

Co-construction of Performance Indicators for a Circular City and Its Relation to a Local Action Net

Bekier, Justyna ; Parisi, Cristiana

Document Version
Accepted author manuscript

Published in:
Accounting, Auditing and Accountability Journal

DOI:
[10.1108/AAAJ-07-2022-5911](https://doi.org/10.1108/AAAJ-07-2022-5911)

Publication date:
2023

License
Unspecified

Citation for published version (APA):
Bekier, J., & Parisi, C. (2023). Co-construction of Performance Indicators for a Circular City and Its Relation to a Local Action Net. *Accounting, Auditing and Accountability Journal*. <https://doi.org/10.1108/AAAJ-07-2022-5911>

[Link to publication in CBS Research Portal](#)

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

If you believe that this document breaches copyright please contact us (research.lib@cbs.dk) providing details, and we will remove access to the work immediately and investigate your claim.

Download date: 05. Nov. 2024



This article has been accepted for publication in the *Accounting, Auditing and Accountability Journal* on 17 May 2023.

This version is the Author Accepted Manuscript (AAM).

Co-construction of performance indicators for a circular city and its relation to a local action net

Justyna Agata Bekier
Copenhagen Business School

Cristiana Parisi
Copenhagen Business School

Abstract:

Purpose: This study examines how circular economy performance indicators are constructed in an urban context characterised by a multitude of conflicting interests and visions of urban development. It explores the process of constructing a shared consensus about the performance indicators in conditions of low contractibility (Speklé and Verbeeten, 2014), where intervention objectives and outcomes are not easily quantifiable because the object is ambiguous and cannot be fully specified in advance.

Design/methodology/approach: The construction of performance indicators at the urban level is examined through the lens of an action net (Czarniawska, 2004). Using group interviews, observations, and documentary analysis, this study investigates the case of a circular economy initiative in the city of Milan.

Findings: The study demonstrates that in cases of low contractibility, the development of circular economy solutions requires actions that span across organisational boundaries, organised in an action net. As the action net unfolds, it is closely knotted with the construction of performance indicators, indicating a co-constitutive relationship between the two processes.

Originality/value: This interdisciplinary study contributes to the public sector accounting literature by exploring the complexity of performance indicator construction at the urban level. It further recognises performance measurement in cities as a dynamic and flexible process, in which the interconnected actions and involvement of multiple actants shape the composition of the indicators.

Keywords: circular economy, performance measurement, city, action net, public sector accounting

Paper type: Research paper

Introduction

Today, the majority of the world's population lives in cities and urbanised regions (UNCTAD, 2021), embedded in complex networks of private and public actors that influence citizens' well-being, the environment, and economy through policymaking (see Parisi and Bekier, 2022). This reality and its consequent impact on people's lives have motivated government policymakers and administrators to envision and plan cities and communities with a more sustainable profile—that is, urban spaces where individual and collective well-being is promoted through new forms of governance along with greater economic, social, and environmental sustainability (Argento *et al.*, 2020).

New approaches to urban sustainability, such as 'circular cities' (Prendeville *et al.*, 2018), 'smart cities' (Argento *et al.*, 2020), or 'flexible urbanism' (Burdett and Philipp, 2018) have gained popularity, inspiring initiatives that would render cities sustainable, resilient, and 'future-proof' (Prendeville *et al.*, 2018). What these approaches have in common are the requirements for broad stakeholder engagement and openness to innovation and uncertainty; however, their definitions are debated (Prendeville *et al.*, 2018). When it comes to a 'circular city', which we define as a city in which circular economy (CE) solutions are initiated and cultivated, the vision and objectives remain multifaceted and ill-defined (Corvellec *et al.*, 2020).

Essentially, CE solutions can be described as actions towards creating an economic system that eliminates waste by reducing, reusing, recycling, and recovering materials in the production and consumption processes (Kircherr *et al.*, 2017). Although the definitions of CE are multiple and evolving, there is an ongoing push from international organisations and policymakers for city actors to measure their progress towards more circular practices (see e.g. OECD, 2020). Such strong emphasis on performance management can be partly explained as an aftermath of the New Public Management (NPM) reforms (Lapsley, 2009), which advocated for the introduction of business-like management practices into the public sector (Hood, 1995). However, a consequence of this situation was the focus on a single public entity or organisation creating and utilising performance measurement systems (Lapsley and Miller, 2019), rather than on accounting's role in a systemic change.

Consequently, performance was understood in terms of a contract that guides civil servants' efforts towards the pre-defined objectives (Bevan and Hood, 2006). This view came from the traditional embeddedness of performance management under organisational management control systems, where it served as a mechanism to control and manage the attainment of organisational strategy and its subsequent objectives (Otley, 1999). For this purpose, performance measurement requires conditions of high contractibility (Speklé and Verbeeten, 2014), meaning: (1) organisational goals are unambiguous and can be specified in advance, (2) the organisation can select or develop performance indicators that are aligned with its objectives, and (3) the organisational actors know and control the production function that translates efforts into results.

This specific view of performance contracting in public sector has been challenged because studies have observed that, in conditions of low contractibility, performance measurement systems can serve multiple operational, incentive, and exploratory goals (Speklé and Verbeeten, 2014). Nevertheless, little is known regarding how performance indicators are constructed in such situations, that is, when organisational objectives are ill-defined or unspecified and the effectiveness of various efforts is undefined.

This study argues that cities experimenting with CE principles present an extreme case of low contractibility. CE has been dubbed as an 'empty signifier' (Corvellec *et al.*, 2020) given the ambiguity of its vision and objectives; as a relatively new concept to the cities, CE requires innovation and experimentation (OECD, 2020) because its production function is yet to be defined; and given its highly complex and technical nature, CE often requires specialised knowledge to understand what 'good' performance is and how it can be measured. Simultaneously, the transition to CE in cities requires new organisational forms based on collaboration and co-creation (COM, 2020). Such emerging, collaborative forms of organising present further challenges to the definition of a common vision and objectives and, consequently, to the formulation of relevant performance indicators. Therefore, we ask the following question: how are performance indicators constructed for 'circular city' initiatives?

