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**Original citation & hyperlink:**

Alsaid, L 2021, 'Performance measurement in smart city governance: A case study of an Egyptian city council', *Journal of Accounting in Emerging Economies*, vol. (In-Press), pp. (In-Press).

<https://dx.doi.org/10.1108/JAEE-09-2020-0244>

DOI 10.1108/JAEE-09-2020-0244

ISSN 2042-1168

Publisher: Emerald

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# Performance measurement in smart city governance: A case study of an Egyptian city council

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**Accepted Manuscript, 22 February 2021**

## **Citation**

[Alsaid, 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. <https://doi.org/10.1108/JAEE-09-2020-0244>.

## **Acknowledgements**

The author would like to thank the editor-in-chief and two anonymous reviewers for their constructive comments and suggestions during the review process. Special thanks should go to The UK's Open University for its financial support during the data collection process in Egypt (FBL seed-corn funding, budget code LR201601QRQ08). This paper is part of the author's research project entitled "Accounting and Smart Cities in Developing Countries". The author's thanks should also go to the participants of the 2018 Interdisciplinary Perspectives on Accounting (IPA) Conference at the University of Edinburgh, UK, for their helpful comments on the early version and their encouragement to continue work on this project.

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## Abstract

### Purpose

This study seeks to explore the powerful role(s) of institutionalised performance measurement systems or metrics in smart city governance in a politically and militarily sensitive developing country.

### Design/methodology/approach

This study extends the application and contribution of the Dillard et al. (2004) multi-level institutional framework to previous management accounting literature on the potential relationship between performance measurement and smart city governance. The value of utilising Dillard et al.'s is to broaden and deepen theoretical analyses about this relationship to include the effect of political pressure from the military regime at the macro level on the institutionalisation of a performance measurement system at the micro-organisational level. Taking the New Cairo city council smart electricity networks project (Egypt) as an interpretive qualitative single-case study, data collection methods included semi-structured interviews, direct observations, and documentary readings.

### Findings

Drawing on Dillard et al.'s, performance measurement systems or metrics, especially in politically and militarily sensitive smart cities, constitute a process of cascading (macro-micro) institutionalisation that is closely linked to sustainable developments taking place in the wider arena of urban policies. Going a step further, accounting-based performance metrics, arising from political and military pressures towards public-private collaborations, contribute to smart city management and accountability (governance). Institutionalised measurement systems or performance metrics play a powerful accounting role(s) in shaping and reshaping political decisions and military actions in the city council.

### Originality/value

Theoretically, this study goes beyond the Dillard et al. (2004) cascading institutionalisation process by arguing for the powerful role(s) of institutionalised accounting and performance measurement systems in smart city decision-making and governance. Empirically, it enriches previous literature with a case study of a developing Arab Spring country, characterised by an emerging economy, political sensitivity and military engagement, rather than developed and more stable countries that have been thoroughly investigated. It is also among the first politically-engaged accounting case studies to highlight public-private collaborations as a recent reform in public sector governance and accountability.

**Keywords:** performance measurement; smart city governance; political sensitivity; military engagement; public-private collaboration; New Cairo city council

**JEL Classification:** M41; P27; P31; Q01; Q25; O55

**Paper type:** Research paper

## 1. Introduction

Given the phenomenon of urban capitalism and recent socio-economic crises, cities' vision of global urban development has experienced a typical shift in which their tangible and intangible resources are combined to combat the effect of such crises and to foster a city's development. The result is the emergence of a new generation of cities with intelligent urban ideology that connects socio-economic and political dimensions in creativity in dealing with the difficulties that arise (Tan and Taeihagh, 2020; Albino et al. 2015). Many scholars have demonstrated this new intelligent philosophy in their urban concepts of a 'smart city' (Westerdahl, In Press; Grossi et al., 2020; Stafford et al., 2020; Argento et al., 2019; Grossi and Pianezzi, 2017; Meijer and Bolivar, 2016; Albino et al. 2015). The concept of a smart city, they argue, is no more restricted to the deployment of information and communication technologies but combines the city's networked infrastructure. It is linked to socio-cultural and political efficiency, and commercially functioning urban development. It is also focused on social capital, the physical environment, and the appearance of sustainable cities based on community and private logics, and social laboratories. Consequently, these cities become urban innovation and include smart governance strategies, plans and projects aimed at achieving sustainable economic and social development, in a smart way, to increase the quality of life given to their population (Tan and Taeihagh, 2020; Nam and Pardo, 2011). However, in order to legitimate and intelligently and effectively project these smart city governance strategies, performance measurement systems or metrics must be an integral part thereof (Burfitt et al., 2020), considering their transformation of city actors' operational effectiveness, and their contribution to increased networking and to engagement of institutions to promote city management and accountability (Raucci and Tarquinio, 2020; Berardi, 2013).

Previous management accounting literature has examined the economic, social and environmental relationship between performance measurement and smart city governance (broadly, sustainable urban developments) from different perspectives. Some seminal scholars have examined this potential relationship from the perspective of accounting for cities (Westerdahl, In Press; Malmrose and Fouladi, 2019; Brorström, 2018; Lapsley et al., 2010). Others have addressed this potential relationship from the perspective of accounting (performance measurement) and smart cities (Stafford et al., 2020; Alsaïd and Mutiganda, 2020; Argento et al., 2019; Brorström et al., 2018). Last but not least, another set of previous studies have examined this trendy topic from the perspective of the alleged relationship between smart cities, neoliberalism, and socio-political urban developments (Tan and Taeihagh, 2020; Raucci and Tarquinio, 2020; Grossi and Pianezzi, 2017; Meijer et al., 2017; Hollands, 2008). However, despite these valuable efforts and attempts to provide different theoretical and empirical perspectives on the potential relationship between performance measurement and smart city governance, these research endeavours have indicated that smart city governance requires complex decisions to be made with attention to economic, social and environmental performance (Tan and Taeihagh, 2020; Raucci and Tarquinio, 2020; Grossi et al., 2020), but with not enough attention to also 'political intervention' (Steccolini et al., 2020; Meijer et al., 2017), 'military engagement' (Alawattage and Alsaïd, 2018; Noguchi et al., 2015) and 'public-private collaboration' (Mutiganda et al., In Press; Alsaïd and Mutiganda, 2020) in place. Although these angles have been widely theorised in public sector management accounting research especially in neoliberalism and its various forms of privatisation, modernisation and state budget reforms (see e.g. Jayasinghe et al., 2020; Jayasinghe and Uddin, 2019; van Helden and Uddin, 2016; Almquist et al., 2013), they have not been explicitly theorised or analysed in previous management accounting literature on the potential relationship between performance measurement and smart city governance. In the empirical sense, the implementation of smart city projects is shaped by social policy and politics approved by leading politicians (civilians or military) at the micro (city council) level. And that political pressure from the military regime at the macro (state government) level institutionalises micro-organisational performance metrics utilised in smart city governance. Therefore, institutionalised performance measurement systems or metrics, at the micro-organisational level, have played a powerful accounting and accountability role(s) in shaping these

decisions for the future (Steccolini et al., 2020; Malmrose and Fouladi, 2019; Lapsley et al., 2010; Miller and O’Leary, 2007). More details on these previous research endeavours will be discussed later.

This inattention in previous management accounting research has created the impetus to contribute to this recent trend on the potential relationship between performance measurement and smart city governance. This was achieved by adding an interpretive single-case study from a politically and militarily sensitive developing country (Egypt) in order to gain a deeper and clearer understanding of the cascading institutionalisation process of performance measurement systems and, subsequently, the powerful role(s) of institutionalised performance metrics in formulating political decisions for smart city governance. In this sense, the purpose of this study is to trace the influence of political pressure from the military regime at the macro (state) level on the implementation of performance measurement systems or metrics at the micro (organisational) level of smart city governance. Previous theoretical analyses and discussions (Argento et al., 2019; Brorström et al., 2018; Grossi and Pianezzi, 2017; Lapsley et al., 2010) have focused on this potential relationship between performance measurement systems and smart city governance only at the field and organisational levels, considering only economic, social and environmental performances. There is still a lack of analysis and discussion of the political relationship between performance measurement systems and smart city governance, and more specifically, how political intervention combined with military engagement and public-private collaboration creates institutional pressure to institutionalise the performance measurement system at the micro-organisational level of smart city governance. As Tan and Taihagh (2020) argue, in the institutional context of smart city governance in developing countries, the political level shapes the state/city urban politics (instance of a macro-level). While the field level shapes the city level, the organisational level is the city council level (instance of a micro-level). Therefore, this case study answers the overarching research question: how can micro-organisational performance metrics, arising from political and military pressures towards public-private collaboration, contribute to smart city governance? This overarching question is split into two research sub-questions: How do smart city projects constitute political pressure by the military regime on city councils to collaborate with the public and private sectors to provide the necessary funding? More interestingly, how does public-private collaboration, driven by the council’s military leadership, create the political significance of utilising a smart city governance system where institutionalised performance metrics play a powerful role(s) in shaping political decisions in the city council?

This study utilises the Dillard, Rigsby, and Goodman (2004) multi-level institutional framework to trace the “cascading institutionalisation process” that connect micro-organisational performance measurement systems at the city council level with smart urban transformations at the state/city level. Previous management accounting literature has theorised and analysed the potential relationship between performance measurement systems and smart city governance, using the concept of “governmentality” (Westerdahl, In Press; Alsaïd and Mutiganda, 2020; Argento et al., 2019; Brorström et al., 2018; Grossi and Pianezzi, 2017) and the institutional perspective of “mediating instruments” (Stafford et al., 2020; Herscovici, 2018; Brorström, 2018; Lapsley et al., 2010; Miller and O’Leary, 2007). Although these frameworks and studies have enriched previous literature with valuable theoretical and empirical contributions, most of them have not included the political angle in their theoretical analyses. They have studied and analysed this potential relationship at two institutional levels only: the field level and the organisational level. Therefore, considering the case at hand, the value of utilising the Dillard et al. (2004) multi-level institutional model appears in the most recent calls (Modell, In Press; Westerdahl, In Press; Steccolini et al., 2020) to capture the ‘political significance’ of institutionalised performance measurement systems or metrics in organisations. The theoretical contribution of Dillard et al.’s appears in the three-dimensional institutionalisation process (Alawattage and Alsaïd, 2018; Wanderley and Cullen, 2012; Hopper and Major, 2007) in which institutional pressure for smart city projects at the macro level created the political significance of public-private collaboration and a smart governance system at the field level, and then a micro-organisational performance measurement system at the city council level. Going a step further, the theoretical ambition of the present study goes beyond the Dillard et al. (2004) cascading

institutionalisation process by arguing for the powerful role(s) of ‘institutionalised’ performance measurement systems or metrics in shaping political decisions in the city council. This further supports the recent study of Steccolini et al. (2020) arguing for the political role(s) of accounting and performance measurement systems in contemporary public administration (see also Modell, In Press).

