation as a complex, multi-level management accounting system at three different but interrelated institutional levels (political, field and organisational).

To reflect the DRG institutional realities, data analysis was not performed using electronic software. This was completed manually to keep the interviewees' natural reflections and expressions as normal. A three-step process (Gioia et al., 2013) was adopted to analyse data collected in line with the different DRG levels of the cascading institutionalisation process. According to Gioia et al. (2013), and similar to Alsaïd (2021), (re)reading documents and notes along with (re)listening to interview recordings was the first step in the analysis process, which was an aid to understanding what is behind the data. Then, in the second step, the appropriate research issues that arose from the first step were identified and coded so that each issue was assigned a specific code. In the third step, consistent with DRG theoretical levels, different groups created to correlate various data encoded in the second step. Based on the DRG, these groupings emerged in the form of a 'tree' that showed institutional sustainability dynamics between smart city projects at macro (political and field) levels and a management accounting/ERP system at a micro (organisational) level. Data were structured as a 'logical tree' (Gioia et al., 2013) through complex, multiple levels of data coding, e.g., the first-order coding, the second-order coding, the third-order coding, etc. In the DRG sense, consistent with Alsaïd (2021), the first-order coding showed the 'political' level. While the second-order coding showed the economic 'field' level, the third-order coding expressed the sense of the 'organisational' level. This three-step institutional analysis process helped distinguish and collect additional evidence to recognise the research question and specific theoretical themes (Parker, 2012). During this analysis process, institutional (practice-driven) patterns appeared in spoken words, meanings, languages, and motivations, as well as an emphasis on emerging important matters (Alsaïd, 2021).

5. Empirical findings

Consistent with the DRG multi-level dynamics, which reflect the cascading institutionalisation process, this data analysis section is structured into 'three' distinct but interrelated subsections. Subsection 5.1 analyses the 'political' level of the case SOE (MAAD), which reveals institutional sustainability pressures for smart city projects and how to comply with them through the multi-level ERP implementation. Subsection 5.2 analyses the potential influence of these pressures on establishing a clear management accounting hierarchy of local governance and accountability at the institutional 'field' level, and the ERP role therein. Then, subsection 5.3 analyses the internal application of different management accounting practices at the 'organisational' level to meet multiple sustainability demands and pressures from different higher (field) or highest (political) agencies involved in the city project for ERP-enabled smart electricity networks.

5.1 At the political level of MAAD: Institutional sustainability pressures of smart city reforms

Smart city reforms have constituted institutional sustainability pressures and demands at the political level of sustainable urban cities, including New Minya city. After the recent political revolutions, the political leadership in Egypt and then the state government have adopted sustainable urban development strategies, plans and projects. The political desire of the state was to confront the many urban problems that localised citizens were suffering from such as the problems of unclean water sources, harmful electricity distribution grids, lack of public healthcare etc. One of these government strategies and sustainability plans were smart city reforms/ projects that SOEs were mandated to implement in different cities as in the MAAD case with the sustainable electricity network project in New Minya city. The city council executive director explains:

The [state] government forms a middleman between city councils and SOEs in a situation where we are jointly commissioned on a state/city network project. For instance, in our case..., MAAD has cooperated with the New Minya city council in implementing the ERP system... practically known as a [complex, multi-level] management accounting system... to install smart and sustainable electricity distribution networks in the city.

MAAD, as a politically sensitive SOE, has faced smart city pressure not only from its line management (the ministry of electricity and energy). But, this sustainability pressure has also extended to come from other government agencies (the central public accountability agency) that MAAD is subject to its scrutiny twice a year (every six months). In line with the DRG work, these government and accountability pressures have represented in different institutional forms within MAAD. The first institutional sustainability pressure was to appoint representatives to the board of directors to follow-up the implementation of the city's smart distribution network project. Currently, as its executive director explains, MAAD has at least three representatives on its board of directors: two from a line ministry and one from the central public accountability agency. The remaining members are from the relevant ministries and the group of directors, for which the ministry of electricity and energy provides a list of suitable candidates. The MAAD sustainability manager adds:

... Nevertheless, [institutional] government and accountability representatives have influenced by [state] politics. I mean..., our board of directors is subject to amendment upon changing the relevant minister. In practice, directors appointed for political reasons either resign or be forced to resign.

The second sustainability pressure on MAAD is the financial funding it receives annually by the state government (budget plan). As a SOE, MAAD depends entirely on the financial resources of the ministry of electricity and energy. But with the smart electricity network project, MAAD has prepared a business (investment) plan on cost and revenue estimates to implement this project in New Minya city. Then the board of directors has sent this plan to the ministry for approval. Surprisingly, given the political revolution circumstances and the subsequent financial crisis that engulfed various economic fields, the ministry has rejected the MAAD business/action plan to implement the project. After several negotiations with the line ministry and the intervention of the central accountability agency, the ministry has approved about 75% of the project implementation plan and requested MAAD to cover the remaining costs from self-financing resources.

As a listed SOE, MAAD has issued new bonds (under the project name) for public offerings on the Egyptian Stock Exchange. This was to cover about 25% of the remaining project costs so that investors could take advantage of the project annual returns (this is known as “smart bonds” (Czarniawska, 2010) in smart city discourses). Due to some political problems, the project was delayed by a year to start in September 2017. The MAAD sustainability manager states:

As a SOE, it is supposed to receive full financial support from the government. However, our sustainability management issue is that we do not receive sufficient support from the line ministry, especially after recent political revolutions and the subsequent shortages of financial resources. We noticed that the line ministry is working as a shareholder and tending to regulate us rather than supporting us as a line management. This has promoted us to rely on other sources of financing such as long-term loans and bond issuing plans.