First, it is important to investigate how such initiatives are organised in cities. Specifically, it is crucial to understand *whether* and, if so, *how* objectives are formulated in such settings, to further uncover how performance indicators are constructed in relation to this process. Accordingly, we follow Czarniawska (2004; 2010a) in problematising the city as a complex action net, that is, a set of collective, interconnected actions, transcending any formal organisation (Czarniawska, 2004). This approach allows us to study how the networks around CE solutions are formed and stabilised in the action net of a city and how performance indicators are constructed within them. It also allows us not to focus on a single entity within a public sector, which is the most common approach in public sector performance management literature (cf. Lapsley and Miller, 2019); instead, we illustrate the connections and translations required to fabricate performance indicators for a 'circular city'.

Following a CE initiative in the city of Milan, this study draws on sociology of translation to examine the interconnected actions, translations, and mediators (Czarniawska, 2004; Latour, 2005) involved in shaping the performance indicators for a circular city.

The remainder of this study is organised as follows. First, we review the developments in public sector and city accounting literature, to which we wish to contribute with this research. Thereafter, the study elaborates on sociology of translation and concept of action nets, which can be particularly useful in studying the city context. Next, the empirical setting and data collection methods are outlined. Subsequently, the findings related to construction of performance indicators in the European cities are presented. Lastly, the findings are discussed, followed by a conclusion and recommendations for further research.

Prior research - from NPM to accounting for the city

Performance measurement in public sector

While cities have been relatively neglected as research subject by management accounting scholars (Lapsley *et al.*, 2010), public sector accounting has received considerably more attention (see Lapsley and Miller, 2019). To identify potential avenues for studying calculative practices, and particularly performance measurement in cities, literature on management accounting in the public sector offers a starting point for our research.

In the last three decades, the NPM phenomenon (Hood, 1995) has influenced the practice and research agenda in the public sector (Arnaboldi *et al.*, 2015; Lapsley and Miller, 2019). The call to introduce more results-oriented, efficient practices in the public sector, taken from private sector experience, has created more space for accounting practice, including performance measurement (Arnaboldi and Azzone, 2010; Arnaboldi *et al.*, 2015). However, performance measurement practices, as advocated by the NPM, are rooted in a view of contracting, in which explicit and measurable performance targets are pre-set to guide civil servants' efforts in achieving defined objectives, creating sufficient incentives to align individual goals with overall objectives (Speklé and Verbeeten, 2014). Examining the Dutch public sector, Speklé and Verbeeten (2014) have pointed out that incentive-oriented performance contracting works best in conditions of high contractability, while a key issue identified in public sector research is the difficulty in defining targets given the multiplicity of goals and principals (Propper and Wilson, 2003). The NPM approaches to performance measurement in the public sector have been criticised and called for allowing more situation-dependent performance management (Speklé and Verbeeten, 2014). Moreover, several case studies have pointed towards the challenges in the implementation of performance measurement systems in the public sector (e.g. Modell, 2003; Arnaboldi and Azzone, 2010). Furthermore, NPM research has primarily relied on institutional theory, examining decoupled approaches to performance measurement in which performance indicators are not directly linked to goals and objectives identified in advance (see Johnsen, 1999); most previous studies have focused on the roles of performance measurement in such situations. Thus far, the relevant literature has not investigated how performance indicators are constructed in such settings (see Modell, 2009).

However, critical accounting research has embraced and explored the constitutive nature of accounting in NPM (e.g. Preston *et al.*, 1992; Chua, 1995; Arnaboldi and Azzone, 2010; Bruno and Lapsley, 2018). Preston *et al.* (1992) have challenged the notion of budgeting and responsibility systems as 'well-defined technologies' in British healthcare and demonstrated the fragile process of their fabrication. Chua (1995) have followed the shifting interests in networks within Australian hospitals that 'experimented' with new accounting systems; Arnaboldi and Azzone (2010) have elaborated on the importance of controversies in translating performance measurement systems into practice. Bruno and

Lapsley (2018) have provided insights into the complex and dynamic process of accrual accounting fabrication in regional government in Italy.

While each of these studies has extended our knowledge on fabrication of accounting in specific public sector settings, little is known about construction of performance indicators in the context of a city, where various stakeholders collaborate and organise beyond their own formal structures. As aforementioned, most studies have referred to a single public organisation instead of a complex network of actors, as is the reality within cities (Lapsley *et al.*, 2010). The literature on public sector accounting has encompassed publications regarding different levels of government (national, state or local), specific government agencies, state-owned enterprises, and major public sector institutions (such as health services or universities) (Lapsley and Miller, 2019), all of which indicate the roles and practices of accounting in the city.

However, the city can be conceptualised as a different object of study within the public sector accounting agenda. Therefore, we wish to contribute to the growing body of accounting literature dedicated to studying cities (Lapsley *et al.*, 2010; Argento *et al.*, 2020; Parisi and Bekier, 2022). Accordingly, we recognise that accounting in general, and performance measurement in particular, can play significant roles in how the city management and operations are organised. Given that modern cities are exploring new approaches to public service delivery, not least in response to increasing levels of competition, resource constraints and marketisation (Argento *et al.*, 2020; Kornberger and Carter, 2010), the focus further turns to the quantification of impacts and outcomes of the city life.

Emergence of the 'accounting for the cities' agenda

For a long time, management accounting literature has remained relatively silent on the issue of cities. In 2010, a special issue of *Accounting, Auditing and Accountability Journal* was published and described as '*the first collection [...] of papers concentrating on city management and accounting*' (Kornberger and Carter, 2010, p. 326). The studies included in this special issue proved the potential for management accounting research to address various aspects of the city, ranging from asset (Arnaboldi and Lapsley, 2010) and strategic managements and competition (Kornberger and Carter, 2010), to representations and 'visions' of the city (Lapsley *et al.*, 2010).

The complexity of accounting for the city is particularly highlighted in the case of an urban project in Rome, described by Czarniawska (2010a). Their study has suggested that following the chain of translations from a political decision to actual events in the city is a difficult, if not an impossible challenge; however, they have also pointed accounting researchers towards the benefits of conceptualising city management as a construction and maintenance of an action net (Czarniawska, 2010a). The multitude of actors and actions involved even in a specific project, makes historical mechanisms of accounting for the city nearly obsolete, where changes and visible results of city initiatives are documented using new communication means such as websites and blogs, instead of formal accounting systems (Czarniawska, 2010a).