Empirical data were collected from an interpretive qualitative single-case study (Parker, 2012) in the internal performance measurement systems or metrics of the New Cairo city council (Egypt), which is responsible for implementing the smart electricity network project (the distribution network enabled by enterprise resource planning/ERP technologies, specifically SAP) in the city. To ensure validity and reliability, data collection methods were triangulated between semi-structured interviews, direct observations, and documentary readings. The aim was to obtain a more comprehensive picture and understanding of the different organisational perspectives (Yin, 2018; Parker and Northcott, 2016) about the potential relationship between (accounting-based) organisational performance metrics and smart city management and accountability, and how these metrics can contribute positively to shaping political decisions in the city council. In addition, comprehensive secondary materials were reviewed on sustainable urban developments, smart city projects and associated governance systems, which distinguish New Cairo as a ‘smart city’. Through interviews, the smart city is viewed as an urban area that employs various advanced forms of electronic patterns and sensors to gather data across the city. The in-depth insights obtained from that data are utilised to effectively operate public benefits, resources and services, and efficiently develop daily operations and reports in the city. This empirical view by the interviewees does not differ much from the concepts theorised by many smart city governance studies (Westerdahl, In Press; Alsaïd and Mutiganda, 2020; Argento et al., 2019; Brorström et al., 2018; Grossi and Pianezzi, 2017). After the 2011 political revolution in Egypt, the state government adopted sustainable urban development projects (recommended by the World Bank and the European Union to revive the Egyptian economy). Smart cities are one of the social, economic and political projects for urban development, which has reached so far about 20 smart city projects all over Egypt (including New Cairo). The city, which has been selected by the central government to implement sustainable urban development projects (such as smart water project, smart electricity project, smart healthcare project, etc.), is referred to as a “smart city”. For why does the city council refer to as ‘smart’? The interviewees explained that the city council is a public (service) sector institution. After the revolution, the World Bank recommended to the central government to adopt new public sector reforms to solve the financing problems that formed political pressure on city councils to implement smart city projects. One of these recent reforms in the Egyptian public sector (city councils, for example) is a “collaboration with the private sector” to provide the necessary financing for the implementation and operation of these projects (herewith the smart electricity project as an example). The city council, which has successfully implemented this “public-private collaboration”, is referred to as a “smart city council”. New Cairo city council was one of the first city councils to implement this modern reform and signed an agreement with the private sector to operate the new electricity networks project in the city, but under its military management and public accountability as a government agency. Regarding the concept of “governance”, which differs from one academic study to another according to its approved theoretical and empirical views (Jayasinghe et al., 2020; van Helden and Uddin, 2016; Almquist et al., 2013), the present case study presents “smart city governance” as a systematic managerial procedure or method of accountability and performance measurement for the smart electricity networks project in the city. As the council’s finance director said about his practical view of governance,

In the context of the smart city, and especially in the recent public-private collaboration, there has been political pressure and a demand for a more responsive governance system ... means a clear management system of performance and accountability. This system was formed in the internal implementation of a performance measurement system on the basis of integrated (accounting-based) performance metrics. Accounting-based (economic and social) performance metrics are now a powerful tool for smart city decision-making and governance.

This study contributes to previous management accounting literature on the potential relationship between performance measurement systems and smart city governance with the following findings. Previous literature above revealed the success or failure of the relationship between performance measurement systems and smart city governance with little regard for political influence on this specific relationship. Contrary to previous literature, the findings of the present study revealed a political influence on this potential relationship between performance measurement systems and smart city governance. As detailed below, the implementation of a smart city project is a political endeavour -recommended by the European Union and the World Bank- to revive the Egyptian economy after the 2011 political revolution. At that time, the European Union provided the Egyptian government with financial aid (amounting to 200 million euros, interviewees said) to implement smart city projects as part of the European Union's efforts to rebuild the Arab Spring countries and their emerging economies (including Egypt) after the recent revolutions. However, this international financial aid was insufficient to implement smart city projects in about 20 cities in Egypt (including New Cairo). New Cairo city council's share of this financing covered only the infrastructure of this project in the city including (not all but several) urban and rural areas. This lack of funding created political/institutional pressure from the Egyptian government on its agencies in every city (here, the city council, which is considered an agent of the state in New Cairo). This pressure was to provide enough and necessary funding to continue operating and managing the smart city project (herewith, the smart electricity networks project). This funding pressure was the reason behind the signing of the agreement with the private sector and the first-time collaboration between the public and private sectors to implement the smart electricity networks project in the city. Collaboration between the public and private sectors is one of the most recent public sector reforms recommended by the World Bank for financing smart city projects in developing countries. This public-private collaboration was based on financing the operation of the project in the city but under the military management and supervision of the city council, a representative of the state government. The public-private partner recovers its financing from the project's financial returns, as well as from the returns of smart bonds that the city government issued for public offering. Accordingly, by contributing to previous management accounting literature on the relationship between performance measurement systems and smart city governance, the findings of the present study indicate that smart city projects created political pressure from the military regime on city governments regarding the fund and the necessity of continuing the project to achieve the social and economic expectations of public citizens. And that the institutionalised performance measurement system plays a powerful role(s) in formulating political decisions in the city council. This further supports the findings of Alsaïd and Ambilichu's recent study (In Press) on the influence of institutional pressure on the implementation of a performance measurement system in an Egyptian social enterprise. This further supports to the recent study of Englund and Gerdin (2020) arguing for the importance of studying the resulting influences of intra-organisational performance evaluations to better understand their powerful roles within individual organisations (see also Steccolini et al., 2020; Speklé and Verbeeten, 2014). This is in an agreement with Mutiganda et al. (In Press) and Andon (2012) arguing for public private participation and its political importance for public investment financing, with a special focus on the role and effect of accounting and accountability therein. And last but not least, this is also in an agreement with Alawattage and Alsaïd's (2018) study that addressed accounting's role in public sector structural reforms in the Egyptian context, which is currently characterised by political sensitivity and military engagement (see also Jayasinghe and Uddin, 2019; Alsaïd and Mutiganda, 2018; Noguchi et al., 2015).

The remainder of this study is structured as follows. Section 2 explains and justifies the Dillard et al. (2004) institutional model utilised. Section 3 provides a contextual and institutional background on sustainable urban developments, with a special focus on smart city/governance projects. Section 4 details the methods used to collect and analyse empirical data. Section 5 deeply analyses the empirical findings in line with the Dillard et al. (2004) cascading institutionalisation process of the city council's performance measurement system. Section 6 provides a discussion of the main findings along with the theoretical debate in previous literature. Section 7 ends this study with conclusions and future research prospects on the potential relationship between performance measurement systems and smart city governance.

## 2. Dillard et al. (2004) institutional model

The present study extends the application and contribution of Dillard et al. (2004) to this specific stream of previous management accounting literature on the potential relationship between performance measurement systems and smart city governance. The value of utilising Dillard et al.'s is demonstrated in incorporating 'political engagement' into institutional management accounting analyses on the role of an institutionalised performance measurement system in smart city governance. Drawing upon Dillard et al. (2004) multiple levels of institutional analysis, and in line with the case observations, the theoretical contribution of the present study is not only the cascading (macro-micro) institutionalisation process of a performance measurement system or metrics in a public service organisation (e.g. city council) to achieve the political desire and social legitimacy for public-private collaboration, then smart city governance. But, the theoretical ambition of the present study goes beyond the Dillard et al. (2004) framework by exploring the powerful role(s) of 'institutionalised' performance measurement systems or metrics in shaping political decisions in the city council. Compared to alternative theoretical frameworks and other studies, the Dillard et al.'s-informed present study provides a deeper (multi-level) analysis of institutionalisation and thus a better understanding of the political role of economic and social performance measures (accounting-based performance metrics) in smart city management and public-private accountability, especially in a developing country (like Egypt) characterised by an emerging economy, political sensitivity and military engagement. In the sense of Dillard et al.'s and in keeping with the case observations, the term "institutionalisation" refers to the micro-organisational action (procedure) of establishing a performance measurement system (metrics) as an organisational practice (norm) in the city council (government). This micro-organisational level institutionalisation aimed to extend the 'political dialogue' between performance measurement and smart city governance in exploring how accounting-based performance metrics at the organisational level are connected to the building and maintenance of smart (public-private) collaboration at the field level and, more generally, urban policy-making and public services at the political level.

Since smart cities are a recent trend in management accounting (performance measurement) research, current management accounting research that has addressed this relationship is still in the early stages. Therefore, the theoretical frameworks used so far in this relationship are relatively limited, which are represented only in Foucault theory (specifically, the notion of "governmentality") and the institutional perspective of mediating instruments (specifically, the concept of "technological mediation"). The utilisation of the concept of governmentality has appeared in some previous case studies that have examined the relationship between performance measurement systems and smart cities (Westerdahl, In Press; Alsaïd and Mutiganda, 2020; Argento et al., 2019; Brorström et al., 2018; Grossi and Pianezzi, 2017). Meanwhile, other management accounting case studies have applied the institutional perspective of mediating instruments to interpret this relationship (Stafford et al., 2020; Herscovici, 2018; Brorström, 2018; Lapsley et al., 2010; Miller and O'Leary, 2007). The present study expands the application and contribution of institutional theory frameworks (herewith, Dillard et al., 2004) to previous literature on this relationship. Compared to other institutional frameworks such as institutional work theory which has become a trend in recent accounting studies (Modell, In Press, 2015; Yee, 2020; Biygautane et al., 2020; Gibassier et al., 2020; see also classical works by Lawrence et al., 2009 or Lawrence and Suddaby, 2006), Dillard et al. (2004) adds an alternative dimension to previous literature to theorise the role of performance measurement systems in smart city governance through three distinct but interrelated institutional levels (i.e. multi-level analysis): political, field, and organisational. This clearly corresponds to the most recent Modell (In Press) study that argues that not enough institutionally-informed management accounting case studies have adopted a multi-level analysis (see also Modell, 2015; Steccolini et al., 2020; Yee, 2020; Biygautane et al., 2020; Gibassier et al., 2020). The Modell (In Press) study and others support the importance of the 'political embedding' of institutional management accounting analyses and interpretations. His institutional work-informed study argues for a multi-level analysis's utility in "turning institutional accounting research into a politically engaged research program underpinned by critical intent" (p.1). This politically-engaged angle (Modell, In Press; see also Steccolini et al., 2020) supports the Dillard et al. (2004) analytical and theoretical



contribution (i.e. political embeddedness) to previous accounting literature on the potential relationship between performance measurement systems and smart city governance.

Apart from previous accounting studies that dealt with the potential relationship between performance measurement systems and smart city governance and the apparent lack of ‘political embeddedness’ in their theoretical analyses, the Dillard et al. (2004) institutional (macro-micro) model has been used extensively in ‘general’ institutional management accounting research. Some research has used the basic theoretical model of Dillard et al. (2004) as without modifications (Alsaid and Mutiganda, 2018; Wanderley and Cullen, 2012). But, other management accounting research has developed the basic model of Dillard et al. (2004) to add other theoretical angles in line with the analytical requirements of their case studies and empirical observations. For example, but not limited, Hopper and Major (2007) have triangulated Dillard et al.’s using actor network theory to deal with the issue of resistance and conflicts in the implementation of activity-based costing in Portugal. In Portugal again, Guerreiro et al. (2015) have combined Dillard et al.’s with institutional entrepreneurship theory to explore changed accounting systems in the wake of the implementation of adapted international financial reporting standards. In Egypt, Alawattage and Alsaid (2018) have supplied Dillard et al.’s with the notion of historical institutionalism to interpret accounting’s historical role in public sector structural reforms. However, these developments (or criticisms, some say) do not dilute the theoretical value and contribution that Dillard et al.’s have added to institutionally-informed management accounting research and analyses, arguing for the ‘institutionalisation’ process of accounting change resulting from external (political) forces. And that the institutionalisation process here takes the form of (macro-micro) institutional flow or an influx across three distinct but interconnected levels: political, field, and organisational. This clear, multi-level analysis of Dillard et al.’s is what sets it apart from other frameworks, especially those used in the context of the potential relationship between performance measurement systems and smart city governance.