The third institutional sustainability pressure on MAAD is that with smart city reforms, the management, accounting and accountability roles of different government agencies sometimes interfere and increase the workload of SOEs (in the DRG sense, so-called “practice variations”). For instance, as an institutional sustainability fact, MAAD is demanded to submit a quarterly performance report (the respondents say, a “sustainability performance report”) to the ministry of electricity and energy and the central accountability agency, but using different forms in addition to different (management accounting) data sets. A senior sustainability accountant explains that MAAD not only suffers from insufficient support from its line ministry, but also from insufficient integration between the regulatory sustainability demands of government agencies, which causes duplication of work. Because of the “notorious red tape in the bureaucratic system” and multiple government agencies to deal with, sometimes MAAD connections need to be repurposed to speed up the work. This results in the opinion of the sustainability manager that the line ministry is sometimes sufficiently inactive or not paying enough attention to SOEs. The MAAD sustainability manager says:

At the end of each fiscal year, the line ministry submits a performance report to the government, including our performance as SOEs. In the MAAD problem..., the ministry did not monitor sustainability performance or did not take any other measures. Only, it places more emphasis on our SOE budget, which it must submit to the cabinet for approval.

In the DRG sense, with all these institutional sustainability pressures, MAAD has responded to smart city reforms and demands (specifically, the smart electricity network project) by implementing the ERP system. The senior sustainability accountant states: “the business name for the ERP system is a management accounting system”. The political reason behind this name is that the ERP system has not only played a management/governance role in installing sustainable electricity networks (imposed by the state government/line ministry) at the institutional field of MAAD (see subsection 5.2). But, ERP has also played an accountability role in institutionalising different accounting practices (imposed by the central public accountability agency) at the organisational level of MAAD (see subsection 5.3). Therefore, due to its different and multiple supporting roles in smart city reforms, the organisational and institutional actors of MAAD and city government have named ERP as a “complex, multi-level management accounting system”. Management accounting, in the sustainability case of the current SOEs, and in accordance with the DRG institutional work, does not exist in the traditional and functional sense known and

understood in textbooks or previous management accounting literature on sustainable and smart cities. But, instead, the sustainability role of management accounting has actually appeared in implementing a complex, multi-level ERP system.

MAAD has then implemented a complex, multi-level ERP/management accounting system to embrace various institutional sustainability demands and pressures imposed by the ministry (line management) and the public accountability agency (government auditor) on the political and social importance of smart electricity distribution networks. The rationale for this MAAD response was to maintain government legitimacy and social acceptance as a SOE as well as to maintain the market's reputation as a SOE listed on the Egyptian Stock Exchange. The chairman of New Minya city council says:

The political desire of the smart electricity project was to implement advanced ICT-enabled distribution networks in various (urban and rural) areas of the city. This was socially important to improve the quality of sustainable electricity services provided to local citizens and then improve societal health. People in some geographical areas, especially rural areas, have suffered for several years from harmful emissions and infectious diseases due to the use of unhealthy electricity distribution sources. [...]

MAAD has implemented a modern ERP system (or as we say in practice, an integrated management accounting system) with the political intention to achieve full integration between the various distribution stations in the city. In this respect, the management accounting/ERP system was not only performing a technical or functional role, but this role was also extended to perform other sustainability management and accounting roles [see below].

5.2 At the field level: Establishing a clear sustainability governance hierarchy

Institutional sustainability pressures and demands for smart city reforms at the political level, resulted in a complex, multi-level management accounting or sustainable ERP system to accommodate them, created changes in MAAD's organisational culture and management at the institutional field level of the smart electricity network project. Apart from the technical or functional details that ERP has institutionalised in the institutional field of the project through technologies of smart home electricity management, smart meters, and smart streetlights (Alsaid, 2021), the sustainable ERP implementation was to transform MAAD into a (multi-level) management accounting system that permitted the field ideologies of capital market, smart governance and the private sector to reorient the case enterprise. The line (field) ministry was driven by the political leadership to adopt market-based management accounting devices for smart city reforms (Argento et al., 2019). Unlike previous literature, in line with the DRG sense at the institutional field level, the adoption of a complex, multi-level management accounting or sustainable ERP system was politically to inculcate a private sector culture (Grossi et al., 2020) in politically sensitive SOEs (such as MAAD). The sustainability management director of the city government confirms:

MAAD is a politically sensitive SOE in which a private sector culture dominates its sustainability performance management. With smart city reforms and ERP-supported smart electricity network project implementation, the company's focus

at the field level has shifted from free operational services to a market-oriented SOE. Institutionally and politically, MAAD has now managed and regulated by various [state] government agencies in a field [the line ministry and the central accountability agency] as a private enterprise.

The sustainability practices between various government agencies support DRG analysis at the institutional field level. A clear sustainability governance hierarchy between institutional field agencies can reduce institutional conflict and complexity in politically sensitive SOEs (such as MAAD). The multi-level ERP system relates to a sustainable hierarchical strategy to manage and monitor electricity distribution in the city. As many respondents at the city and company levels claimed, sustainable ERP has reshaped old centralised distribution plans and strategies by applying clear hierarchical governance and advanced distribution devices in the city. The smart governance, as the council chairman said, is the important management accounting reform at the institutional field level of MAAD to operate and manage the city's massive distribution networks and build effective sustainability governance structures. The ERP-enabled management accounting system has institutionally categorised multiple different management and governance levels, namely, the upper strategic category (at the political level), tactical bottom category (at the field level), and lowest local category (at the organisational level). The MAAD project manager says:

At the upper strategic level, sustainable ERP distribution networks enable the city government to display, operate and monitor accounting/calculative functions by gathering financial and non-financial information from various bottom field and local levels and market classes. At the field level, tactical controls have different functions to provide the optimal settings for the lowest local/MAAD level controls, including distribution network management, development and protection.

Therefore, in the DRG sense, the ERP-driven management accounting system is considered as a remote smart governance system (Lapsley et al., 2010), which 'connects' sporadic distribution networks at the institutional field level of MAAD. Smart electricity governance, which MAAD has established at the city-field level of the project through the sustainable ERP implementation, is a complex, multi-level management accounting tool (Cooper et al., 2019) for politicising the company's local management in the city's bureaucratic system. The MAAD sustainability director states:

ERP-managed distribution networks have paved the sustainable development way for hierarchical, manageable, and calculable communications between different government agencies and then between dispersed systems of sustainability management, accounting and governance that practised in the pre-2017 period (prior to the ERP implementation). From 2017 onwards, with smart city reforms and projects, sustainability governance policies have been behind everything practiced in the electricity field of New Minya city to curb political interference.