Building upon the aforementioned literature, our study investigates the creation of performance indicators in a complex action net of a city. Instead of political decisions and their translation into practice, we observe the vision and objectives of a 'circular city' co-created in a chain of actions together with the parallel process of fabrication of performance indicators. Given that CE is being increasingly observed as a strategy used by cities to improve their overall sustainability (Prendeville *et al.*, 2018) and remain competitive (Kornberger and Carter, 2010), understanding how performance indicators are defined in this context has become particularly relevant. Moreover, this study can provide a greater understanding of how cities, and city initiatives, respond to pressures of measuring and reporting performance on issues that are vague and ill-defined. The next section highlights CE-related concerns in urban planning and city management, which could potentially make accounting for the city even more challenging.

Circular cities and the issue of performance measurement

CE is slowly entering the accounting research domain (see Marrone *et al.*, 2020; Larrinaga and Garcia-Torea, 2022; Parisi and Bekier, 2022), with journals like *Accounting Forum* (Arjaliés *et al.*, 2020) or *Accounting, Auditing and Accountability Journal* (Lapsley *et al.*, 2010) dedicating special issues to the topic. Considering that the concept is hardly novel (cf. Prendeville *et al.*, 2018), many definitions and conceptualisations of CE have emerged throughout the years. Although numerous examples exist in practice, no generally accepted definition exists within academia.

Kirchherr *et al.* (2017) attempted to consolidate existing definitions of CE from academic and practitioner literature, resulting in the development of a broad conceptual foundation for working with CE. They have defined it as '*an economic system that replaces the 'end-of-life' concept with reducing, alternatively reusing, recycling, and recovering materials in production/distribution and consumption processes. [CE] operates at the micro level (products, companies, consumers), meso level (eco-industrial parks) and macro level (city, region, nation and beyond), with the aim to accomplish sustainable development, thus simultaneously creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations.*' (Kirchherr *et al.*, 2017, p. 229).

The concept of CE has been criticised as incomplete and idealistic (Prendeville *et al.*, 2018), providing only a partial agenda with 'unrealistic' and 'unclear' goals (Gregson *et al.*, 2015). It has been described as an 'empty' concept that allows for a multitude of approaches and interpretations to be bundled together under a generic term (Corvellec *et al.*, 2020). CE and its narrative have focused on 'value creation', 'resource efficiency', and 'economic growth', and have been regarded as particularly well-suited for businesses, especially at the 'micro' level of transition (referring to a single company or consumer; Ghisellini *et al.*, 2016) and not for the public sector, especially at the 'meso' and 'macro' levels involving various stakeholders characterised by conflicting interests (referring to eco-industrial systems and cities, regions, and nations; Ghisellini *et al.*, 2016). Considering these limitations and the manifold issues of public governance, city-level implementation of CE has been particularly challenging.

Nevertheless, cities continue to adopt policies and implement initiatives that could support their transition to a 'circular city' to address the sustainability agenda (Prendeville *et al.*, 2018) and increasing competitive pressures (Kornberger and Carter, 2010). Accordingly, cities follow numerous recommendations and guidelines that emphasise various aspects and visions of CE, published by international organisations that have been dominating the global CE discourse (Corvellec *et al.*, 2020). Differences in definitions of CE present a challenge for the development of performance indicators because they need to be adapted to fit the local context and address the needs of different stakeholders (Sobkowiak *et al.*, 2020).

While definitions of CE differ, recent studies have confirmed that changes in production and consumption patterns and infrastructure investments are required for cities to transition towards CE (Prendeville *et al.*, 2018); however, their achievement is dependent on factors such as political leadership, active engagement with the city's stakeholders, development of a long-term adaptable vision, and openness to experimentation (Prendeville *et al.*, 2018).

Implementation and management of CE initiatives also require consideration beyond the spatial and temporal boundaries (Korhonen *et al.*, 2018). As material flows cross organisational and geographical boundaries, the impact of local intervention can be observed on other, distant locations. Similarly, investments in CE initiatives can provide benefits years or decades after the initial decision. Thus, CE implementation must go beyond a single organisation, and, at minimum, be based on inter-organisational cooperation (Korhonen *et al.*, 2018). At the city level, top-down and bottom-up involvement are needed for the transformation, including political and institutionalised actors, social movements, and entrepreneurial activity (Prendeville *et al.*, 2018).

Given these considerations, conventional ways to define performance indicators may be ineffective when the objectives are ill-defined and the initiative transcends organisational boundaries, as is in the case of CE. Consequently, new ways of devising indicators may emerge. Therefore, our study investigates how performance indicators are developed in, and for, a circular city.

Theoretical framework

In this study we explore how cities handle performance measurement of CE. Particularly, we examine how performance indicators are constructed for CE initiatives in cities and how this process relates to other actions required for the development and implementation of such initiatives. This study aims to expand the knowledge on development of CE performance indicators in a city setting, mapping the actions and 'connecting points' (Czarniawska, 2004, p. 783) at which translation takes place, leading to the construction of performance indicators in a complex action net.

Organizing collective action—a lens of an action net

Cities have been recognised as complex settings with messy realities (Stafford *et al.*, 2020) in which a multitude of actors coexist, representing conflicting interests, time

horizons, and visions of urban development (Zapata Campos and Zapata, 2012). Simultaneously, CE initiatives require collaboration and cooperation that transcend organisational boundaries. At the city level, this calls for various organisations and groups to work together in an organised manner to develop, prototype, and realise solutions designed in line with the CE principles (Prendeville *et al.*, 2018).

Cases in which different collective actions are connected and performed in certain patterns for a certain objective can suggest the existence of an *action net*. The concept of action nets has proven useful in studying city management (Czarniawska, 2002), accounting for a city initiative (Czarniawska, 2010a), city organising (Zapata Campos and Zapata, 2012), and public sector accounting (Bruno and Lapsley, 2018). However, it is yet to be mobilised in studying the construction of performance indicators and their relation to other actions in the city context. In this study, we rely on the following definition of an action net:

'Action nets are understood as assemblages of collective actions, connected to one another because they are perceived, within a given institutional order, as requiring each other; or, if new, because they are perceived as effective means of accomplishing a goal that lies outside the present order' (Corvellec and Czarniawska, 2014, p. 89).