In the present case study, in line with the research questions and accessible empirical data, the basic theoretical model of Dillard et al. (2004) is appropriate, especially with the emergence of this relationship between accounting (hereto, performance measurement) and smart cities (hereto, city governance) in a developing country (like Egypt) that is politically sensitive. As above, most previous case studies on this relationship have adopted a ‘two-dimensional’ analysis, covering only the field and organisational levels. As Modell (In Press) pointed out, here again, there is a distinct lack of ‘politically-engaged’ accounting case studies research that have taken a ‘multi-level perspective’ (see also Modell, 2015), which clearly reflect the theoretical significance and contribution of Dillard et al.’s utilisation in this context (Alawattage and Alsaid, 2018; Wanderley and Cullen, 2012; Hopper and Major, 2007). However, to go a one step further, the theoretical ambition of the present case study goes beyond the theoretical limits of the Dillard et al. (2004) framework. As previously explained, the theoretical contribution of the present study was not limited to the cascading institutionalisation process of performance measurement systems or metrics in the city council. But, its scope was extended to include the powerful role(s) of these ‘institutionalised’ performance measurement systems or metrics in making and remaking political decisions and military actions in the city council. This further supports the most recent study of Steccolini et al. (2020) arguing for the role(s) of accounting and performance measurement systems in contemporary public administration (see also Mutiganda et al., In Press; Englund and Gerdin, 2020; Noguchi et al., 2015). Clearly, this goes beyond the Dillard et al. (2004) framework which is limited to the cascading (macro-micro) institutionalisation process in organisations.

In the context of performance measurement in smart city governance, as detailed in the empirical findings section below (section 5), Dillard et al. (2004) interpret that the institutionalisation process (of a performance measurement system) is framed and structured as consecutive actions and behaviours at three interrelated but distinguishable institutional levels:

1. At the economic and political level: this macro level of institutionalisation explains a blending of economic and social political systems that establish and publicise socio-political norms and values

to society members (citizens). As shown in the case below, these socio-political systems, at the macro-state/city level, are represented in the policies, strategies and projects of smart urban developments (for example, the smart electricity networks project). At this macro level, Dillard et al. (2004) argue that while realising the potential of institution-building and its bottom-up adjustments, it realises the institutional dynamics of top-down influences. In this sense, the macro level provides a broader and more comprehensive socio-political normativity, which dictates the economic and social political significance and legitimation of changed accounting (performance measurement) systems. In the empirical sense as shown below, this is clearly demonstrated in the management way and the military ideology in which the socio-political regime, at a macro level, is institutionalised and accommodated in a smart city governance system. As Dillard et al. (2004) exemplified in their model, market capitalism is a political regime and its political normativity is shown in capital accumulation, investor priority and market centrality. This is illustrated by the 'sense-making criteria' which, for example, include security laws, governance regulations, performance measurements and accounting systems that support the pursuit of urban capitalism and smart developments.

2. At the field level: this macro level of institutionalisation is a reflection or translation of economic and social political systems at the macro-state/city level. It interprets whether and how field-level governance systems and structures respond to socio-political pressures, at a macro level. Here, Dillard et al. (2004) gave institutionally some empirical examples from the western experience of capitalism, such as industrial clusters, professional institutes and geographical groupings. A field, in line with the institutional meaning of Dillard et al. (2004) which is consistent with the context of performance measurement in smart city governance, is a distinct domain or sectoral area (here in the case at hand, electricity) controlled by the actions, behaviours, and decisions of the city government. This field/sector is usually a reflection of economic and social political systems, at the macro-state/city level, according to its institutional specifics and details. In the empirical sense, in line with the institutional meaning of Dillard et al. (2004), the legitimation and social acceptance of smart city governance systems, specifically in the field of electricity being studied, stems from socio-political norms at a macro level. Thereafter, as below, these legitimated governance systems, at the field level of the city, have institutionalised the political significance of changed accounting (performance measurement) systems, at the organisational level of the city council.
3. At the organisational level: this micro level of institutionalisation, in the sense of Dillard et al. (2004), represents individual organisations (either early innovators or late adopters). These organisational forms accommodate the institutional fields in which the macro-level political/field institutional systems and measurements are acted as institutional pressure on their internal socio-economic performance. Hence, in line with a smart city governance system where a performance measurement system (metrics) acts as a powerful instrument as detailed in section 5, Dillard et al. (2004) argue that the organisational level of the institutionalisation process demonstrates whether and how organisational performance measurement institutions, at the city council level, are accommodated in a smart city governance system through the reflexive social actions of encoding, enactment, reproduction and institutionalisation. These social actions, thereafter, iterate successive institutionalisation processes throughout three interrelated levels by adjusting and reproducing socio-political norms, rules and routines at a micro level.

Based on the foregoing, in the institutional meaning of Dillard et al. (2004), the powerful role(s) of performance measurement systems in smart city decision-making and governance is seen through this cascading flow of institutional influences. As shown in the analysis (section 5) and discussion section (section 6), the macro level of the institutionalisation process of a performance measurement system (metrics) is the smart city projects that put the New Cairo city (among other smart cities in Egypt) under certain political pressure from the military regime to establish public-private collaboration to provide the necessary fund, and then create a system of smart city management and accountability (governance) to

reduce potential conflict and complexity between the two sectors. The micro level of the institutionalisation process, in line with Dillard et al. (2004), is how political demand for a smart city governance system has influenced the council actors' internal choice of performance metrics, and more importantly, how 'institutionalised' performance metrics played a powerful role in shaping political decisions in the city council. Drawing on Dillard et al.'s (2004) macro-micro institutional influences, the present study contributes to previous studies and analytical frameworks that it is necessary to see institutionalised performance measurement systems or metrics, especially in politically sensitive smart cities such as in Egypt, as a form of an institutional accounting change that is closely linked to the political importance of public-private collaboration and then smart city governance taking place in the wider arena of urban development policies. This indicates that smart city/governance projects are institutionally predicated upon (a combination of economic and social) political performance metrics, which have been in an 'influx' of (macro-micro) institutionalisation at the council level. This is a somewhat theoretical contribution to previous management accounting literature on the potential relationship between performance measurement and smart city governance. This can also be seen as an addition to the Dillard et al. (2004) model-inspired management accounting research (Alawattage and Alsaïd, 2018; Alsaïd and Mutiganda, 2018; Guerreiro et al., 2015; Wanderley and Cullen, 2012; Hopper and Major, 2007).

### **3. Contextual and institutional background**

African developing countries (such as Egypt) are now in their early stages of smart urban development projects, plans and strategies (Tan and Taihagh, 2020; Siba and Sow, 2017). In the recent urban development report on "smart city initiatives in Africa", Siba and Sow (2017) explain that in early 2015, African countries (such as Egypt) were the lowest in the urbanised regions of the world. Only 40 percent of the population lived in urban cities. However, at present, Africa has become the second fastest growing urban region in the world after Asia. Given this accelerating economic, social and environmental growth, population experts expect Africa to reach its highest levels of urbanisation by 2020, promoting African policymakers to include smart city projects in urban development policies and strategies (Siba and Sow, 2017). By 2050, the African region is expected to experience a 16% growth rate in urban population (Tan and Taihagh, 2020; Slavova and Okwechime, 2016).

In the institutional context of the urban population, there are a set of determinants (institutes) that make African cities a strong competitor to implement smart city projects and related governance systems. For example, according to a 2016 Deloitte report, some African countries (such as Egypt, Nigeria, Kenya, and Ethiopia) currently require fixed telecommunication links. African cities can install the latest information and communication technologies (ICTs), eliminating costs related to replacing or modernising the existing ICT infrastructure. As Deloitte recently reported, many young people (citizens) in Africa can also be a reference/point for adopting advanced technological, managerial and calculative innovations for smart cities and urban governance. This was clearly exemplified by the early and modern emergence of the Kenyan Silicon Savannah and the Yabacon Valley in Lagos (Deloitte, 2016; Siba and Sow, 2017).

In May 2017, under the socio-political slogan of smart urban developments: "Towards a bright future in African cities", the Transform Africa Summit brought together about 300 African mayors as well as regular heads of state and ministers. At this Summit, African initiatives were to integrate ICTs as mediating instruments in modernising the continent's economic and social political systems, specifically smart city governance systems. For example, the Rwandan government revealed the "smart cities blueprint"; a smart city governance framework or scheme designed to stimulate the enactment of ICT-driven economic and social political systems and applications in African cities. This framework prompts African countries and cities to rethink about a more liveable future when facing urbanisation problems and institutional pressures (socio-political pressures for sustainable urban developments). Overall, it institutionalises about ten (10) steps to build smart cities, most of which consist of collecting calculative and measurable data, identifying urban development challenges, implementing pilot projects, and evaluating project efficiency. It also pushes African countries and cities to search for non-traditional financing methods such as public-private

partnerships, smart bonds (bonds that guarantee returns upon project implementation) and the spread of shareholding (investors buy a share instead of a bond in the smart city project) (Tomor et al., 2019; Siba and Sow, 2017; Smart City Hub, 2017).

Nationwide, countries such as Rwanda, Nigeria, Ghana and Ethiopia have initiated smart city projects and applications. For example, amid the world's admiration for African growth and the European Union's financial support for that, the Nigerian Smart City Initiative, launched in June 2017, has enabled ICT innovations in Nigeria, providing institutional means that connect citizens with physical infrastructure to enhance public service delivery. In Ethiopia, in an attempt to find a solution to the lack of parking spaces, Addis Ababa has built smart or sustainable parking by applying Chinese parking technology in a steel building with an automatic elevator. Compared to Western smart city experiences, this is similar to most European countries (for example, UK, USA, France) that solved this problem in the same way (Tan and Taeihagh, 2020). In the Ghanaian context, IBM uses the Ghana Smarter Cities Challenge Team to assess whether and how advanced ICT technologies are being adopted to achieve a blending of economic and social political performance in Accra (Siba and Sow, 2017; Slavova and Okwechime, 2016).

In Egypt, the absence or even limited internet access was a significant institutional handicap in the pre-2011 period of the political revolution (Hamza, 2016). There was significant urban development pressure on achieving civic authorisation, public-civil cooperation, and sustainability in public service performance (Tomor et al., 2019). Tomor et al. (2019), for example, explain that the movement of public services and citizen-government collaboration to the World Wide Web (WWW) can be hindered by the digital social, cultural, and economic gap. This dearth of institutional openness for multiple ICT applications also hinders collaborative, technology-based urban developments and related smart governance systems (Hamza, 2016). The modern authoritarian past is negatively related to citizen engagement and public-civil cooperation fueled by advanced digital technologies. More formal and hierarchical public administration structures have resulted in the least ICT-empowered citizen participation. This has resulted from centralised public administration and governance at the macro-state level, which subsequently has led to a less technology-based collaboration between citizens/communities and councils/local governments (Tomor et al., 2019).

In mid-2012, especially after the January 2011 socio-political revolution, the weakness of the Egyptian economy has been observed, with the national public debt approaching \$200 billion. The weak economy and the unattractive nature of the Egyptian market have put pressure on the macro-state government to implement smart city governance projects and investments and gradually eliminate financial support for consumers/citizens (Hamza, 2016). The socio-political and economic environment of smart urban developments nurtures top-down and down-top technological innovations and citizen participation that contribute to smart city governance (Tan and Taeihagh, 2020). This has been at the heart of state/city governments since they announced the national/local need for a smart city and smart city governance by implementing advanced ICT-ERP systems, networks and applications (Tomor et al., 2019). Supported by Egypt's sustainable urban development policies and decisions, the socio-political initiative for smart city/governance was institutionally launched in 2015. It has covered so far about twenty (20) cities in northern, central and southern Egypt. New Cairo city is one of the first and modern smart city/governance projects in Egypt (EUF Report, 2015).

#### **4. Data and methods**

This study adopts an interpretive single-case study approach (Yin, 2018) and contributes to previous literature by providing the New Cairo city council (Egypt) as additional evidence of the potential relationship between performance measurement systems and smart city governance. New Cairo city council, like other city councils in Egypt, has come under political pressure from the military regime to implement a smart city project. This political pressure, at a macro level, has resulted in the use of a city-level system of smart governance where accounting-based performance metrics play powerful management and accountability roles. New Cairo city is one of these smart city initiatives in Egypt since the New Cairo

business (action) plan (2015-2025) was announced the willingness of the city council/government to stay ahead of the future. New Cairo is a modern city that applies ICTs through which the city's infrastructure and services are more productive and interactive, such as public utilities, administration, transportation, and healthcare. According to its 2015-2025 business plan, New Cairo city embraces the spirit of sustainable urban strategies and benefits from smart urban technologies that promote resource efficiency, sustainability performance and a healthy lifestyle (Hamza, 2016).