However, according to the DRG institutional work and as a collective understanding of the interview participants, political interference remains but it is currently in an 'acceptable' institutional sustainability network between MAAD and various state government agencies for smart city reforms (Brorström et al., 2018). The MAAD senior accountant says:

ERP-enabled distribution networks have more freedom than their predecessors. However, political interference is still present by various government agencies in MAAD internal systems and practices as a SOE. [...] Smart city reforms for public electricity services were getting stronger in the consciousness of MAAD managers to maintain legitimacy and social acceptance in the city.

The city government's sustainability manager agreed and added:

The political pressure and demand for smart and sustainable city reforms were translated at the institutional level of the city's electricity field by establishing a clear governance hierarchy through ERP or what we consider a [complex, multi-level] management accounting system.

5.3 At the organisational level: Applying different sustainability accounting practices

Political sustainability pressures for smart city reforms were not only affected at the institutional field level of MAAD, but also extended to its internal sustainability management accounting practices at the organisational level. In pre-smart city reforms and projects, MAAD was applying the "uniform accounting system" issued by the central public accountability agency in the 1970s³. The head of the financial management in MAAD mentions:

The uniform accounting system in Egypt is a government accounting means for state-owned enterprises to process and report their financial transactions and activities in a standardised manner in the same field. The uniform system of accounting practices has standardised many of the basic elements containing a standardised chart of accounts, standardised accounting procedures, and external financial reports.

Apart from the regulatory details of this uniform system for SOEs, which is one of this study's limitations, MAAD -as a sustainable SOE- has an obligation with the line ministry and the central public accountability agency to implement the uniform system including a standardised chart of accounts, standardised accounting procedures, and external financial reports. However, with smart city reforms, government agencies have imposed additional and different accounting practices through which MAAD can meet the institutional demands of the sustainable electricity network project in the city. Along with the uniform system, MAAD has been enforced to apply different accounting practices, namely, smart distribution cost management and smart distribution pricing, which have been institutionalised through sustainable ERP implementation. A senior accountant in MAAD says:

These multiple and different accounting practices have been added in our ERP-enabled management accounting system and then became an essential part of our daily sustainability activities and practices. With sustainable ERP, MAAD internal accounting practices have become visible and manageable by various government

³ For more details about the Egyptian uniform accounting system that governs government accounting performance (rules, procedures, accounts, reports, etc.) for various SOEs in Egypt, see, for example, Kholeif et al. (2008) and/or El-sharkawy (1995).

agencies involved in sustainable and smart distribution networks ... I mean ..., the line ministry and the central public accountability agency.

These multiple and different accounting practices have formed institutional sustainability pressure on the MAAD financial management because of the increased workload, then practice variation or duplication in the accounting work. With smart city pressures, MAAD internal accounting work is not only limited to implementing the uniform system accounts, procedures and reports, but extended to include more sustainable work on 'cost management' and 'pricing'. In the DRG sense, the problem, here, is that these additional accounting practices are "different" due to "different" institutional demands from "different" government agencies. The sustainability practice of smart distribution cost management came from the central public accountability agency, while the smart distribution pricing practice came from the line ministry. The head of the financial management in MAAD expressed his anger over the increased workload, practice variation and duplication, which sometimes lead to internal conflicts and complexities with various government agencies involved in the city project:

We are now facing multiple and different management accounting practices for different institutional sustainability demands and pressures by different government agencies. We are [really] angry because of the multiplicity and variation in our internal management accounting practices. This has at times led to internal conflicts and complications with various government agencies in the city project.

In the pre-smart electricity project, MAAD was applied a single accounting practice, which is represented in the uniform accounting system (procedures, accounts and reports). Now, with the implementation of a city project, additional (but different) accounting practices in practice are smart or sustainable distribution cost management and pricing. The financial manager explains that MAAD must meet these multiple and different institutional sustainability requirements to maintain its socio-political legitimacy as a sustainable SOE. To this, MAAD must provide the various government agencies involved in a city project every quarter with a "sustainability performance report". This report is now integrated into the complex, multi-level ERP-enabled management accounting system for the project. The political purpose of this sustainability report is to demonstrate the performance of a city network project as well as internal details of cost movement and electricity pricing processes within smart distribution networks.

Sustainable cost management (cost analysis and control) has been institutionalised as a routine management accounting practice for smart city reforms. The head of the cost accounting department explains that with the implementation of a city network project, the head of each cost sub-departments (purchase cost department, indirect cost centres, inventory cost management, distribution cost centres) bears a daily oversight responsibility (accountable) for operational cost movements in his/her specific 'cost accounting headings'. For instance, the daily movements of smart distribution costs are managed by the distribution department, which can visualise and manage distribution costs through ERP. Through the sustainable ERP system, the actual distribution costs are compared to the budget, and the differences are reported to the head of the distribution department who prepares an official report through the system – the "daily movement report". The report focuses on these differences and the rationale for increasing distribution costs (if any). This report is visible through the sustainable ERP system among the city's main actors for internal auditing by MAAD and external auditing by the city government, the central public

accountability agency and the line ministry. The same management accounting cycle is politically pursued in other cost sub-departments through a sustainable ERP system.

Cost differences (between the current and previous periods) are also reported by a sustainable ERP system as distribution “cost movements” (Alawattage and Alsaid, 2018). Although this is simply a sub-system of variance reporting in a traditional (well-known) management accounting system, cost management/cost movement brought about by sustainable and smart city reforms signified an additional management accounting practice for MAAD which has not previously experienced such a practice. Senior (interview) participants observed that with a city network project, sustainable cost movements became vital to various government agencies in the project. In the DRG institutional sense, the political focus on cost differences has made cost management a sustainability mechanism (good management accounting practice) with which MAAD’s organisational efficiency and effectiveness is identified, expressed, and shared with different state government agencies. Cost management (sustainability) reports are now used for regular urban audits (Grossi et al., 2020) by the city government, the line ministry, and the central accountability agency to ensure MAAD’s institutional commitment as a sustainable SOE. Therefore, distribution cost movements are a key management accounting component of MAAD’s sustainability performance reports, which are mapped quarterly (Stafford et al., 2020) to the (cost) performance of ERP distribution networks. Compared to the (old) situation in the pre-ERP distribution system, the head of the cost department recalls that:

In pre-ERP distribution systems, old performance reports were included only very basic cost accounting data (account balances, cost entries, cost constraints, and major cost elements). These traditional management accounting reports were prepared for internal audit only and were never for external urban audits by a city council, the line ministry, or even the central public accountability agency.