Action nets differ from organisations and networks. Organisations refer to legal entities, that is, units with formalised boundaries. Networks describe connections between well-defined points, which do not necessarily need to engage in any joint action. Only the occurrence of actions to be performed, coordinated, and connected to each other signifies an action net (Czarniawska, 2010a). Thus, formal organisations emerge from action nets, comprise several action nets, and are potentially included in several action nets (Lindberg and Czarniawska, 2006). City management is an example of a large action net—a joint action that requires organising *among* organisations, instead of within them (Czarniawska, 2010a, 2010b). Although each city is 'equipped' with a formal organisation in the form of a city administration, nearly any activity performed in the city requires not only the political and productive involvement from the city administration, but also cooperation between the many other organisations that exist within the city including private businesses, NGOs, other public institutions, or voluntary associations).

Using action net to study cities

Following the methodological and analytical approach of action net studies (see Czarniawska, 2002, 2010a; Lindberg and Czarniawska, 2006; Zapata Campos and Zapata, 2012; Dembek, 2020), we study the construction of performance indicators as a process connected to the development of CE solutions in which the vision and objectives of a CE initiative are collaboratively defined. Accordingly, this study examines the following questions: *'What is being done?'* and *'How does this connect to other things that are being done in the same context?'* (Czarniawska, 2004, p. 784). Based on this, we uncover how performance indicators for CE are constructed and connected within a city action net.

Studying action nets requires analytical focus on *actions*. An action can be defined as *'a movement or an event, to which an intention can be attributed by relating the event to the*

social order in which it takes place' (Czarniawska, 2004, p. 782). Accordingly, this study follows the events identified as necessary for development of CE solutions in a city initiative. A study of an action net also requires focus on *knotting*, that is, connecting between various actions, where emphasis is on the *connecting points* at which actors or objects—things or technologies (Lindberg and Czarniawska, 2006)—mediate between the actions. In studying the connecting points, we inherently mobilise the concept of translation (Czarniawska, 2004; Latour, 1987, 2005).

Translation is used to reflect the ways in which actions are brought together and new traceable associations between actants (human or non-human) are produced (Latour, 2005). Consistent with Czarniawska (2010a), we recognise that *'in any city there are a great many translators of events into words, pictures and numbers (...). Some of these translations connect actions, contributing to the process of organizing in the city; some have no effect; and some are clearly detrimental'* (Czarniawska, 2010a, p. 421). Our study focuses on the translations that shape the performance indicators of a circular city initiative, and the translations of performance indicators that shape the actions in the complex action nets they are embedded in.

Our focus on actions and how they are connected also points us to study the mediating power of actants (Latour, 2005), allowing us to recognise that mediators might be present at certain connecting points in an action net (Latour, 2005). Mediators are referred to as actants that *'transform, translate, distort and modify the meaning or the elements they are supposed to carry'* (Latour, 2005, p. 39). Accordingly, we pay particular attention to the actors and objects engaged in the construction of performance indicators, the associations that create these entities, and the traces they produce (Latour, 2005, p. 79).

Following studies on management accounting influenced by sociology of translation, we observe various types of 'boundary objects' that mediate diverse interests within networks (Briers and Chua, 2001). In the complex context of a city initiative, we expect to observe various actants behaving as mediators. In this investigation into the development of performance indicators, which is an innovation that requires numerous meetings, negotiations, and trials, the mediators can be particularly visible before turning to *'invisible, asocial intermediaries'* (Latour, 2005, p. 80). In our study, we share the perspective that mediators are not limited to humans and can extend to non-human actants (Latour, 1987), such as accounting technologies and calculative devices.

Research context

Adopting a case study approach (Stake, 2000), this study follows the emergence of an action net in the city of Milan, examining how performance indicators are constructed and embedded in this setting. Specifically, we observe how performance indicators are constructed across formal organisational boundaries, when organising is based on connected collective actions and the common objective is unclear and ambiguous (an inherent feature of CE initiatives—see Corvellec *et al.*, 2020; Gregson *et al.*, 2015).

Our starting point is a group of Milan city stakeholders participating in a large-scale European Union (EU) project focused on supporting the city's transition to CE. The group

constitutes one of six 'pilot cities' from the EU project, which aims to develop and test innovative solutions over a three-year period to transform the linear flow of materials (the 'take-make-dispose' model) into a more circular one. As a pilot city, Milan focuses on the food system and attempts to create sustainable and long-term solutions for '*the logistics, transportation, transformation, distribution and conservation of food*' (Project Internal Document, 2020). Four organisations from Milan are formally enrolled in the EU project—the municipality office, an academic institution, and two makerspaces (also called Fab Labs, defined as workshops that provide public access to tools and skills). However, the core group extensively collaborates with the external stakeholders, including private sector organisations, NGOs, citizen associations, and public institutions.

Thus, Milan presents an exemplary case of a circular city project in which actors collaborate to achieve top-down (policymaking) and bottom up (social innovation) development to create more circular practices (Prendeville *et al.*, 2018). Within the project, the pilot city of Milan is supported by a network of various organisations, all located in the EU and specialising in various topics including technology, material engineering, governance, and business and process management. Ultimately, we observe many actants rooted in clearly demarcated units (various organisations and groups they are part of) that are required to cooperate in order to fulfil the vision of a circular city. This amount of cooperation requires connections that transgress organisational and professional boundaries and can be studied as an action net (Lindberg and Czarniawska, 2006).

At the onset of the EU project, the pilot city of Milan was provided with nine performance indicators to guide their efforts and ensure accountability to the European Commission. However, during the first two years of the project, the pilot city could adjust these indicators and even formulate their own, in addition to the ones proposed by the formal project contract. While the city has been supported by one of the consulting firms and the academic institution, it had full autonomy in developing the performance indicators. In this study, we observe this process in parallel with actions required to develop the solutions for a circular city, aiming to expand the existing knowledge on performance indicators construction and its relation to the larger action net of the city.