The smart electricity networks project specifically signifies one of the advanced ICT-empowered applications in this smart urban context of New Cairo. With old sporadic grids, which caused severe air pollution and overheating, and growing public demand for safe electricity, the city government has necessitated a new governance system to manage and measure electricity distributions. This has created political pressure for the city government to adopt advanced distribution networks based on ERP/SAP technologies. New ERP/SAP-enabled electricity applications have become the building blocks of smart distribution services in the city. These modern technological applications have paved the way for the city's innovative management and measurement tools, from electricity utilities to individual consumers/citizens. In this regard, the city government director explains that the city council has contracted with two of the largest Egyptian companies (interviewees know them as "smart electricity dealers") to provide high-quality electrical products and services in the modern city. This included a public sector company (MAAD) and a private sector company (AETCO). This was then the birth of the first public-private sector participation in implementing a smart city/governance project (Grossi et al., 2020) in Egypt and the emergence of the so-called "third way" (Giddens, 1998) or "hybridisation" (Baxter and Chua, 2003) in a city-level performance measurement system that acts as a mixture of economic and social political performance metrics.

Empirical data and their collection levels were distinguished in line with the overarching research question and theoretical framework adopted. Data were collected from two different but interrelated institutional levels: a macro level and a micro level. The macro level is the state government level through which empirical data reveal how smart urban developments have become a political problem (pressure). The second level of data collection is the micro-city level in which empirical data reflect the influence of political pressure from the military regime on establishing public-private collaboration and then using a smart city governance system where performance metrics are a powerful accounting tool (Miller and O'Leary, 2007). Empirical data, here, have extended to cover state-level urban developments that brought the smart city and related governance projects (for example, the smart electricity networks project) in the case city council, and micro, internal reconfiguration of a performance measurement system (metrics) by which the city council can shape political decisions, thus gaining social acceptance and political legitimacy.

Most relevant state-level data on smart urban developments were originally published as secondary materials. These included urban development reports, periodicals on sustainability, public management and governance, local government newspapers, academic journal articles and smart cities forum websites. The micro-organisational data at the city council level was obtained through semi-structured interviews with various institutional and organisational actors in the New Cairo city council, and direct observations on their daily activities and performance metrics. Given the research question and the work nature of each participant, a separate interview guide was used. The interview questions and individual observations differed between the interviewees. Interview guidelines are provided in the Appendix, however, each interview had a specific type of question that corresponded to the job role(s) of each participant. This helped gain a deeper understanding of the daily work and performance of each one (Yin, 2018; Parker, 2012). Since "participant observations" were made in a Yinian sense (Yin, 2018), data collection methods were largely observer-to-participant extensions. The participation went above and beyond the level of interviews, as the author walked through the daily implementation of specific performance measurement practices, showing how such uses of performance metrics are implicated in overall smart city governance. It was also extended to participate in decision-making, especially in providing academic advice (Alvesson, 2011) on ERP/SAP-empowered distribution cost controls.

The people interviewed were selected in consultation with the city council's financial director as a representative of the council's board of directors. The focus, here, was on selecting people with expertise in smart city/governance projects (specifically, the smart electricity networks project under study) who engage in the day-to-day processes of performance measurement, city management, accounting and accountability. During interviews, most of the participants were generally reluctant to say anything controversial, especially since they were the council's current management and employees. This fear, which characterised public sector institutions in Egypt, was to some extent a restriction of access to some (especially sensitive) data, such as employee characteristics and behaviours that could influence the role of performance metrics in shaping political decisions in the council, then smart city governance. Therefore, their claims were taken at face value, differentiating academic research from investigative journalism (Alawattage and Alsaïd, 2018; Parker and Northcott, 2016; Yin, 2018). To avoid any potential biases, as well as a culture of fear for them as a public sector organisation, the interviews were semi-structured (as opposed to open and exploratory interviews). The scope of the interviews was expanded to include people from different operational departments and at different management levels (top, middle, and bottom). Some interview questions were repeated with different words to the same interviewee during the same interview or in another interview to make sure s/he gave the correct answer. Moreover, some questions were repeated for all people interviewed to ensure that their answers regarding the research issues under investigation were correct and reliable (Yin, 2018). In addition to semi-structured interviews, data were also collected from documentary readings and meetings observation/participation as secondary sources to ensure the correctness and reliability of interview data (Parker and Northcott, 2016).

(Main) interview data were collected from June to September 2018. Then, the follow-up took place from June to July 2019 and from September to October 2019. Eight (8) separate visits were conducted to New Cairo city council, approximately 3-5 interviews were conducted during each visit, and twenty (20) working days were spent with employees in different operational departments and units. Overall, 32 formal interviews were conducted with 24 different people in New Cairo city council: sixteen (16) accountants, three (3) senior managers, three (3) financial advisors, and two (2) community innovation officers. Each interview lasted between 45 minutes and an hour and a half, but most took about an hour. The interviews were tape-recorded whenever possible and all recordings were transcribed. It was conducted in either Arabic or English as per the interviewee's choice. Two joint meetings were held: for example, the first meeting included the council's societal innovation director, the senior financial consultant and the head of innovation, while the second was with the council's accountability and control head and the managing director. These meetings and open discussions brought a deeper understanding of different research dimensions such as political pressure from the military regime for smart city projects, funding pressure, public-private collaboration, the smart city governance system, and the powerful role(s) of a performance measurement system in shaping political decisions in the city council. As above, the validity and reliability of the data were enhanced through multiple interviews with participants and other documentary evidence (Parker, 2012).

Empirical data were not analysed using electronic software, but manually to maintain normality in the words, expressions and phrases of the people interviewed (Alvesson, 2011). The interview transcripts and notes were carefully (re)read in the data analysis phase, which went through a three-step process (Alvesson, 2011). According to Alvesson (2011), in line with Dillard et al. (2004) theoretical levels, the first step in the analysis process was to read the transcripts and notes in-depth while listening to the audio recordings. This facilitated obtaining a comprehensive picture and meaning from the data. The second step was to identify relevant research issues in line with the transcripts and notes. In this step, research issues that emerged from the interview materials were coded; an open code was assigned to every emerging issue. In the third and final step, the coded data was divided into diverse but interrelated clusters/themes in line with Dillard et al. (2004) theoretical levels. In line with the theory, this division has taken the form of a "coding tree" (Alvesson, 2011) that reflects the institutional dynamics between smart city projects, at the macro-level, and performance measurement systems, at the micro-level. The tree (data structure) coding emerged

sequentially through multiple interrelated levels of coding (Yin, 2018). In the institutional sense of Dillard et al. (2004), the first-order coding reflects the political and economic level (an instance of political pressure from the military regime for smart city projects at the macro-state level). The second-order coding reflects the macro-organisational field level (an instance of military pressure towards public-private collaboration and a smart governance system at the city level). The third-order coding expresses the micro-organisational level (an instance of an institutionalised performance measurement system/metrics at the city council level).

This multi-level process of data analysis (Dillard et al., 2004) has aided in identifying and gathering the additional data contributed to answer the research question and theoretical issues at hand. During this process in which the interview transcripts and notes were summarised and analysed thematically (Parker, 2012), patterns emerged in spoken words, messages, and underlying motives, in addition to stressing important emerging issues. This multi-level analysis inspired by Dillard et al. (2004) was accompanied, as far as possible, by working alongside multiple views and interpretations, thus avoiding a pre-defined understanding of the data collected. This facilitated access to empirical findings from immediate or direct views and interpretations. Each participant had a copy of a transcript for review. The names of the participants are anonymous for the sake of confidentiality, however, and their city council positions have been disclosed where they were quoted. All quotes have been carefully checked with them during the analysis and (re)writing phases (Parker and Northcott, 2016; Parker, 2012; Alvesson, 2011).

## **5. Empirical findings**

In line with the Dillard et al. (2004) theoretical institutional model, the empirical findings are framed in three distinct but interrelated levels: political, field, and organisational levels. While the macro-political level sets up the institutional context in which smart cities accommodate, the macro-field level details the influence of political pressure from the military regime on collaboration with the public and private sectors and then on the implementation of a smart city governance system. Then, the micro-organisational level interprets how a smart city governance system has institutionalised (accounting-based) performance metrics at the city council level, and how these metrics played a powerful role(s) in shaping political decisions in the city council. Especially certain performance measurements have been institutionalised as powerful accounting tools to embrace a blending of economic and social political systems. In the institutional sense of Dillard et al. (2004), performance measurements are considered playing an important role in the accountability and control of executing smart city projects. A performance measurement system can support the smart city project of self-control and self-accountability in an institutionalised military regime of sustainable urban developments. Drawing on Dillard et al., performance metrics act as a powerful institutional instrument through which council actors can shape political decisions, then reflect upon themselves in order to become legitimate actors in the smart city governance system (see below). The institutional event, here and again, is the implementation of smart city projects after the 2011 political revolution as part of Egypt's 2030 sustainable development strategy. As explained above, the 2011 revolution has generated a major challenge for the state's political leadership on how to revive the Egyptian economy in line with the economic goals and social demands of this revolution. The implementation of smart urban development projects (hereto, smart city projects) is the most important event in Egypt's 2030 socio-economic and political strategy for sustainable urban development. In the sense of Dillard et al.'s, the "cascading institutionalisation process" of these smart projects at the city level was conducted through three 'distinct' but 'interrelated' institutional levels (Below are epistemological issues related to building the pillars of this framework and their limitations).

### **5.1 At the city-political level: institutional pressure for smart city projects**

This macro-political level reflects the institutional pressure of smart city projects. The government's adoption of smart city projects has created political or institutional pressure on city councils. As explained above, the financial support provided by the European Union to the Egyptian government to implement these projects was only for building the infrastructure for this project (hereafter, the smart electricity

networks project), and not for operating and managing the project. This smart electricity project was partly funded by the European Regional Development Fund (ERDF) and implemented by the New Cairo city council with the participation of the public and private sectors. This has put the city council and its military management under political pressure not only to provide residual funding but also to institutionalise a clear micro-organisational performance measurement system (or metrics) that play powerful accounting and accountability roles in shaping political decisions, and then smart city governance at the organisational field level (see below).

Institutional pressure is not just about political influence as Dillard et al.'s informed accounting studies have argued, rather, it extended to include 'military engagement' in implementing the smart city project. This contributes to the development of the Dillard et al. institutional model that argues only for political influence. Besides political influence, the findings of the present study also revealed the existence of 'military influence' at the overall (macro) institutional level. After the 2011 political revolution, the leadership and the top leaders of the state, government and affiliated agencies (such as city councils) became military personnel. Those top leaders are the 'eyes of the state' in their associated public agencies. For example, in this Egyptian case, the director of the city council is a military man, from whom the politician interferes in the management and accountability of the smart city project through setting appropriate plans and making relevant decisions regarding sources of financing, smart bonds, public offerings, public-private partners, etc. Therefore, the role(s) of the performance measurement system in smart city governance is not limited to a political role as per Dillard et al.'s but also to a military role through an embedding of economic and social political performance metrics in a single operating system to face the institutional demands of the public-private collaboration, hence smart city governance and accountability.

Commenting on the political pressure exerted by the military regime for smart city projects, the deputy director of the council said:

After the political revolution of 2011, the state system came under military command. This led to the militarisation of the central government and its agencies such as city councils. Senior commanders in various city councils across Egypt were changed into military men. The political logic here was to protect the state's assets and property from the management and accounting manipulations and irregularities that occurred in the pre-political revolution of 2011. In the period before the 2011 revolution, a report of the Central Agency for Accountancy revealed administrative and financial abuses in public sector institutions (including city councils) exceeding ten million Egyptian pounds. The cause of this revolution was the spread of political corruption, which was reflected in the spread of management manipulation and accounting fraud in various state institutions including the public sector/city councils. For example, the director of the council board is currently a military man, who is considered a state agent or the eye of the central government in the city. This clearly indicated the inclusion of military engagement in the implementation of smart city/governance systems, including a performance measurement system or accounting/accountability-based performance metrics...