The involvement of various government agencies in auditing cost movement reports (daily or quarterly) supports the DRG view of “recursive dynamics” between the (lower) organisational level, (higher) field level, and (highest) political level. With these recursive dynamics (from bottom to top), MAAD is facing smart city pressure to adhere to sustainable cost management practices in the city network project governance (Lapsley et al., 2010). A senior accountant argues that such institutional pressure is to ensure that MAAD keeps distribution costs under a sustainability control system and that the company -as a sustainable SOE- no longer represents the “financial burden” of various state government agencies. Sustainability performance reporting (which reflect cost movements) are more important than just periodic financial statements because these management (accounting) reports currently show actual changes (movements) in the city’s distribution costs. These are now the most important thing that must be clear to the state/city government agencies in sustainable and smart city reforms/projects (Czarniawska, 2010). Another senior accountant agreed, saying:

The financial burden of various government agencies [the line ministry, the city council, and the central accountability agency] is strongly echoed by MAAD’s managers, executives, and employees. Politically, an impressive achievement is that MAAD does not represent such a state/city government burden to maintain legitimacy in the field as a sustainable SOE.

However, smart city reforms in New Minya city have become politically unstable, despite the sustainable implementation of the smart electricity network project. Perhaps the reason is “haphazard pricing” policies (which do not support SOEs’ business plans) that the line ministry imposed on MAAD in smart city reforms. “SOEs’ internal pricing” is one of the salient political interferences in ERP-enabled distribution networks. The “pricing study”, as described by the participants, is a negotiation mechanism between MAAD and different government agencies over the city’s smart pricing structure. As per a senior accountant, “ERP networks have created a smart distribution pricing method”. In the DRG institutional sense, with ERP, smart distribution pricing has become a government practice (not an organisational practice as it used to be in previous literature). The tariff structure for the smart electricity project is determined by the line ministry (ministry of electricity and energy). The financial management role in MAAD only proposes some changes from year to year to recognise changes in the surrounding business environment (field). These organisational-level proposals must be supported by cost movement (sustainability) reports which are now an intermediary management accounting mechanism for “pricing negotiations” between the company (micro-level) and the line ministry (macro-level).

For state pricing negotiations, MAAD must provide the line ministry with a “pricing study” after preparing the annual distribution budget in full. The financial manager in MAAD explains that the pricing study includes a proposal for smart distribution costs and prices that must meet specific criteria imposed by the line ministry to achieve the smart city objectives of social justice, public health improvement and sustainability. In the DRG sense, these criteria constitute the pricing policies imposed by the line ministry since the implementation of a city network project in 2017, which were described as “haphazard policies” by some of the interview participants. Therefore, pricing studies for SOEs that do not comply with government policies are rejected by the line ministry. The financial manager also observed:

Employee incentives and bonuses at MAAD depend entirely on ensuring that the costs and prices of smart electricity distribution in the sustainable city are kept within government permissible limits.

A senior sustainability accountant in the city government agreed but added:

MAAD meetings with various government agencies (the line ministry, the city council and the central public accountability agency) are always dominated by extensive explanations and controversial discussions about sustainable distribution prices and sustainable cost movements. The political rationale for these regular government audits and discussions is to maintain [socio-political] legitimacy as a sustained SOE and ensure smart city governance and accountability through the [complex, multi-level] ERP-enabled management accounting system.

6. Discussion

The case findings reveal that the interplay between multiple institutional sustainability demands from different government agencies guides the complex, multi-level implementation (Cooper et al., 2019) of a management accounting (ERP) system through ‘three’ unique institutional ‘levels’ of the city project: political, field and organisational (Dillard et al., 2004). The multiple ERP role, then different management accounting functions, includes institutional sustainability demands

imposed by different government agencies in a variety of ways. In the DRG sense, with ERP, multi-level management accounting functions as a political sustainability practice, helping to maintain MAAD's position as a sustainable SOE (see below).

6.1 Smart city reforms and multi-level management accounting

Smart city reforms are an important 'political sustainability event' that has emerged recently in emerging and developing countries (such as Egypt) after the Arab Spring revolutions. Previous literature investigating whether, how, and why smart city projects shape management accounting systems within politically sensitive SOEs in developing countries are relatively limited, and their findings are somewhat 'partial' and 'unexplored' empirically. Some studies have revealed that sustainable projects can push city governments to transform performance measurement systems (Alsaïd, 2021; Argento et al., 2019; Brorström et al., 2018). On the contrary, Stafford et al. (2020) reveals that the adoption of the sustainable and smart city approach has not led city governments in Greater Manchester to transform private-public control systems into that smart governance. By contributing to this kind of previous studies, there is a crucial need to explore more how smart city reforms/projects, and subsequent institutional sustainability dynamics, affect the implementation of a multi-level management accounting system in SOEs. In the institutional sense (of DRG), consistent with Alsaïd (2021), and Quattrone and Hopper (2005), the ERP-enabled management accounting system has played 'multiple sustainability roles' (Cooper et al., 2019) to face different institutional demands from different government agencies in the city's smart electricity project.

Other studies have documented that institutional sustainability pressures from smart city reforms are pushing public sector organisations (such as city councils) to apply short-term performance measurements as a means for employee incentives (Stafford et al., 2020; Czarniawska, 2010). These organisations may not use budgets to set smart city goals, but specific financial targets set in smart city projects can be used as an alternative goal for managing and measuring future sustainability performance (Lapsley et al., 2010). However, these insights only confirm (or may not) the impact of smart city projects on management accounting practices in various city governments, mostly in various Western and developed contexts. Previous literature has attributed major performance changes in city governments to the sustainable influence of smart cities (Drapalova and Wegrich, 2020; Ferry et al., 2019; Eckersley et al., 2018). In response to some recommendations (Grossi et al., 2020; Argento et al., 2019), there is a lack of case studies to explore further the conditions under which institutional sustainability pressures for smart city projects interact to guide the complex, multi-level implementation (Cooper et al., 2019) of a management accounting (ERP) system within a SOE in a developing context. Of particular interest, the multi-level ERP implementation was a sustainable management accounting system through which the three unique institutional levels of the city's smart electricity network project were informed (Dillard et al., 2004): political (state), field (line ministry), and organisational (SOEs).