Methodology

Studying action nets requires following the actions and chain of translations between them (see Lindberg and Czarniawska, 2006; Czarniawska, 2010). As '*action nets need [...] to be observed as they are being established and re-established*' (Czarniawska, 2004, p. 782), the data collection took place in a 24-month period between late 2019 and 2021. The timing of data collection was intentional because it corresponded with the timeframe given to the pilot cities in the EU project to develop their performance indicators. In our approach, we remained open to multiple data sources, such as field observations, documents, and semi-structured interviews. This allowed us to obtain varied accounts and study the KPI development process from many angles (Gioia *et al.*, 2012).

Having full access to the project's internal document and meetings, we were able to familiarise ourselves with the inner workings of the different teams and project members based on observations from meetings and documentary analysis. As formal members of the project, we observed formal meetings and informal discussions and accessed project documents, informal notes, comments, and information shared via online communication channels. This flexibility in data collection allowed us to remain alert to new, emerging evidence and pursue avenues important to our research question (Scapens, 2004). For this study specifically, primary data collection involved 132 hours of participant observation in meetings and workshops, and nine interviews, including group interviews (Fontana and Frey, 2000). The details of data collection are presented in Table 1.

Interviews			
Interview type	Date	Interviewees	Duration
Group interview	08/01/2020	Municipality employee 1 Municipality employee 2	1h
Group interview	06/10/2021	Municipality employee 1 Municipality employee 2 Fab Lab member 1 Fab Lab member 2 Fab Lab member 4	1h
Group interview	08/11/2021	Municipality employee 1 Municipality employee 2 Fab Lab member 2 Fab Lab member 3 University employee 1	1,5h
Group interview	08/11/2021	FabLab member 1 Fab Lab member 2 Fab Lab member 3 Fab Lab member 4 NGO member 1 NGO member 2 Municipality employee 1 Municipality employee2	1,5h
Group interview	09/11/2021	NGO member 1 NGO member 2 Municipality employee 1 Fab Lab member 1	1h
Individual interview	23/09/2022	Municipality employee 2	30min
Individual interview	23/09/2022	Fab Lab member 2	35min
Individual interview	27/09/2022	Municipality employee 1	50min

Individual interview	10/11/2022	Fab Lab member 1	30min
Observations			
Meeting type	Period	Number of meetings	Total time
KPI development process design	2019-2020	3	6h
KPI development process	2020-2021	4	5h
ToC development process	2020-2021	4	5h
Milan city team – meetings with project partners	2020-2021	4	6h
Milan city team – meetings with local stakeholders	2021	4	14h
Project workshops and meetings	2019-2022	18	72h
Steering Committee meetings	2019-2021	9	9h
Other meetings	2019-2022	10	15h
TOTAL:			132h

Table Error! No text of specified style in document.-1. Details of data collection. Table by authors.

The observations were primarily carried out at project meetings related to KPI development and development of solutions in the Milan pilot team. The former included the following types of meetings: (1) KPI development process design, in which the teams of experts in the project discussed and agreed upon the indicator construction methodology to be implemented in the participating cities; (2) KPI development process, in which the pilot city team discussed and negotiated their final sets of indicators. The latter observations focused on two types of meetings, namely (1) Theory of Change (ToC) development process, in which the pilot city iteratively described the plans for their interventions and reflected on the performance indicators' fit, and (2) meetings with EU project partners in which solutions were discussed and altered.

As part of the ongoing field engagement, other meetings observed included project workshops, steering committee meetings, and more informal check-ins in which the topics of KPIs and performance measurement were frequently addressed. The recordings of these meetings were transcribed and supplemented with field notes and various documents that were either created or brought into the discussion during this stage. If recordings were not available, that is, when meetings were held in person, extensive field notes were taken.

To supplement the participant observations, individual and group interviews (Fontana and Frey, 2000) with the city team were conducted; one at the beginning of KPI

development, and eight once the process was concluded. The initial interview aimed to understand the city's context, local connections, and vision for circularity. The latter interviews aimed to capture more nuance and clarify some of our observations, allowing us to better understand which actions impact the KPI development from the city teams' perspective. The exploratory group interviews helped us further observe how different tensions and interests played out in the team setting, which is something that could not be observed in the individual interviews (Fontana and Frey, 2000). The interviewees were purposefully selected as key actors involved in the process, to explain the emerging action net and process of constructing performance indicators.

Secondary data sources included formal documents, such as the project proposal, project contract, various reports and project deliverables, and other internal documents, such as meeting notes, report drafts, presentations, e-mails, and other written communication. Additionally, we studied various artefacts created and mobilised in the project in relation to KPI development, such as graphs (e.g. developed and iterated on online whiteboards), spreadsheets, and other forms of visualisation.

All data were coded by both the authors to control for subjective biases that could skew the analysis (Flick, 2018). Two rounds of coding were conducted. The first round included open coding to search for themes emerging from the data, which helped us discover patterns of actions within and around the KPI development process. The second was a directed content analysis (Hsieh and Shannon, 2005) using concepts drawn from action net approach and applied as codes (Czarniawska, 2004; Lindberg and Czarniawska, 2006). During our study, we 'cycled' between emergent data and relevant literature (Gioia *et al.*, 2012), subscribing to the abductive research approach (Alvesson and Kärreman, 2007).

Research results

The following sub-sections present how performance indicators have been constructed by the Milan city team participating in the European CE project. First, we describe how the project team members organised themselves and actions required to arrive at CE solutions. Subsequently, we describe how the construction of performance indicators unfolded, intertwining with the various actions identified as crucial for CE solutions development.

Circular economy in cities requires co-creation

CE is known to be a contested concept (Korhonen *et al.*, 2018; Gregson *et al.*, 2015) that has different meanings for different people (Kirchherr *et al.*, 2017). It is recognised that the development and implementation of CE solutions require collaborative interventions; particularly in cities, this collaboration unfolds across different levels (Prendeville *et al.* 2018). In the EU project observed in this study, the city teams relied on collaboration and knowledge exchange within their own teams, with the EU project consortium partners, and with external actors at the local, national, and international levels.