He adds:

There is political pressure from the state government on city councils due to the lack of funding needed to implement sustainable urban development projects, such as smart city projects. This funding shortfall created institutional pressure on the council board to seek a private sector partner, cooperate and agree on terms to operate the project. The available government fund only covered the cost of the infrastructure of the project. This was financial support from the European Union of about 200 million euros to implement the smart city project across 20 cities in Egypt by 2030. Therefore, this created pressure on the council board to adopt some other policies to save the remaining costs, perhaps the most important one was to collaborate with the private sector for the first time in the wake of recent World Bank recommendations in 2015. This public-private collaboration is called in practice smart collaboration.



Hence, urban developments, and seeking to improve the quality of city life, have created an important political (financial) pressure in the military regime of smart cities. In the sense of Dillard et al. (2004), the 2011 political revolution, at a macro-state level, was a turning point and pressure on the political economic institutions of urban developments in Egypt and brought an expression of the smart city on a diverse political course. Based on the political desire of the state government, smart urban developments have emerged on the political agenda as a “higher-order principle” (Dillard et al., 2004) to which institutional transformations have been directed. The revolution has spawned diverse political normativity, including a radical institutional transformation not only in urban development policies and decisions but also in many economic fields and related governance systems across urban cities. The current urban movements towards smart city projects have become a means of institutional transformation, bringing in a mixture of economic and social political systems (Dillard et al., 2004).

The political demand for urban governance structures and (accounting-based) performance systems has translated into socio-political and economic measures. For the first time, on a macro level, the Ministry of Urban Renewal and Informal Settlements and the Ministry of Housing, Utilities and Urban Communities were established in early 2015. Informal areas have also been recognised in the new Egyptian constitution for urban planning and development. In the sense of Dillard et al. (2004), the state/city government has institutionalised new socio-political and economic vocabularies consistent with an institutionalised regime for smart or sustainable cities such as social justice, health and safety, citizen participation, and sustainability. This has combined a blending of economic and social political systems in one smart city governance system, which contributes to previous literature (Alsaid and Mutiganda, 2020; Argento et al., 2019; Brorström et al., 2018; Herscovici, 2018; Lapsley et al., 2010) that it is not only politicised but also militarised. The chairman of the New Cairo city council is from the military, who was appointed after the revolution as the state’s ‘eye’ in managing, measuring and controlling the performance of the city’s resources and urban development projects to achieve the economic and social goals and visions of the political revolution. Since then, as respondents reflect, the political ideologies of smart city governance have come under the control of military regimes and decisions at the macro level.

These military systems of political management have then institutionalised a set of urban development strategies to launch smart governance projects in cities. These politicised and militarised strategies have constituted institutional devices (Dillard et al., 2004) for smart urban governance, social justice, and goal-centered development. According to a senior accountant in the city council, these institutional devices

... included both Egypt 2030 strategy and Egypt 2050 strategy, each with its socio-political goals, visions and projects. Egypt 2030 was developed by the Ministry of Urban Renewal and Informal Settlements and it deals with socio-economic challenges. Egypt 2050 was developed by the Ministry of Housing, Utilities and Urban Communities and it deals with effective urban spatial developments.

Urban development strategies were both a socio-political solution to advance with the ‘map of modern Egypt’. These strategies have enabled the current smart movements of post-revolution urbanisation. The city council director explains that Egypt 2030 aims to develop different urban areas, which is one of the desirable political strategies to create new cities and communities with different socio-economic norms and values (Dillard et al., 2004). Egypt 2050 focuses on exiting the Nile Valley region, maintaining the New Cairo city as a smart city, and reducing internal migration between cities. According to the executive director of urban planning in New Cairo city council,

Our development plans, at a macro-political level, have included many smart urban expansions in an institutionalised regime of sustainable cities. These expansions, for example, are included developing the Suez Canal cities as a centre for logistics and global industries, developing the northwestern coast and remote desert cities, developing the cities of north and central Upper Egypt, developing Southern Egyptian cities, and last but not least, developing the New Cairo city.

New Cairo is one of these smart sustainable cities. Here again, the city council's willingness to remain at the forefront in the future has been announced with the 2015 New Cairo business plan as an executive part of the 2030 urban development strategy. A council manager emphasised the political focus at the macro-level on measuring performance in smart urban developments, saying:

Since 2015, Egypt's new military leadership has focused on that smart urban projects are a political force for managing and measuring socio-economic developments, built on existing smart cities planning towards social justice and sustainability performance. This is facilitated by adopting a new urban development agenda that focuses not only on urban planning, urban economy or even urban legislation but also on a system of smart city governance where performance measurements act as a blending of economic and social political systems. This reflects the political significance of creating an inclusive performance measurement system that demonstrates how such uses of these performance measures are implicated in overall smart city governance.

## **5.2 At the city-field level: public-private collaboration and smart governance system**

This field-level translates political pressure at the macro-state level in the military management's drive towards collaboration with the public sector and the private sector (as a form of modern public-private partnerships). The military management of city councils (the New Cairo city council, for example) began in 2015 to adopt a collaboration/engagement strategy (or called "smart collaboration," as the interviewees said) with the public and private sectors. This came in response to a recent recommendation from the World Bank to finance sustainable urban development projects in developing countries (especially Arab Spring countries such as Egypt). The political purpose of this smart collaboration at the institutional field level of the city council was to provide the necessary funding to ensure the implementation of the smart electricity networks project as planned by the state's political leadership at the macro level. The political problem emerged here in how to measure and manage the operating performance of the public sector and the private sector in working together. Each sector has its own management and accounting ideologies and desires. While the public sector seeks to achieve the social objectives and public welfare of the smart city project, the private sector seeks to achieve the economic and commercial profitability objectives of the smart city project. To reduce institutional conflict and complexity between the two different sectors, the city council under its military management established a robust system of 'smart governance' at the organisational field level in which performance measures played powerful roles in accounting and accountability (see below). The military management of the city council has been supportive of this smart public-private collaboration to ensure the successful implementation of the smart electricity networks project. The infrastructure for smart electricity networks was created through the ERP implementation (specifically, the SAP platform) that integrates various distribution networks across the city into a single system that technically works through the council's engineering management.

Military pressure for public-private collaboration, at the macro level, has created the political significance of establishing a system of smart governance at the city level. In the sense of Dillard et al. (2004), the state government has put many cities under political pressure to regulate their sustainable urban expansions by creating a city-level system of public-private collaboration and smart governance. This was under the slogan: the smart city governance system should be utilised to solve the political problems of urban developments, not exacerbate them (the city council director said). Electricity was one of the major urban problems in city development. With older distribution networks and increasing social equality demands for electricity, the city government needed an effective governance approach on how to manage and measure the economic and social performance of electricity in New Cairo city. According to the council's executive director, "the electricity was not enough, but it had to be sustainable or smart". This has, then, created the political desire (Dillard et al., 2004) for the military management at the city level to implement a sustainable or smart electricity governance system, ranging from public utilities to individual citizens/consumers.

The smart electricity governance system has been established at the city level by the military management in response to political pressure from the military regime for public-private collaboration in implementing

smart city projects (Dillard et al., 2004). In the institutionalised sense of Dillard et al. (2004), the 2011 revolution's social demands for a healthy lifestyle, social justice and sustainability performance in the city were institutionalised in a "smart electricity governance system" (senior accountant explained). In order to meet these demands, the city government -in collaboration with a private generation company (AETCO) and a public distribution company (MAAD)- has created this new system of electricity governance, which includes a set of sustainable electricity governance mechanisms (see below).

Smart home electricity management system is a new urban governance mechanism for sustainable electricity system in New Cairo city. It enables various stakeholders (such as homeowners and utilities) to manage and measure electricity consumption. In the sense of Dillard et al. (2004), it is a sustainable electricity governance "system" as it translates home devices into smart tools. It integrates these tools into one network that recognises them while in use and informs citizens about the status of home devices that can be monitored by smartphones and other non-traditional "means" (Dillard et al., 2004). In this regard, the executive director of the council comments on this new system of electricity governance, saying:

The new governance system manages and measures the electricity load from sustainable renewable energy sources. It consists of four main performance units: central unit, monitoring unit, control unit, communication unit, and secondary elements. Each unit has specific governance functions...

...The central unit uses advanced sensors that form a graphic interface to monitor electricity consumption in every room and to automatically interfere with the control system, whether through the internet or mobile phone. For the monitoring unit, functional sensors have the ability to measure some parameters such as the temperature in a room. The information provided by the control unit can assist the citizen in making certain decisions, such as reducing consumption and harmful emissions. And last but not least, the function of the communication unit is connected to sustainable renewables.

Smart home electricity management system, as a new institutional form of smart city governance, has achieved a variety of sustainable socio-political desires (Dillard et al., 2004) of the city's stakeholders. Each desire reflects an urban development perspective of various stakeholders such as citizens, utilities, society and the environment. According to the council's senior accountant, in keeping with the institutional meaning of Dillard et al. (2004), while citizens aim to reduce their monthly electricity bills, the utility goal of the smart home electricity management system is to cut off the peak load. From the societal level, smart home electricity management system aims to use green resources to generate electricity. Based on our smart home electricity management report 2017/2018, New Cairo communities assured that this system (or model) of smart city governance becomes more independent of fossil fuels to generate electricity. Therefore, the environmental goal of this system is to reduce emissions and create a safer environment while monitoring and optimising the power allocated to home electronics from a device perspective.

Under the supervision of the council, two contracting companies (public-private participation) provide citizens with the "means" and "devices" of this new "system" for smart electricity governance, both hardware and software, to facilitate urbanisation and sustainability performance at the city-field level. In this regard, a senior manager provided some examples of new tools and devices for a smart home electricity management system, saying:

Home power controllers and multiple sockets (provided by private generation company, AETCO), strips and heavy-duty controllers (by AETCO), power thermostats and photovoltaics (by AETCO), smart power monitors and rechargeable Li-ion batteries (provided by a public distribution company, MAAD), and smart metres and smart power-enabled communications (by MAAD). The governance functions of these devices vary in terms of hardware and software, ease of use, and (accounting) data collection for management and control.

Smart metres are also the second key mechanism for the new electricity governance system in New Cairo city. These smart technologies for urban developments include two-way communication between citizens/consumers and city electricity utilities. These were institutionalised by the city government in collaboration with a private generation company (AETCO) and a public distribution company (MAAD) to manage and measure (accounting-based) billing readings, detect faults (accounting errors) and dispatch teams to quickly repair the site. In this regard, the head of the council's smart meters unit explains the institutional importance of this mechanism within a city-level electricity governance system, saying:

... Old electricity metres provided automated (traditional) readings, which were developed into a sophisticated infrastructure for urban development in New Cairo city. This advanced measurement technology (I mean smart electricity meters) does not just manage and measure loads and other statistics instantly. But it also constitutes a (accounting-based) signaling tool through which consumers (citizens) can monitor their loads.

So far, the city government has installed around 250,000 smart metres as part of the city's electricity distribution governance system. The city-field level political rationale was to eliminate the inaccurate accounting readings and management irregularities that were common with the old metres. According to the city council director, in the institutional sense of Dillard et al. (2004), these new measurement practices are important socio-political tools for citizens (on an accounting basis) to manage and control consumption, increase readability, and determine the portion of monthly bills. The new metering/measurement system provides citizens with their financial and non-financial information requirements such as remaining balance in kilowatt-hours, accounting values in Egyptian pounds, days remaining etc.