The multi-level ERP implementation has formally facilitated to include different sustainability practices from different government agencies. In the DRG sense, which differs from the Egyptian case studies of Alsaïd (2021), Alsaïd and Mutiganda (2020), and Alawattage and Alsaïd (2018), sustainable ERP in this (smart city) context has played different and multiple (supportive) roles across the three institutional levels of a city network project: political, field and organisational (Dillard et al., 2004). On the (political) front, institutional sustainability pressures for smart city

reforms were addressed through the complex, multi-level implementation (Cooper et al., 2019) of the ERP system that led to the institutionalisation of the smart city electricity distribution project. While ERP was structured a clear sustainability governance hierarchy at the institutional (field) level of MAAD, ERP was used at the (organisational) level as a platform to implement different accounting practices imposed by various government agencies. In the DRG sense, the role of ERP as a sustainable management accounting system has not stopped at the organisational level of MAAD, as it was known in previous studies (Quattrone and Hopper, 2005). But, this sustainable role has transcended organisational boundaries to encompass the political and field levels of the case company. Multiple ERP practices have demonstrated the multiple sustainability roles of a management accounting system in smart city reforms. While the findings may be a case specific to a politically sensitive SOE in Egypt, (important) insights were provided about the sustainable ways in which a multi-level management accounting (ERP) system could be operationalised in SOEs following smart city projects.

Further, the interplay between different sustainability demands has placed MAAD in the status of “institutional dynamics” (Dillard et al., 2004) since the inception of the city project in 2017. These dynamics were not only from the higher (political) level to the lower (field) level and then to the lowest (organisational) level, but these were also from the lowest to the lower and then to the higher institutional levels (Alsaid, 2021; Alsaid and Ambilichu, 2020; Wanderley and Cullen, 2012). For example, consistent with the DRG recursive dynamics where government agencies have influenced MAAD through higher organising sustainability principles, values and criteria, MAAD has also influenced them through regular sustainability ‘reports’ that are an influencing factor in the (political) decision-making processes. The belief that a SOE is an independent business entity accountable for managing sustainability performance in the electricity market was demonstrated. This belief has encouraged MAAD to invest in internal management accounting systems (the multi-level ERP institutionalisation) to align with strategic sustainability goals, social visions and private sector cultures, emphasising ‘growth’ in the sustainable electricity field (Mouritsen and Kreiner, 2016). With these (important and new) insights, this study has gone beyond previous studies (Cooper et al., 2019; Kurunmäki and Miller, 2011; Quattrone and Hopper, 2005) and accounted for the strong influence of a broader set of organising (political) principles, criteria and practices on the cascading institutionalisation process of a multi-level management accounting (ERP) system in SOEs. It has further indicated that (emerging and existing) institutional sustainability pressures may work together and jointly influence the ways in which a management accounting (ERP) system operates within a sustainable SOE in a developing country.

6.2 Multi-level management accounting, institutional sustainability dynamics, and SOEs

The dynamics perspective was used by institutional management accounting research to examine the connections between institutional sustainability pressures and the implementation of a management accounting system by government institutions. Some studies have examined the implementation of a performance measurement system to make concessions between various government forces imposed on city councils (Alsaid, 2021; Cooper et al., 2019; Argento et al., 2019). Other studies have explored how plural sustainability pressures (leading to institutional conflicts and complexities) have (re)shaped organisational accounting systems (Cooper and Ezzamel, 2013; Kurunmäki and Miller, 2011). By exploring the ‘way’ in which a complex, multi-level management accounting (ERP) system is operationalised to meet multiple sustainability demands faced by a SOE following smart city reforms, this study aligns with the latter mainstream

of institutional management accounting research. However, previous literature in this institutional context of smart city reforms have emphasised a ‘single’ organisational management accounting practice (budgeting) and examined how individual (organisational-level) practice encounters multiple institutional sustainability requirements. They have focused on the ways in which multiple requirements are handled ‘across’ different organisations (through practices shared between organisations and not through practices ‘within’ the organisation). Previous literature have largely ignored institutional conditions in which a management accounting system (ERP) accommodates multiple and different sustainability demands even within a specific organisation (politically sensitive SOEs).

MAAD has faced ‘salient’ sustainability demands after smart city reforms by the government. Consistent with the DRG, these demands (which formed institutional sustainability dynamics) appear to be ‘compatible’ with various organising (political and field) principles directing organisational practices in various ways. One demand does not exactly match others, but it can accommodate them. This is the case even for the ‘inverse’ relationship between the state pricing demand, which is related to MAAD as a SOE, and the capital market demand, which is applied in the wake of the city’s sustainable electricity network. MAAD pricing practices must ‘not differ’ from government practices and tariffs approved by the line ministry. In the DRG sense, the ‘relative’ compatibility of these demands depends on MAAD status as a sustainable ‘SOE’. With this (special) sustainability status, the company has balanced the influence of various beliefs, rationales, and expectations resulting from its environment that has a special political character than that of previous literature (Cooper et al., 2019; Argento et al., 2019; Kurunmäki and Miller, 2011; Quattrone and Hopper, 2005). The smart electricity project was supported by the state government as a socio-political sustainability means of further electricity distribution reforms (Alsaid, 2021; Alsaid and Mutiganda, 2020). Consistent with the DRG and this particular (smart city) context, where the state dominates the political and economic climate, ‘SOEs’ may see various sustainability demands challenging them as ‘compatible’. Although these insights are subject to the specific smart city context, this study ‘echoes’ DRG institutional dynamics; cf. Alsaid (2021); Alawattage and Alsaid (2018); Hopper and Major (2007). It ‘adds’ to this kind of previous studies that multi-level sustainability demands (which sometimes lead to practice variation or duality in practice) are not necessarily incompatible, but may reinforce each other to serve the political sustainability goals of smart city projects.