The approach towards designing CE solutions and their implementation strategies has been described in the project as *'a large-scale co-creation effort, in which municipalities, SMEs, makerspaces and citizens collaborate to bring new value for CE in urban contexts'* (Project deliverable D1.1., 2020, p. 20). Here, co-creation was understood as active involvement of stakeholders with different competencies and interests in re-thinking and re-defining how certain products or services are provided in the city. In other words, it assumed joint and collaborative definition of the changes that were desirable and how they should be implemented. Beyond the collaborative definition of objectives and strategy, the overall co-creation framework defined in the project also assumed stakeholder mobilisation in co-design (engagement in the solution design process) and co-production (engagement in the implementation and delivery of the solution).

In the Milan city team investigated in this study, the understanding of CE and desired changes varied among different actors. For instance, the Municipality representatives largely related CE with its potential for sustainable economic impact, stating the following: *'We look at it from this point of view – that CE could be a foundation to develop new projects and ideas, to develop urban economies'* (Municipality employee 1, Group interview, 08-01-2020). Conversely, makerspace members emphasised the redefinition of material flows, potential waste reduction, and other environmental impacts. In a project exercise, where all team members participated in mapping the envisioned change, CE was related with environmental, social, and economic aspects ranging from *'reduced emissions'* and *'increased recycling rates'* to *'open innovation possibilities'* and *'cohesive communities'* (Project workshop, Observation notes, 1-07-2020).

To accommodate various interests and desired impacts, the first *'common'* vision, presented on different occasions by the project team, was purposefully broad and all-encompassing, simply referring to the development of a *'circular food system rooted in municipal markets'* (Project workshop, Observation notes, 23-09-2020). The intended outcomes and impact changed throughout the project in the Milan city team. To leverage the participation of different stakeholders and ensure a multi-level collaborative process, the team identified key actions required for defining objectives and implementing CE solutions. For the Milan team, it was important to identify actions that would allow reflexivity and flexibility of the objectives, providing *'the capacity to change ideas during the process, to see how the process is going, and to change the goals and ideas during the project'* (Municipality employee 1, Group interview, 08-01-2020).

Organizing co-creation—emergence of an action net

As a result, the co-creation model emerged. The model consisted of a sequence of three key actions that were required to trigger meaningful change; these actions were arranged in what we identified as an ideal action net (Lindberg and Czarniawska, 2006) in which cross-organisational collective action was to be achieved. Each of these three actions was required to develop CE solutions in the Milan city initiative. The actions were coordinated by the Milan city team participating in the European project; however, more actors

performed these actions, inherently becoming co-creators, co-designers, and co-producers of the CE solutions in their city (Czarniawska, 2010a).

The first action was referred to by the Milan city team as 'stakeholder engagement, mapping, and research grounding.' At the beginning of the project, one of the team members explained that this action was crucial to the definition of CE in the local context of food systems and objectives of the project. They stated that, *'[what we do] is an interesting experiment, because we try to translate a general concept of CE into a specific need, a specific activity that we can create in the marketplaces. So, the barrier is really the difficulty to identify the needs correctly, to arrive at the real needs of the citizen'* (Municipality employee 1, Group interview, 08-01-2020).

Therefore, the idea was to map out stakeholders relevant to the urban food system in Milan and engage in extensive dialogue to understand their everyday needs, and to consequently co-create objectives of the project. Another team member reflected on the importance of this action after the project was completed, saying that, *'stakeholder engagement for us was very important, because it was a kind of action research phase. We used it to onboard people and define the typology of stakeholders, but it was also the phase in which we built our objective. So, it has been a strategic phase.'* (Municipality employee 2, Interview, 23-09-2022).

The subsequent action involved arranging co-design 'labs' (workshops) to ensure collaborative and participatory development of specific solutions. Once the problems were identified and objectives were established through 'stakeholder engagement, mapping and research grounding', the action of co-design aimed to translate them into more operational ideas. Accordingly, the two actions were closely 'knotted' together (Lindberg and Czarniawska, 2006), with connections assuming different forms including formal contracts (the EU project contract laid the ground for involvement of specific partners) and informal agreements based on common interest (most stakeholders' involvement was voluntary, with the intention of addressing a common need). Images and inscriptions served as connecting points in translating the results of the stakeholder engagement, mapping, and research grounding into a specific design (Latour, 1990). Specifically, the Milan city team used an online whiteboard tool called 'Miro' to translate the knowledge gained from the first action into a visual map indicating how food flows from and within the wholesale market. With Miro, the resource flows were expressed with different shapes, colours and text, and connections were drawn between various items. This served as a foundation for the co-design workshops:

'For the co-design workshops, we created a tool – we designed a value flow map of how the food chain worked in [the wholesale market] and outside of it. We designed it on Miro, we highlighted everything, and we tried to use the circularity ideas in it as well. [...] And through that tool, we were able to understand the problems, understand where we would act. And that is also something that helped us a lot in solution development, and specifically to deal with technological development. It helped us in translating [the idea] from a value flow into technology.' (Fab Lab member 2, Interview, 23-09-2022)

The possibility of visualisation was a powerful advantage of the online whiteboard and a key reason for its use. Given the multidimensionality of CE (Kirchherr *et al.*, 2017), and need for various tools and processes to operationalise it on a local level, visualisation was deemed helpful in establishing connections. One team member stated that, *'We are trying to have a vision with different layers, and each layer adds to the understanding of what we are doing. In that, we can use different tools to map them – and maybe visualizations like Miro are helping us to better see connections between the different aspects of the project'* (Municipality employee 2, Milan city team – project partners meeting, 02-07-2020).

Without the visualisations on online whiteboards, the solutions developed by the Milan team would have looked different. In that sense, Miro played an important role as a non-human actant (Latour, 2005) that allowed for codification and mapping of knowledge, leading the team to take specific decisions within their action net. Miro, together with other inscriptions, was key in facilitating the actions and establishing durable connections between them as they provided a tangible, material object for the action net (Lindberg and Czarniawska, 2006).