Last but not least, smart streetlights are also the third key mechanism of the new electricity governance system in New Cairo city. In the pre-smart city governance system, electricity companies' charges for lights on city streets were baseless estimates. This meant that the city government explicitly incurred a high cost. However, with the smart urban governance system, street lighting cost performance is calculated and measured, which means that lighting costs in the city are decreased. Governing smart street lights helps the city government monitor and decrease these costs, then institutionalise a sustainable (or legitimate) urban governance "system" in the sense of Dillard et al. (2004). As a form of institutional change at the city-field level (Dillard et al., 2004), the council's senior accountant states:

By replacing old [sodium] bulbs with electricity saving [LED] bulbs, costs have been reduced by about 50%, in addition to providing brighter street lighting. These [sustainable] bulbs last much longer than old bulbs, which reduces maintenance costs. Streetlights make up a large part of New Cairo city budget, and the implementation of smart LED devices helps the city council to save costs. These cost savings are then used to provide other sustainable urban development projects.

The city government has then institutionalised interconnected streetlights throughout the urban and rural areas of the city. This was achieved through the installation of new "Internet of things" networks, eliminating the institutional demand (Dillard et al., 2004) for a large capital investment. It has also created, in the sense of Dillard et al. (2004), urban development "opportunities" to transform the city into a smart city. In this context of smart city governance, the council's senior accountant says:

Two contracted companies are the council's best partners in the public and private sectors. As per their participation in the smart city governance system, they have implemented sustainable city street lights. Through smart governance, they provide broad coverage across both urban and rural areas of the city. This is done by installing Internet of things networks, reducing the demand for additional capital expenditures on network devices. These networks provide a [socio-political] solution for managing and measuring smart street lighting performance costs and bringing sustainable benefits to the various commercial, residential and industrial areas of the city.

### **5.3 At the city-organisational level: the intra-institutionalisation of performance metrics**

The smart governance system at the organisational field level, which was established by the city council to avoid conflict and complexity due to public-private collaboration, was politically required to “institutionalise” a clear performance measurement system (metrics) at the micro-organisational level of the council. The political purpose of institutionalising this performance measurement system was to integrate economic (financial) and social (non-financial) measures into a single management and accountability system. As explained below, these institutional measures were considered political metrics for smart city performance management and accountability (smart governance). This smart governance system (built on politicised performance metrics) was institutionalised through ERP-SAP networks at the micro-organisational level of the council. As explained by the chief financial officer of the board, through ERP-SAP networks, the council’s financial department can carry out its daily tasks of accounting and performance measurement for the smart electricity networks project, and thus for collaboration between the public and private sectors. It provides regular performance reports (daily, monthly, quarterly and annually) to the board of directors to continuously assess the city’s networks performance and take the necessary political decisions (appropriate military actions).

Therefore, internal performance measurements at the council level serve as powerful “institutional tools” (Dillard et al., 2004) within the smart city governance system. The performance measurement system plays an important socio-political role(s) in the integration of the economic and social political systems. Internal performance measurements act as socio-political tools within the smart city governance system through assessing and reporting economic and social performance to the military management of the city/state for making appropriate urban development decisions and policies. Although there are ideological, cultural and managerial differences in how public (MAAD) and private (AETCO) companies operate, these differences did not create tensions between the two in implementing the ERP/SAP-enabled electricity distribution project and then the smart city governance system. Especially since our socio-political goal is to serve the smart city vision in achieving public interests and benefits. To avoid these differences between the political ideologies of the public and private sectors, the internal performance measurement system was designed and implemented to integrate financial/economic (private/business sector) and social (public sector) political systems (executive director of the council explained).

Here and again, performance measurements play an important accounting role in the context of smart governance and accountability in New Cairo city. With institutional pressures for urban development projects and the implementation of the smart electricity governance system, the city government has institutionalised a performance measurement system (metrics) in October 2015. In the institutional sense of Dillard et al. (2004), the political rationale for using performance measures was to manage and measure the performance of economic and social political systems at the city level. According to the city council director, institutionalised performance metrics play three powerful roles within the smart city governance system, which include electricity management, measurement and control. It provides the micro-level city government, and then the macro-level state government, with useful (financial and non-financial) information rather than raw data. It also contributes to the overall system of smart electricity governance through determining comprehensive operating boundaries in real time including thermal and stability limits, and measuring economic and social performance thereof. Furthermore, it is built on “ideal” control devices (Dillard et al., 2004) which are networked online (via the Internet of things infrastructure) and quickly brings the city’s public electricity system into a steady-state (a senior manager explained).

So, an institutionalised performance measurement system is connected to multiple control units within the overall smart city governance system. The powerful role(s) of these units is to manage and measure the economic and social performance of the various electricity distribution stations across the city. They are also responsible for collecting manageable, measurable and calculable data from various distribution stations and send them to a performance measurement system at the council level in no more than ten (10) seconds. A performance measurement system, in turn, provides the military management of the city/state

with these data in the form of the quarterly performance measurement report for management, accountability and control. In early 2016, the council-level internal performance metrics became built on an advanced ERP-SAP infrastructure. This “structural change” (Dillard et al., 2004) was imposed by the politicised and militarised management of the city to ensure an effective smart governance system. The institutional goal was to integrate an internal performance measurement system at the city council level with the state government actors (Ministry of Urban Renewal and Informal Settlements, Ministry of Housing, Utilities and Urban Communities, and Ministry of Electricity and Energy). This micro-macro integration of a performance measurement system is to enable different institutional actors (Dillard et al., 2004) to manage, measure and evaluate the economic and social performance of the city’s electricity on a daily basis, and then provide the political management of the state with a comprehensive smart city governance report on an immediate basis.

A performance measurement system produces this city-level governance report to reflect key performance measures, which are a blending of economic and social political systems. In this regard, commented on the institutional significance (Dillard et al., 2004) of the governance report based on key performance measures, the council board director says:

At the city level, in response to the institutional requirements of the political management at the macro-state level, we need to be able to do this smart governance by providing a set of critical performance metrics. We can also say that these performance metrics constitute the right way to see things..., are best suited to measure the economic and social performance of the smart electricity networks project in New Cairo city. We adopted this way because our [public-private] partners advised us to use this scientific approach to measuring performance, which they are always used in other smart city projects in the context of sustainable urban developments.

In an electricity governance context, the council-level performance measurement system has included two sets of key performance measures in response to the political demands (Dillard et al., 2004) of different state government actors. These are economic and social performance measures, which translated into a durable performance measurement system within a system of smart city governance. The council’s senior accountant explains the social performance measures imposed by political systems, at the macro level, saying:

With regard to social performance, political systems have imposed three main measures. The first measure is the scale of the smart electricity project. This measure enables the city council to calculate the number of citizens accessing smart distribution networks. It also measures the ability of the city council to expand these smart networks to include urban and rural areas. The second measure is the penetration level of the smart electricity project. This measure aims to measure the ability of the city council to penetrate these covered areas and transform their citizens, with access to smart networks, to become regular customers. Then, the third and final social performance measure is the regularity of each customer’s consumption. This measure is politically required to ensure that citizens start using sustainable electricity regularly and stop using old, unhealthy alternative sources...

The council’s senior accountant continues his discussion about the economic performance measures imposed by political systems at a macro level, saying:

...But with regard to economic performance, there are two basic measures in the smart city governance system. The first measure is self-financing. The self-financing measure is an important performance measurement because the military management of the city council decided to adopt a smart bond policy to finance the smart electricity networks project in the city. The second measure is economic efficiency. It was not enough that the smart electricity networks project achieves a breakeven. The city management required measures that enable to manage and calculate the contribution margin of each cluster of citizens, such as the contribution margin for every smart distribution network in the city. The city management, then, decided to manage and measure the

operational (cost) movement of sustainable distribution networks to ensure citizens pay for a smart, measured and managed service.

These economic and social political measures have contributed to the overall smart city governance. After defining performance measures, politically, it was important to regulate a “real process” (Dillard et al., 2004) to collect manageable and measurable data. Operational teams, consisting of the council staff visiting citizens to assess their health safety awareness of electricity, collected accounting data and numbers. During this process, operational teams reported to the city government that the real calculation for some of the performance measures was unsatisfactory. In the institutional meaning of Dillard et al. (2004), this subsequently led to an institutional change in the way these measures are measured and calculated. For instance, with respect to the penetration rate, there was a change from the measurement based on conventional meter readings only to the measurement based on “daily records” prepared by the council in collaboration with the private generation company (AETCO) and the public distribution company (MAAD) (council senior accountant explained).

The political rationale behind this calculative change was that the old measurement of the penetration rate mixed up two different types of information, that is, the number of citizens and the average consumption per household. This was a political problem at the city/state government level because accounting (performance measurement) practices must define the social objective of the project; the average consumption of smart distribution networks is important for every household. To achieve this social objective, it was politically necessary for the council to record the number of households consuming smart electricity services to a large extent, instead of having many households consuming only the old electricity sources as they were in the old performance measurement. Only a politically desired health improvement outcome can be achieved if the citizens are not using other sources of ageing and unhealthy distribution networks. In this regard, the council senior accountant commented on the project’s real measurement process and how the political significance (Dillard et al., 2004) of changed accounting (performance measurement) practices is implicated in the overall smart city governance, saying:

During the real data collection process, the operational teams brought together the number of households and the number of citizens per household, regardless of whether citizens use smart [secure] distribution networks. The city management based this census on the assumption that potential consumers usually live less than 70 meters from multiple points in smart electricity networks. Therefore, a new data collection process was introduced whereby the council began keeping a daily measurement record of every citizen’s purchases. The council, in response to political demands at the macro-state level, has collected citizens’ data with potential households to implement a new way for calculating project penetration. The new way enabled the city management to calculate and measure the number of covered citizens, the average daily consumption and the proportion of regular citizens (I mean, people who use smart distribution networks so the council can measure to what extent the city no longer provides ageing and unhealthy electricity) ... For management, accountability and control, the city council relies on certain accounting-based [economic and social] performance measurements that are provided regularly through the ERP/SAP-enabled performance measurement system within the socio-political framework of the smart city governance system.

Therefore, performance measurements are seen in practice as a powerful accounting and accountability tool in managing public-private collaboration and hence the overall smart city governance. Since these measurements play supportive roles in smart city management and accountability, these roles are institutionalised and coded in the city council governance system. The most important tool (cited here as a ‘symbol’ in the ERP/SAP system) in successful smart city governance is the performance measurement system (or metrics that integrate measurements of economic and social political performance). Empirically, the financial director explained that with ERP approval (especially, the SAP version), these metrics were “grouped” and “coded” for good public-private collaboration and smart city governance. From direct observations, some ERP/SAP operational screens were seen for some employees in the accounting

department during their daily practices. Performance metrics are an essential function of the daily business screen. Within the SAP-based governance system, performance metrics are one of the daily job listings that are categorised and coded into two groups in response to political requirements at the macro-state level: “economic” and “social”. Aside from technical details, each group takes a “specific symbol” that denotes the smart city (SC) project. For example, economic performance metrics are referred to as “ESCs” (economic-smart city) while social performance metrics are referred to as “SSCs” (social-smart city). Each group of these metrics are further sub-categorised and sub-coded. For example, social performance metrics (SSCs) are sub-categorised and sub-coded into three measures: the smart electricity project scale (SSC1), penetration level (SSC2), and the regularity of each customer’s consumption (SSC3). Likewise, economic performance metrics (ESCs) are sub-categorised and sub-coded into two measures: self-financing (ESC1) and economic efficiency (ESC2). Therefore, through the SAP-based governance system, performance metrics in the city council are “symbolised” (i.e. encoded) and each measurement plays a powerful accounting role in smart city management and public-private accountability. Through the SAP system, as the interviewees reflected, the council’s financial management can calculate or measure these metrics “automatically” and quickly extract “periodic performance reports” that are submitted through the system to the council board to take appropriate political decisions and managerial actions when needed.