Multi-level sustainability demands are then reflected in the DRG cascading institutionalisation process of a management accounting (ERP) system. Here and importantly, the case findings have emphasised major management accounting practices enabled through the sustainable ERP system, including the institutionalisation process of a clear sustainability hierarchy of local governance, cost management, and pricing. The findings, in the DRG sense and compared to previous literature (Alsaid, 2021; Cooper et al., 2019; Argento et al., 2019), have demonstrated how ‘compatibilities’ between multiple demands are integrated into the ERP-enabled management accounting system, but in different practices (variation). A multi-level management accounting (ERP) system binds three ‘different’ institutional levels together, resulting in what is called “institutional blending” (Guerreiro et al., 2015; Hopper and Major, 2007; Dillard et al., 2004). Consistent with the DRG, practice variation related to smart electricity pricing is partitioned, in response to different institutional demands about the choice of a pricing criterion (Alsaid and Mutiganda, 2020; Alawattage and Alsaid, 2018). While one demand is calling for the political importance of adopting unified government tariffs, another demand is calling for the political importance of

moving the company into competition and the market. This means that while different demands still appear compatible with each other, they ‘may not’ be enmeshed fully into one particular aspect of pricing, such as choosing the appropriate basis. For sustainable cost management, while there is inconsistency between governmental demands in specific aspects (cost reporting), others tend to tie these demands together.

Accordingly, there is ‘no uniform way’ in which a multi-level management accounting (ERP) system is (re)shaped in the institutional context of smart city projects. How the institutional dynamics of various sustainability beliefs and attributes guide the multi-level implementation (Cooper et al., 2019) of a management accounting (ERP) system ‘relies’ on specific ‘political’ aspects. As a politically sensitive SOE, a multi-level management accounting (ERP) system in MAAD tends to respond to, communicate, and mediate multiple sustainability demands to match the specificities of a particular smart city project (Alsaid and Mutiganda, 2020; Argento et al., 2019). While previous management accounting studies have highlighted ‘inter-organisational’ practice variation (Ferry et al., 2019; Eckersley et al., 2018; Lapsley et al., 2010), this study broadens these studies by supporting that institutional sustainability dynamics (the interaction between multiple and different sustainability demands) may also result in ‘intra-organisational’ variation in practice (within individual organisations).

Hence, the complex, multi-level implementation of a management accounting (ERP) system has helped maintain MAAD legitimacy as a ‘state-owned’ after smart city reforms. A SOE, in the DRG sense, has seen as a ‘sustainable’ organisation (Battilana and Lee, 2014). To sustain its sustainable status, MAAD has implemented a management accounting (ERP) system, which includes ‘multiple’ and ‘different’ practices, then acts as a ‘complex, multi-level’ operational system (Cooper et al., 2019). As a sustainable SOE, apart from whether ERP applied to face sustainability pressures, the ERP-enabled management accounting system made the sustainable situation of MAAD ‘stable’ (Quattrone and Hopper, 2005). Consistent with the DRG, the sustainable situation of MAAD requires the multi-level management accounting system. These findings add to that of the Western, developed (public and private) enterprises that have been explored significantly (Stafford et al., 2020; Cooper et al., 2019; Argento et al., 2019). Previous efforts revealed that the plural demands of the institutionalisation process within organisations were considered to be in competition; accordingly, localised management accounting systems were built to manage competition between different institutional demands. For MAAD and consistent with the DRG institutional dynamics, the multiple sustainability demands of cascading institutionalisation process following smart city reforms have often been seen as compatible. The multi-level institutionalisation process of a sustainable management accounting (ERP) system enhances the DRG institutional compatibility between multiple sustainability demands and sustains the company’s complex status as a sustainable SOE.

7. Conclusion

This study has explored the sustainable implementation of a multi-level management accounting (ERP) system in a politically sensitive SOE after smart city reforms. Drawing on the DRG cascading institutionalisation process, it has indicated that besides the institutional (political) pressure from the state government that SOEs naturally face, additional sustainability beliefs, rationales, and prescriptions from their institutional (field) environment may also be influenced. By examining MAAD, an Egyptian SOE that was implemented the smart electricity network

project in New Minya city, this study has supported previous studies that the DRG cascading dynamics of institutional sustainability demands may underpin the importance of understanding their implications for the complex situation of SOEs. The co-existence of multiple institutional sustainability pressures and demands from different government agencies conditions how a complex, multi-level management accounting (ERP) system is operationalised in SOEs following smart city projects.

For DRG analytical purposes, this study has distinguished between three institutional levels, namely political, field, and organisational, although this distinction in the environment of Egyptian SOEs may not be clear-cut. Compared to previous institutional analyses, the present case analysis has argued that the multi-level institutionalisation process, and then various institutional sustainability demands, are interpreted within MAAD as compatible and able to accommodate each other to serve the political goals of smart city reforms. However, in the current infrastructure phase of the city's smart electricity network project, the influence of government demand for market orientation on MAAD may not be as strong as the influence of other institutional sustainability demands. For example, the market-oriented demand was overruled by the state about pricing, highlighting complete government dominance and MAAD's absence of complete autonomy and the necessity for additional corporatisation⁴. As time goes by, the market-driven demand effect may become stronger, and the relative compatibility of multiple demands and their dynamics within SOEs may change to achieve new political goals for sustainable and smart cities. A potential change in the balance and interaction between multi-level institutional sustainability demands and pressures may generate new uncertainties and tensions that threaten the complex situation of the company in the long run. For a future research, hopefully, one may examine how a management accounting (ERP) system is changed (shaped and reshaped) to encounter changes in multi-level sustainability demands and pressures (Grossi et al., 2020) and how far it can continue to sustain the sustainability performance of SOEs. Furthermore, the current demands may become less compatible in the long run. This may be due to political turmoil in the institutional environment of SOEs (as is the case with the political revolutions in Egypt). Therefore, a future research may explore how a sustainable management accounting (ERP) system can deal with institutional conflicts and complexities between multiple and different logics and demands (Martins et al., 2020; Grossi et al., 2020; Argento et al., 2019).