Beyond translating the collective insights into operational ideas, the co-design workshops also helped create a feeling of inclusion and ownership towards the solution among involved stakeholders. This was based on the recognition that such engagement would *'make the stakeholders active participants in the solution'* (Project workshop, Observation notes, 05-02-2020). We observed that the participants to action of co-design acquired the identity of co-designers (Lindberg and Czarniawska, 2006). They became co-designers because they could provide what was required to design the CE solutions for the food system in Milan. The solutions—albeit in different form—would have been developed regardless of the individual actors, and in that sense, the action net would change only slightly (Lindberg and Czarniawska, 2006).

Lastly, the co-design was translated into prototype experiments as *'a way to further validate and iterate the solution'* (Project workshop, Observation notes, 23-09-2020). The prototype workshops were conducted near the very end of the project, aiming to create a working prototype for each solution developed, test it in practice, and make necessary adjustments given the input of stakeholders involved. Similar to the co-design workshops, the visualisations—graphs demonstrating food flows in and around the Milan markets—were a key connecting point for aligning stakeholders on the solution developed. However, the visualisations could not work in isolation to translate the data and knowledge into practice.

Given their skillset and competencies in industrial design, Fab Lab members played an important role in this translation, as they could translate the data collected into a concrete operational solution addressing food waste. One of them stated that, *'there is very little culture about data when you speak with the stakeholders. At least that's our [Fab Lab] experience. Data is not seen as a design instrument, and it's not seen as something that you can use to understand how to improve your circularity. So, the visualization of the material flows gave a bit of that sense in my opinion.'* (Fab Lab member 2, Group interview, 6-10-

2021). Accordingly, the Fab Lab members were key mediators, utilising the visualisations of material flows as a kind of boundary object (Star and Griesemer, 1989) that helped to stabilise the emerging action net (Lindberg and Czarniawska, 2006).

The need for a co-creation of specific solutions and a participatory and collective definition of objectives for a circular food system in Milan resulted in challenges to the definition of the performance indicators. Given the multiplicity of actors involved, their contrasting interests (cf. Arnaboldi and Azzone, 2010), and lack of pre-defined objectives, which could have guided the efforts of city stakeholders (cf. Bevan and Hood, 2006), it was important for us to first identify the action net that led to the development of common objectives in the project. Accordingly, we proceed to describe how performance indicators were constructed in relation to this process.

Indicator development process aligned with co-creation

To provide a rich account and in-depth understanding of how performance indicators were constructed in relation to a broader action net in a circular city initiative, it was important to trace their beginnings. The investigation led us to the project Grant Agreement, which, to a certain extent, guided the activities of the EU project members. The Grant Agreement was first constructed as a written project proposal by participating project members; once it was approved by the European Commission, who funded the project, it became a binding contract. As the project's formal contract, it outlined the key tasks, milestones, and deliverables required for the project's successful conclusion, and as such it served as a foundation for performance indicator development. However, already at the stage of project proposal writing, which lasted around two years before project commencement, the involved actors kept shifting, introducing various interests and understandings into the emerging project contract.

After the process of negotiation, the first 'account' of the project and envisioned city initiatives emerged. Consequently, an inscription was created (Latour, 1990) that codified the different interests in writing and became a reference point for future actions and convincing of others to own interests. The inscription (that is, the Grant Agreement) also provided a preliminary foundation for constructing performance indicators in each of the city initiatives.

More specifically, the Grant Agreement assumed the development of *'a core set of urban-specific circular principles and key performance indicators (KPIs) to be shared across all pilots as well as calibrated to each pilot's local context'* (Project Internal Document, 2019, p. 18), pointing towards a joint interest in measuring performance of the circular city initiatives. However, the Grant Agreement did not prescribe how the development of context-specific indicators should be organised. Ultimately, the performance of Milan and other participating cities was measured and evaluated based on a set of KPIs constructed by each city team on the basis of the 'proposal KPIs,' which were included in the Grant Agreement, and 'co-constructed KPIs,' which have been developed following a separate process.

The proposal KPIs referred to a list of nine performance indicators suggested by the cities and other project members in the project proposal writing stage. Once formalised, the Grant Agreement became thus a powerful actant, driving a specific agenda and impacting actions taken on its basis. Simultaneously, for the city team in Milan, responsible for development of CE solutions on the local scale, these KPIs can be interpreted as objectives pre-defined to guide their efforts towards an overall project strategy (Bevan and Hood, 2006; Otley, 1999). The proposal KPIs for the Milan city are presented in Table II.

Performance indicator	Target
Number of agri-food specific city resources identified (materials, infrastructures, etc.)	150
Number of specific agri-food streams identified	30
Number of governance / business models developed	6
Percentage of food regenerated (current: 20% of complete stream)	25%
Overall stakeholder satisfaction with new models	75%
Number of new applications for food stream developed	6
Willingness to pay for regenerated products and materials	75%
Number of local makers and businesses reached through showcases	250
Number of citizens engaged through educational programmes	500

Table Error! No text of specified style in document.-2. Proposal KPIs for the Milan pilot city. Table by authors.

However, the ideal action net for developing CE solutions in Milan was defined based on a perceived necessity for a multi-level collaborative engagement of various stakeholders in a broader system of co-creation. It rested on the idea that collaborative development of objectives and strategy will reduce, if not eliminate, the issue of CE having multiple meanings (Kirchherr *et al.*, 2017). In this setting, instead of providing direction, the proposal KPIs became contested by Milan city team and considered ill-fitted to how their plans and visions for the circular city were unfolding. The KPIs defined at the project proposal writing stage did not correspond with the actions later identified as essential to the development of solutions for circular food flows in the city. Thus, in situations of low contractibility (Speklé and Verbeeten, 2014), such as circular city initiatives, setting pre-defined performance indicators may be an unavailing effort. As one of the team members reflected, the proposal KPIs could still be mobilised, but not in a meaningful way because the scale of interventions and their objectives were still under development. They stated that: *'If I need to take the indicators that we have drafted in the proposal – for example, 'percentage of food regenerated'. At that moment nothing was clear enough to formulate smart indicators. But alright, if I need to use this indicator, and let's say I choose*

a scale – I choose to make an experiment in Milan with 2kg of bread and I can say honestly that I have the 20% of the bread reused. But it's not interesting, because maybe the KPI fits something but it's not the scope of the project' (Municipality employee 2, KPI calibration workshop, 08-03-2021). Thus, they suggested that in situations in which the objectives are not stabilised, the performance indicators should be iteratively constructed, closely linked to the actions of co-creation, co-design, and prototyping:

'So, my approach would be to look beyond these KPIs to the action plan, to the scenarios, the concepts, our stakeholders, the iterative way we are working on... and at the end maybe we need to reinterpret some of these indicators accordingly to what we are doing. [...] Because what we do as a pilot is more experiments, prototypes – they are not supposed to have an impact in that sense, and on that scale. So, it's a matter of defining an approach, where we try to reframe and replace the indicators from the Grant Agreement with other indicators that consider the issues from the pilot point of view.' (Municipality employee 2, KPI calibration workshop, 08-03-2021).