The key institutional outcome of a performance measurement system (metrics) in the city council is the so-called “performance report” or “metrics report” as the interviewees said. These institutionalised (accounting and performance measurement) reports have been instrumental in changing managerial actions and behaviours in the city council. The deputy director of the board states that the director of the board (a military man who is seen as a state agent on the board as mentioned earlier) controls performance movements through these monthly reports. These reports guide the senior management team’s behaviours and strategies, which are adopted for performance measurement and smart city governance. Through them, the relevant employees can determine cost and price increases or decreases compared to previous periods, considering socio-economic circumstances and other political considerations surrounding the field. For example, the 2016 performance metrics report revealed increases in costs compared to the previous periods. The city council board required a detailed report about the reasons for these increases. The council established a committee (including the director of the board, the financial director, the cost department chief, chiefs of other operational departments and a representative of its public-private partners) to discuss the reasons for these increases in the smart electricity network (or some of its elements) during that period. The committee reported that there had been changes following the revolution of 25th January 2011 and that they had had an impact in terms of the following increased costs: increased import costs for the high-quality cables that are installed in the smart electricity network, increased electricity supply costs from power stations, and increased transportation costs to get network equipment to specific sites. The city council board in consultation with its public-private partners had to change its intra-organisational behaviours and strategies in terms of the smart electricity network. These intra political changes included purchasing smart network cables from the domestic market rather than importing them, while also retaining a satisfactory level of electricity provision to citizens/customers, increasing electricity sale prices (especially in urban and luxury areas) in accordance with increases in purchase costs from power stations, and subcontracting one of the transportation companies (the Hope company), which offered lower costs for five years. Therefore, based on this above-analysed empirical evidence, the powerful role(s) of institutionalised performance measurement systems or metrics emerges in shaping and reshaping such political decisions in the city council, beyond the Dillard et al. (2004) cascading (basic) institutionalisation process.

## **6. Discussion**

The case findings reveal that a smart city project is predicated upon the use of performance measurements, which have been in a ‘flow’ of institutionalisation (Alawattage and Alsaïd, 2018; Alsaïd and Mutiganda, 2018; Guerreiro et al., 2015; Wanderley and Cullen, 2012; Hopper and Major, 2007; Dillard et al., 2004). Drawing on Dillard et al. (2004), arguably, it is necessary to see performance measurements, especially in politically sensitive smart cities in less developed countries, as a form of institutional change that is closely



linked to sustainable urban developments taking place in the wider arena of state policies. Previous management accounting literature on the potential relationship between performance measurement and smart city governance indicated that smart city governance requires complex decisions to be made with special attention to economic, social and environmental performance (Westerdahl, In Press; Brorström, 2018; Grossi and Pianezzi, 2017; Meijer et al., 2017; Speklé and Verbeeten, 2014; Chiwamit et al., 2014; Lapsley et al., 2010; Hollands, 2008; Brown and Deegan, 1998), but also political interventions, public-private collaborations and military engagements in place. Accounting (performance measurement) practices in that institutional sense of Dillard et al. (2004), compared to other governmentality frameworks (Westerdahl, In Press; Alsaïd and Mutigand, 2020; Argento et al., 2019; Brorström et al., 2018) or agglomeration economics theory frameworks (Stafford et al., 2020), become important in supporting these decisions for the future (Miller and O’Leary, 2007). Contrary to previous accounting and smart cities literature, performance metrics are simultaneously supporting a system of smart city governance with its social justice rhetoric and status quo of the military ideology of management and urban development.

Urban developments have then created important political problems and pressures at the macro-political level. These urban pressures have politically influenced on cities and have institutionalised a system of smart city governance where a performance measurement system plays a powerful role(s) to bring together economic and social political systems (Steccolini et al., 2020; Englund and Gerdin, 2020). By contributing to previous literature (Argento et al., 2019; Lapsley et al., 2010), performance metrics can support smart city governance of self-control and self-measurement in an institutionalised regime of urban developments. Taking the institutional work of Dillard et al. (2004), city actors use performance metrics as a “powerful instrument” by which means they reflect and act upon themselves in order to become legitimate actors within the socio-political framework of a smart governance system. Hence, a performance measurement system is political and acts as a powerful accounting and accountability tool for smart city governance. With an institutionalised performance measurement system, economic and social performance measures at the city/state level work as technological and managerial tools (Steccolini et al., 2020; Bunders and Varró, 2019; Jayasinghe and Uddin, 2019; Almquist et al., 2013) that bring together the wider socio-political goals and narrower economic goals (Jayasinghe et al., 2020; Mizrahi and Minchuk, 2019; Brorström et al., 2018; van Helden and Uddin, 2016) of the smart electricity networks project.

In an institutionalised sense, a smart city governance system has been enabled, measured and calculated through three distinct but interrelated institutional levels: political, field, and organisational (Dillard et al., 2004). The political pressures of smart urban developments have penetrated these levels to transform performance measurement practices (Wanderley and Cullen, 2012), in effect institutionalising smart city governance where accounting-based performance metrics became not only a strategic imperative in a managerial sense but also a political imperative (Steccolini et al., 2020; Argento et al., 2019; Brorström et al., 2018) within the military management (Noguchi et al., 2015) of the city. For example, in line with Dillard et al. (2004), a city-level smart governance system has institutionalised council’s militarised ideologies and hierarchical accountability structures through the new ERP/SAP-enabled performance measurement system. With the new performance measurement system, council’s calculable performance measures were introduced to enable these ideological and structural changes at the micro level. A smart city governance system has signified the council’s public-private collaboration (Mutiganda et al., In Press) and sustainability performance reporting (Millar and Searcy, 2020) that evidenced the socio-political and military roles of performance measurements alongside their economic and managerial roles. Therefore, a set of apparently non-political smart city governance systems, particularly performance measurement systems or metrics, became socio-political and military instruments (Alawattage and Alsaïd, 2018; Wickramasinghe, 2015; Noguchi et al., 2015; Miller and O’Leary, 2007) that shape a dynamic process of accounting practices and smart city governance, which is a rather interesting contribution to previous literature (Westerdahl, In Press; Steccolini et al., 2020; Alsaïd and Mutiganda, 2020; Argento et al., 2019; Brorström et al., 2018; Speklé and Verbeeten, 2014; Chiwamit et al., 2014; Lapsley et al., 2010).

In the Dillard et al. (2004) institutional sense, these political and military dynamics at work in the New Cairo city council differed somewhat from the findings of previous management accounting literature on the potential relationship between performance metrics and smart cities (Westerdahl, In Press; Stafford et al., 2020; Alsaïd and Mutiganda, 2020; Argento et al., 2019; Mizrahi and Minchuk, 2019; Brorström et al., 2018; Herscovici, 2018; Lapsley et al., 2010). Here and again, previous literature did not explore political pressure from the military regime in their empirical analyses that addressed the relationship between performance metrics (broadly, accounting) and smart cities through a governmentality theoretical framework (Westerdahl, In Press; Argento et al., 2019; Brorström et al., 2018) or economics-based agglomeration theory (Stafford et al., 2020). The current study contributes to previous literature by exploring the influence of smart city governance on the utilisation of a performance measurement system using an institutional perspective to enrich current analyses with political embeddedness (Steccolini et al., 2020; Stafford et al., 2020; Dillard et al., 2004). In an institutionalised military regime of smart sustainable cities, as in Egypt, it argues that smart city governance represents sustainable urban development that has a socio-political alongside economic influence on the creation of the council's internal performance metrics, which has been in an influx of institutionalisation (Dillard et al., 2004).

Previous literature has also exposed this relationship through the adoption of 'inter-organisational' performance measurement systems among various organisations in Western and developed contexts. By contributing to previous literature, the present study is more concerned with the developing context (Egypt) and reveals this potential relationship by accrediting 'intra-organisational' performance metrics within a single organisation (city council) to face the political demands and decisions for smart city governance. This further supports to the recent study of Englund and Gerdin (2020) arguing for the importance of studying the conforming influences of intra-organisational performance evaluations to better understand their powerful roles within individual organisations (see also Alsaïd and Ambilichu, In Press; Steccolini et al., 2020). To go one step further, the present study also revealed that the intra-organisational performance measurement system within the case (individual) organisation has been built on specific (accounting/accountability-based) metrics (integrating a blending of economic and social political performance measurements) rather than just mediating (technological and managerial) instruments as indicated previously in most institutional management accounting case studies on the relationship between performance measurement systems and smart city governance. This further supports to the recent study of Burfitt et al. (2020) arguing for the importance of "integrating non-financial and financial measures" to ensure the accounting infrastructure stability (especially in relation to "budget relief" practices) in a sporting organisation playing the value-in-kind game.

Within this institutionalised system of smart city governance, accounting-based performance measurements (Argento et al., 2019; Brorström et al., 2018) play important roles through the inclusion of specific social and economic political measures (or broadly, "political systems or criteria" in the institutional dynamics sense of Dillard et al. (2004; Wanderley and Cullen, 2012)). Such uses of performance measurement systems (economic and social calculative measurements simultaneously) are then implicated in overall smart electricity governance in New Cairo city. For example, in Finland, Argento et al. (2019) have examined the benefits and criticalities of performance measurement systems (broadly, management accounting) to achieve smart city goals and programmes in the city of Helsinki. Their findings show that the smart city has launched new technologies of government by networking multiple performance measurement systems (with an emphasis on economic, social and environmental performance systems but not political intervention and military engagement in place). Although there was a socio-economic and environmental need to implement such measurement systems at the city level, the implementation of these systems has not been effective due to their multiple conflicting roles and work tensions within the city network. Therefore, a "temporary paralysis" situation (Argento et al., 2019, p.204) hindered the real achievement of smart city goals and programmes in the city. Contributing to this, and in agreement with the recent study of Steccolini et al. (2020), the present study indicates that the conflict or institutional tension has decreased between the various parties of the public and private sectors participating in the New

Cairo project due to political interference and military pressure that governs the performance of the various actors in the city through certain strong performance measures as analysed above.

In Sweden, Brorström et al. (2018) have explored and analysed the successful influence of employing sustainable or smart collaboration strategies on micro-organisational performance measurement systems in the city of Gothenburg. Their critical analysis reveals that the implementation of sustainable or smart strategies has improved and enabled city-level collaboration networks, which led to more attention on the financial, social and humanitarian aspects between the city's key actors. This is inconsistent with the findings of Argento et al. (2019) in Finland, which have shown a case of failure to apply management accounting (performance measurement) systems to attain smart city goals and programmes. But, it is consistent with the successful influence that Alsaïd and Mutiganda (2020) have shown in their early interpretive case study on accounting interventions in establishing smart governance in New Cairo city (Egypt). Their empirical findings revealed the accounting role(s) of ERP technologies, pricing studies and cost management reports in achieving this cooperative governance that rhetorically makes a 'city' smart. More recently, Stafford et al. (2020) examine the city's transportation policies and the awkward gap between policymakers' imaginations and the chaotic realities of the Manchester city tram. Although Manchester policymakers have shown a successful experience in establishing the new tram system, the findings reveal a failure condition in its operational performance. This failure resulted from the disordered orbital traffic patterns and the varied mobility requirements of a new tram system that represented as an "ill-judged city investment". As a result, these chaotic realities of the new tram system created negative financial (accounting) consequences and the inability of the Public Transport Authority to support other public (buses) services in the city.