In the DRG sense, SOEs in Egypt have politically formed a new organisational environment to explore how a complex, multi-level management accounting (ERP) system is implemented not only due to sustainability pressures from government agencies, but also due to other institutional demands, in the wake of smart city reforms. The DRG three institutional levels and the ongoing critical discussion of their dynamics were anchored in the context-specific evidence in the case of SOEs. However, some evidence argue that institutional sustainability dynamics between three distinct levels are not the only influence on SOEs in Egypt. By utilising the DRG interconnected levels, evidence have further revealed 'more' dynamics between institutional complexity and the cascading institutionalisation process of a management accounting (ERP) system within SOEs. As a future research ambition, one might reveal if there is an additional prominent demand evident in the field of Egyptian SOEs and interpret how it interplays with existing institutional demands and

⁴ It has been pointed out that after nearly 30 years of public sector structural reforms, since they began in the early 1990s (Alawattage and Alsaid, 2018), SOEs in Egypt are still calling for 'more corporatised' to support the political sustainability goals of smart city reforms (Alsaid and Mutiganda, 2020).

pressures to direct the sustainable implementation of a complex and multi-level management accounting (ERP) system. Especially, sustainable and smart SOEs in Egypt may be affected by further complex and multi-level institutional demands and pressures. The operational and organisational ways in which a management accounting (ERP) system is (re)shaped in these enterprises may be 'more advanced' based on the institutional complexity of their changing environment. Moreover, to develop a 'more general theory' explaining how and why a management accounting (ERP) system works in certain ways in SOEs following smart city reforms, another future research ambition may reflect the institutional work of SOEs in various developing fields and contexts. Also, one may study a public service company that is currently listed on the stock market. Of course, such companies maintain their public and social beliefs, rationales and values even after implementing smart city reforms. But, they are likely to react or grapple with stock market demand to form their internal regulatory sustainability systems, including a management accounting system.

Although the accounting community needs to consider future research above which are the limitations of this study, this study has argued that the interaction of multiple institutional sustainability pressures has influenced the sustainable implementation of a complex, multi-level management accounting (ERP) system within SOEs after smart city reforms. Compared to previous studies, this study has found that a multi-level management accounting system (ERP) accommodates different institutional sustainability requirements in a variety of ways, but as a complex organisational system that nurtures SOEs to maintain their sustainable performance. In the DRG sense, this study reminds the running theoretical question of what smart cities are. Smart cities, from a critical DRG view and consistent with case observations, are not only about ERP-enabled electricity networks (which appeared as a multi-level management accounting system), but also other important theoretical aspects. For example, Eckersley et al. (2018) examine sustainable developments in cities and give an example of urban climate resilience without using the term smart cities as used by the present study. Ferry et al. (2019) highlight how a city can act smartly in its budget and consultation practices without necessarily involving advanced ICTs and/or integrated infrastructure as the present study indicates ERP, but smarter social practices for societal well-being. More so, using the technocratic perspective, Drapalova and Wegrich (2020) address the role of political leaders and citizen engagement in smart city governance, without regard to institutional field interactions and/or organisational-level implications that shaped the cascading smart city dynamics (from a critical DRG perspective) of the present study. Therefore, these particular case findings may open up future opportunities 'beyond' the obvious in current management accounting research on sustainable and smart cities, which is still in its early stages especially in developing and emerging fields. Given this study is limited to using a qualitative field single-case study approach of a specific smart city context, the accounting community's need for a variety of interdisciplinary and comparative case studies emerges in an effort to further explore the potential influence of smart city projects on management accounting systems. Especially since developing and emerging countries are now witnessing an unprecedented growth of political sustainability in smart city projects, which may later affect operating systems and practices within organisations.

References

- Alawattage, C. and Alsaïd, L.A. (2018), "Accounting and structural reforms: A case study of Egyptian electricity", *Critical Perspectives on Accounting*, Vol. 50, pp. 15-35.
- Alsaïd, L.A. and Mutiganda, J.C. (2018), "Political and Business Leaderships in Managing Public Service Organisation", *Corporate Ownership & Control*, Vol. 15 No. 4, pp. 18-28.
- Alsaïd, L.A. and Mutiganda, J.C. (2020), "Accounting and Smart Cities: New Evidence for Governmentality and Politics", *Corporate Ownership & Control*, Vol. 17 No. 3, pp. 158-170.
- Alsaïd, L.A.Z.A. (2021), "Performance measurement in smart city governance: a case study of an Egyptian city council", *Journal of Accounting in Emerging Economies*, Vol. ahead-of-print No. ahead-of-print. doi: [10.1108/JAEE-09-2020-0244](https://doi.org/10.1108/JAEE-09-2020-0244) (accessed 18 March 2021)
- Alsaïd, L.A.Z.A. and Ambilichu, C.A. (2020), "The influence of institutional pressures on the implementation of a performance measurement system in an Egyptian social enterprise", *Qualitative Research in Accounting & Management*, Vol. 18 No. 1, pp. 53-83.
- Argento, D., Grossi, G., Jääskeläinen, A., Servalli, S. and Suomala, P. (2019), "Governmentality and performance for the smart city", *Accounting, Auditing & Accountability Journal*, Vol. 33 No. 1, pp. 204-232.
- Battilana, J. and Lee, M. (2014), "Advancing research on hybrid organizing - Insights from the study of social enterprises", *Academic Management Annals*, Vol. 8 No. 1, pp. 397-441.
- Berquier, R. and Gibassier, D. (2019), "Governing the "good citizen" and shaping the "model city" to tackle climate change: Materiality, economic discourse and exemplarity", *Sustainability Accounting, Management and Policy Journal*, Vol. 10 No. 4, pp. 710-744.
- Brorström, S., Argento, D., Grossi, G., Thomasson, A. and Almquist, R. (2018), "Translating sustainable and smart city strategies into performance measurement systems", *Public Money & Management*, Vol. 38 No. 3, pp. 193-202.
- Cooper, D.J. and Ezzamel, M. (2013), "Globalization discourses and performance measurement systems in a multinational firm", *Accounting, Organizations and Society*, Vol. 38, pp. 288-313.
- Cooper, D.J., Ezzamel, M. and Robson, K. (2019), "The Multiplicity of Performance Management Systems: Heterogeneity in Multinational Corporations and Management Sense-Making", *Contemporary Accounting Research*, Vol. 36 No. 1, pp. 451-485.
- Czarniawska, B. (2010), "Translation impossible? Accounting for a city project", *Accounting, Auditing & Accountability Journal*, Vol. 23 No. 3, pp. 420-437.
- Dillard, J.F., Rigsby, J.T. and Goodman, C. (2004), "The making and remaking of organization context: Duality and the institutionalization process", *Accounting, Auditing and Accountability Journal*, Vol. 17 No. 4, pp. 506-542.
- Drapalova, E. and Wegrich, K. (2020), "Who governs 4.0? Varieties of smart cities", *Public Management Review*, Vol. 22 No. 5, pp. 668-686.
- Eckersley, P., England, K. and Ferry, L. (2018), "Sustainable development in cities: collaborating to improve urban climate resilience and develop the business case for adaptation", *Public Money & Management*, Vol. 38 No. 5, pp. 335-344.
- EUUF (Egypt Urban Forum) Report, (2015), "My City My Responsibility", Egypt: Cairo, 14-16 June, available at: https://en.wikipedia.org/wiki/Egypt_Urban_Forum (accessed 18 March 2021).
- Ferry, L., Ahrens, T. and Khalifa, R. (2019), "Public value, institutional logics and practice variation during austerity localism at Newcastle City Council", *Public Management Review*, Vol. 21 No. 1, pp. 96-115.