Therefore, accounting (performance measurement) practices at the city-level act as a powerful instrument (Steccolini et al., 2020; Stafford et al., 2020; Grossi and Pianezzi, 2017; Wickramasinghe, 2015; Chiwamit et al., 2014; Speklé and Verbeeten, 2014; Miller and O'Leary, 2007) within an overall system of smart city governance. Through performance metrics, the military management of the city/state government can regularly obtain manageable, measureable and calculable economic and social performance data in a form of a quarterly sustainability performance report. Also, various political actors (Ministry of Urban Renewal and Informal Settlements, Ministry of Housing, Utilities and Urban Communities, and Ministry of Electricity and Energy) can obtain these comprehensive financial and non-financial data (Burfitt et al., 2020) on an immediate basis through the ERP/SAP-enabled performance measurement system, which represents as a blending of economic and social political systems. In this regard, some previous performance measurement studies have explored the political significance of changed accounting practices as powerful instruments (Westerdahl, In Press; Burfitt et al., 2020; Herscovici, 2018; Lapsley et al., 2010; Miller and O'Leary, 2007). For example, in Israel, Herscovici (2018) has used an instrumental approach to examine the practical dearth of smart city performance evaluation criteria in the city of Tel Aviv. The findings show that the use of "lean thinking principles" represents as helpful sustainable development instruments in this required evaluation of smart city performance. Likewise, Lapsley et al. (2010) has explored the powerful role of accounting in smart city governance in the city of Edinburgh (Scotland). Their findings indicate that accounting has acted as a political instrument in managing and measuring smart city performance through certain distinct but interrelated processes: visualisation, representation and intervention. Visualisation is a process by which city actors can provide accurate awareness of the future of a city to be measurable and calculable. Representation is a process by which the city management can reflect different demands from different classes of citizens while intervention is a process by which the city government can move the entire city into a controllable and manageable network. Furthermore, Lapsley et al. (2010) reveal that the smart city has been perceived as a "good governance model" in which calculative (accounting) practices play a mediating instrumental role in measuring and managing smart governance performance and thus improving the quality of citizens' life in the city (Mouritsen and Kreiner, 2016).

In the Dillard et al. (2004) sense, a smart city governance system has not only institutionalised politics within the relationship between performance measurements and urban developments, but also military

power in place. Especially if military power (pressure) was used to drive collaboration between the public and private sectors to provide the necessary funding and then support performance metrics as a political accountability tool in the smart city governance system. Here again, military power was clearly demonstrated in this relationship in New Cairo city council. After the political revolution (2011) at the state level, the leadership and management ideologies have moved from civil management to military management. Then, the people who lead the state or the city governments are currently from the Egyptian military. Therefore, the council's internal power of institutionalised performance metrics is stemmed from the politicalised and militarised management that leads the New Cairo city and is related to broader urban political developments at the city-level. The political significance (Westerdahl, In Press; Wickramasinghe, 2015; Speklé and Verbeeten, 2014) coupled with military power (Alawattage and Alsaïd, 2018; Alsaïd and Mutiganda, 2018; Noguchi et al., 2015) was instrumental in institutionalising a smart city governance system through a durable set of changed accounting (performance measurement) practices (Burfitt et al., 2020; Argento et al., 2019; Brorström et al., 2018; Lapsley et al., 2010) in the city council.

Council's changed performance measurement practices are governed by the military power between the various political actors in the city. This power is imposed by a political actor (the city government) and a field actor (the ministry) through certain governance and legitimisation rules and routines (Elsayed and Ammar, 2020), which manage, measure, and calculate economic and social performance measurements of the smart electricity networks project in the city. This specific category of power is what Dillard et al. (2004) so-called the "political power" (Alawattage and Alsaïd, 2018; Alsaïd and Mutiganda, 2018; Wanderley and Cullen, 2012). In line with Dillard et al. (2004), council's political power was not only imposed by the military executive director but also by the non-military financial manager, as regards a single procedural "system" of performance measurement (Hiebl, 2018) by institutionalising a blending of economic and social political measures (Baxter and Chua, 2003), calculable electricity distribution devices and sustainability performance reporting (Elsayed and Ammar, 2020). By contributing to previous literature (Argento et al., 2019; Brorström et al., 2018; Brorström, 2018; Grossi and Pianezzi, 2017; Meijer et al., 2017; Lapsley et al., 2010; Hollands, 2008), this council's socio-political significance of changed accounting (performance measurement) practices shows how such uses of performance metrics have become implicated in the overall smart city governance (Stafford et al., 2020) and then in making socio-political urban development policies and decisions at the macro-city level (Steccolini et al., 2020; Speklé and Verbeeten, 2014).

This specific category of socio-political power of a performance measurement system has been applied to eliminate the council's internal tensions and institutional conflicts (Contrafatto et al., 2020; Hiebl, 2018), so that various city actors are aware of social justice rhetoric and status quo of the military ideology of management and urban development. Institutionalised performance metrics are simultaneously supporting smart urban developments and actors cannot imagine another possibility (Stafford et al., 2020; Elsayed and Ammar, 2020). This finding further contributes and adds to Dillard et al. (2004) that institutional dynamics between the macro and micro levels of the city have created the use of the overall smart city governance system where the (accounting-based) performance measurement system does not only play a political and economic role but also a social and military role in place. This means that institutionalised performance metrics play a powerful accounting and accountability role(s) in shaping and reshaping political decisions in the city council, beyond the Dillard et al. (2004) framework and contributes to previous management accounting studies on the potential relationship between performance measurement and smart city governance (Westerdahl, In Press; Stafford et al., 2020; Grossi et al., 2020; Alsaïd and Mutiganda, 2020; Argento et al., 2019; Mizrahi and Minchuk, 2019; Brorström et al., 2018; Brorström, 2018; Grossi and Pianezzi, 2017; Meijer et al., 2017; Lapsley et al., 2010; Hollands, 2008).

## **7. Conclusion**

Drawing on institutional theory, this case study explores the powerful role(s) of performance measurement systems or metrics in smart city governance in a developing Arab Spring country characterised by an

emerging economy, political sensitivity, and military engagement. Given the current lack of empirical studies and hitherto unexplored linkages, it answers the overarching research question: if and how does institutionalised performance measurement system within public service organisations implicate in the overall smart city governance? Given the socio-political and military nature of the Egyptian smart city projects, this overarching question is split into two sub-questions: how do smart city projects shape political pressure from the military regime on city councils? And interestingly, how does this military pressure drive public-private collaboration and then the utilisation of a smart city governance system where performance metrics play some powerful roles in shaping political decisions in the city council?

Drawing on the Dillard et al. (2004) institutional model, the above-analysed findings of the current study reveal that a smart city project is predicated upon the use of performance measurements, which have been in a 'flow' of institutionalisation within the city council. This dynamic process of (macro-micro) institutionalisation took place through three distinct but interrelated institutional levels: political, field, and organisational levels. Each level has a special institutional feature that flows to the next level. Therefore, it is necessary to see institutionalised performance metrics, especially in politically sensitive smart cities in a developing Arab Spring country, as a form of institutional change that is closely linked to sustainable urban developments taking place in the wider arena of state policies. As previous literature indicated, smart city governance requires complex decisions being made with attention to economic, social and environmental performance. However, there is an apparent lack in institutional management accounting case studies on the influence of smart city projects, at the macro level, on the creation of a smart city governance system at the city level, then use (accounting-based) performance metrics as a powerful tool to integrate economic and social political measurements and to shape political decisions at the city council level. Accounting (performance measurement) practices became important political tools in making and remaking urban development decisions, policies, strategies and plans for the future of cities and citizens. Hence, performance measurements are simultaneously supporting a smart city governance system with its social justice rhetoric and status quo of the military ideology of control and accountability. This is a rather interesting conclusion feeding into previous management accounting studies on the potential relationship between performance measurement and smart city governance.

Of course, the findings of the individual case study are not generalisable because they are a 'reflexive' understanding (Parker and Northcott, 2016) of the political and military context of a developing Arab Spring country (Egypt). But still, they may help other city councils in the successful implementation of a smart city governance system and then performance measurements. The case may also help city policymakers and regulators when allocating resources (such as financing) or formulating sustainable public-private collaboration policies (such as pricing) for smart electricity distributions. They may benefit from the politicalised and militarised experience of the New Cairo city council, as a public sector institution, and how to adapt to political pressure from the military regime for smart city projects. Since no cities are alike, more case studies are needed within the accounting community to explore whether and how contextual differences and institutional complexities between smart sustainable cities can influence the political relationship between performance measurements and smart city governance (Grossi et al., 2020). Moreover, given the political, economic and social conditions in Egypt after the recent revolution (2011), there have been empirical restrictions on collecting some (sensitive) data, especially with regard to the influence of the origins and characteristics of city council workers on the utilisation of performance measurements in smart city governance. Therefore, with hope, future research may focus on this potential influence in line with some recent academic calls and recommendations of the accounting community (Steccolini et al., 2020; Grossi et al., 2020; Stafford et al., 2020; Argento et al., 2019). Another future research might be a 'logics multiplicity' within the city council, and how to co-exist with institutional complexities and conflicts (if any) between economic and social performance measurements to serve the objectives and mechanisms of smart city governance. This may pave the way towards the potential application of alternative theoretical perspectives, such as institutional logics and institutional work, to

analyse and gain diverse insights into the potential relationship between performance measurement and smart city governance.

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## Appendix: Interview guidelines

Levels	Fieldwork themes	Interview issues
<p>The fieldwork has transcended the underlying theoretical argument (Dillard et al., 2004), which represents a flow of institutionalisation through three distinct but interrelated institutional levels, to embrace the powerful role(s) of institutionalised performance metrics in making and remaking political decisions in the city council.</p>		
<p>At the city-political (macro) level</p>	<p>Institutional pressure for smart city projects</p>	<ul style="list-style-type: none"> <li>- Urban development policies, strategies, plans and projects after the 2011 political revolution especially in the Egypt 2030 strategy.</li> <li>- Financial support from national and international institutions and donors (e.g. businessmen, private sector organisations, the World Bank and the European Union).</li> <li>- How have smart city projects become a political pressure or a financing problem?</li> <li>- The smart city concept, and why is New Cairo referred to as the smart city?</li> <li>- Why is the city council referred to as the smart city council?</li> <li>- The concept of governance.</li> <li>- Political pressure from the military regime on city councils.</li> <li>- The current leadership of the city council: civilian or military?</li> <li>- The processual interaction between smart city policy-making and implementation.</li> <li>- Smart city projects: implementation and implication.</li> <li>- Smart city governance, accountability and control, and their impact on the sustainability performance of public sector organisations (e.g. council) and society.</li> </ul>
<p>At the city-field (macro) level</p>	<p>Public-private collaboration and smart governance system</p>	<ul style="list-style-type: none"> <li>- The influence of smart city projects at the city-field level.</li> <li>- The implementation of the smart electricity networks project in New Cairo city.</li> <li>- Military pressure for public-private collaboration to provide the necessary funding.</li> <li>- Potential conflicts between public and private sector interests in a new electricity project, and how to limit this.</li> <li>- Smart governance mechanisms in the new electricity networks project: smart home electricity management system, smart metres, smart streetlights.</li> <li>- The ability of these mechanisms to provide calculated and measurable (accounting) data</li> </ul>

		<p>useful in management, accountability and governance.</p> <ul style="list-style-type: none"> <li>- The creation of a smart city governance system, where the organisational performance measurement system plays some roles.</li> </ul>
<p>At the city-organisational (micro) level</p>	<p>The intra-institutionalisation of performance metrics</p>	<ul style="list-style-type: none"> <li>- The influence of field-level public-private collaboration and then a smart governance system on the sustainability performance of the city council.</li> <li>- The political utilisation of an intra-organisational performance measurement system (the political benefit of accounting-based performance metrics).</li> <li>- The internal choice of certain performance metrics to face the demands of public-private collaboration, then smart city governance.</li> <li>- The political significance of a blending of economic and social political measurements.</li> <li>- Key city actors in the micro-organisational performance measurement system.</li> <li>- Information and communication technology that enables the performance measurement system in the overall smart city governance (ERP/SAP).</li> <li>- How do accounting (performance metrics) reports contribute to shaping and reshaping political decisions in the city council as a public sector organisation?</li> </ul>