- Gioia, D.A., Corley, K.G. and Hamilton, A.L. (2013), “Seeking qualitative rigor in inductive research: notes on the Gioia methodology”, *Organisational Research Methods*, Vol. 16 No. 1, pp. 15-31.
- Grossi, G., Meijer, A. and Sargiacomo, M. (2020), “A public management perspective on smart cities: ‘Urban auditing’ for management, governance and accountability”, *Public Management Review*, Vol. 22 No. 5, pp. 633-647.
- Guerreiro, M.S., Rodrigues, L.L. and Craig, R. (2015), “Institutional Change of Accounting Systems: The Adoption of a Regime of Adapted International Financial Reporting Standards”, *European Accounting Review*, Vol. 24 No. 2, pp. 379-409.
- Hamza, K. (2016), Smart City Implementation Framework for Developing Countries: The Case of Egypt. In: Gil-Garcia J., Pardo T., Nam T. (eds.), Smarter as the New Urban Agenda: A Comprehensive View of the 21st Century City (pp. 171-187), Public Administration and Information Technology, Vol. 11, Cham: Springer International Publishing.
- Hopper, T. and Major, M. (2007), “Extending institutional analysis through theoretical triangulation: Regulation and activity-based costing in Portuguese Telecommunications”, *European Accounting Review*, Vol. 16 No. 1, pp. 59-97.
- Huang-Lachmann, J. (2019), “Systematic review of smart cities and climate change adaptation”, *Sustainability Accounting, Management and Policy Journal*, Vol. 10 No. 4, pp. 745-772.
- Kholeif, A.O., Abdel-Kader, M.G. and Sherer, M. (2008), Enterprise Resource Planning: Implementation and Management Accounting Change in a Transitional Country, UK: Palgrave Macmillan.
- Kurunmäki, L. and Miller, P. (2011), “Regulatory hybrids: Partnerships, budgeting and modernising government”, *Management Accounting Research*, Vol. 22, pp. 220-241.
- Lapsley, I. and Miller, P. (2019), “Transforming the public sector: 1998-2018”, *Accounting, Auditing and Accountability Journal*, Vol. 32 No. 8, pp. 2211-2252.
- Lapsley, I., Miller, P. and Panozzo, F. (2010), “Accounting for the city”, *Accounting, Auditing & Accountability Journal*, Vol. 23 No. 3, pp. 305-324.
- Martins, A., Gomes, D., Oliveira, L., Caria, A. and Parker, L. (2020), “Resistance strategies through the CEO communications in the media”, *Critical Perspectives on Accounting*, Vol. 71.
- Miller, P., Kurunmäki, L. and O’Leary, T. (2008), “Accounting, hybrids and the management of risk”, *Accounting, Organizations and Society*, Vol. 33 No. 7-8, pp. 942-967.
- Mouritsen, J. and Kreiner, K. (2016), “Accounting, decisions and promises”, *Accounting, Organizations and Society*, Vol. 49, pp. 21-31.
- Parker, L.D. (2012), “Qualitative management accounting research: Assessing deliverables and relevance”, *Critical Perspectives on Accounting*, Vol. 23, pp. 54-70.
- Quattrone, P. and Hopper, T. (2005), “A ‘time–space odyssey’: management control systems in two multinational organisations”, *Accounting, Organizations and Society*, Vol. 30, pp. 735-764.
- Siba, E. and Sow, M. (2017), “Africa in Focus: Smart city initiatives in Africa”, available at: <https://www.brookings.edu/blog/africa-in-focus/2017/11/01/smart-city-initiatives-in-africa/> (accessed 18 March 2021).
- Slavova, M. and Okwechime, E. (2016), “African Smart Cities Strategies for Agenda 2063”, *Africa Journal of Management*, Vol. 2 No. 2, pp. 210-229.
- Stafford, A., Stapleton, P., Wei, H. and Williams, K. (2020), “The imaginary of the city versus messy realities”, *Financial Accountability & Management*, Vol. 36, pp. 244-260.

- Tan, S.Y. and Taeihagh, A. (2020), “Smart City Governance in Developing Countries: A Systematic Literature Review”, *Sustainability*, Vol. 12 No. 3, p. 899.
- Wanderley, C.A. and Cullen, J. (2012), “A Case of Management Accounting Change: the Political and Social Dynamics”, *Revista Contabilidade & Finanças – USP*, São Paulo, Vol. 23 No. 60, pp. 161-172.
- Westerdahl, S. (2020), “Yield and the city: Swedish public housing and the political significance of changed accounting practices”, *Critical Perspectives on Accounting*. doi: [10.1016/j.cpa.2020.102161](https://doi.org/10.1016/j.cpa.2020.102161) (accessed 18 March 2021).
- Yin, R. (2018), *Case Study Research and Applications: Design and Methods*, Sixth Edition, SAGE Publications, Inc.