What followed was a period of performance indicator development. The process was designed by two organisations participating in the EU project and supporting the pilot city teams. Accordingly, the process aimed to fulfil the objective for KPI development set out in the Grant Agreement and pilot team's request for more locally relevant KPIs. The approach intended to draw on performance indicators, which exist in global CE frameworks (see OECD, 2021), and translate them into a contextually relevant and applicable set of indicators using a series of workshops and a survey circulated among city stakeholders. The KPIs were also discussed by the pilot city team and mobilised in discussions with their stakeholders at different points in the co-creation of solutions. Ultimately, the goal of this two-year process was to develop indicators that *'fit best cities' action plans and their priorities'* (Consultant 1, KPI strategy meeting, 03-02-2020). The process prescribed specific phases, such as 'longlisting', 'shortlisting', and 'calibrating', to support the cities in establishing their own performance indicators.

Co-construction of performance indicators in a circular city initiative

The first step in the development of performance indicators was identifying the 'impact areas', which the cities participating in the EU project considered to be a priority in the transition to a circular city. In late 2019, in a project workshop, Milan and other city teams agreed upon 12 impact areas common to all cities, ranging from *'materials and resources'* and *'air quality'* to *'community participation'* and *'behaviour and lifestyles'* (Project workshop, Observation notes, 21-11-2019). These categories represented the initial considerations of the impacts the cities can achieve. The categories were kept broad to accommodate cities like Milan, who were just embarking on the co-creation efforts.

The definition of potential impact areas was an important exercise in which the Milan team could communicate the intermediate results of their stakeholder engagement, mapping, and research grounding, while simultaneously reflecting on and articulating their own visions of a circular city and feeding them back into the co-creation of circular solutions in Milan. Therefore, the action of defining impact areas was connected to co-

creation, whereby knowledge was translated into the definition of impact, and the jointly defined impact areas were further translated into potential solutions. Meanwhile, the two organisations coordinating the KPI development process drew on this exercise while researching the indicators in international frameworks that could fall under these impact areas.

The 'longlisting' process was conducted by the two organisations coordinating the KPI development process. Both of them relied on the following three key sources of available performance indicators for CE in cities: (1) EU directives, (2) global indicator databases defined by international organisations, and (3) literature review of academic papers. Ultimately, the longlist of performance indicators consisted of 125 indicators, categorised under the 12 previously defined impact areas.

For Milan, the coordinating organisations highlighted 62 performance indicators, which had the highest potential relevance to solutions regarding circular food systems. The action of selecting indicators from various sources was not directly connected to the co-creation of CE solutions in Milan. However, we observed that the output of this action—an Excel spreadsheet that has been colour-coded for various impact areas and had dedicated tabs for each of the cities participating in the European project—emerged as a powerful actant. It shaped further discussions and convinced others towards certain courses of action. The longlist was also acted upon, with the Milan city team and organisations coordinating the KPI development process by adding new or modifying its existing elements.

In the next step, the 'shortlisting' of KPIs, the city teams were asked to review the longlist and select indicators most relevant to their context. The 'shortlisting' was to be completed when Milan city was engaging with the stakeholders and conducting mapping and research. Although the city team members participated in the workshop to envision potential impact areas for circular cities and provided inputs, the shortlisting of KPIs according to the different impact areas proved to be a difficult task. One team member said that, *'we cannot define the relevance of different impact areas at this point, since they [impacts] depend on the activities and solutions we choose, and we are not there yet'* (Academic researcher 1, KPI shortlisting workshop, 26-02-2020).

The team members became more comfortable with making a preliminary shortlist only when they were reassured that the shortlisting exercise did not imply a final selection, that is, the indicators could be further developed, adjusted, or even removed from Milan's KPI list. However, the selection was based on a broad understanding of the Milan city's vision for food circularity. Lacking a clear set of solutions and objectives, the team members made the following suggestions based on their own preferences: *'regarding 'Air Quality' impact area, it's relevant if we'll have a solution, for example, about food delivery and a group of vendors that can work together towards that. Personally, looking through the list, I think 'Behaviour and Lifestyle' and 'Health and Well-being' could be interesting in relation to agri-food local chains, considering the healthy food and direct impacts of eating healthy food. [...] More from the municipality point of view, "Governance and Policy" areas*

would be interesting for us. But maybe we need to speak about this in the next weeks within our team [...]’ (Municipality employee 1, KPI shortlisting workshop, 26-02-2020). In the end, 10 additional indicators were selected (see Table III).

Performance indicator	Target
Circular food use rate	-
Food waste index	-
Material import dependency	-
Increased consciousness of citizenship	-
Number of stakeholders involved in activities	-
Number of people reached	-
Citizens’ awareness regarding urban nature and ecosystem services	-
Extent to which the project serves to promote a healthy lifestyle among local residents	-
Policy learning concerning adapting policies and strategic plans	-
Quality and frequency of dialogue between and among domestic and external stakeholders	-

Table Error! No text of specified style in document.-3. A shortlist of additional KPIs selected by the Milan pilot city team. Table by authors.

These indicators were taken verbatim from the sources that the two coordinating organisations relied on when creating the KPI longlist for the project. These sources—the EU directives, global indicator databases, and academic literature—not only participated in the action of constructing performance indicators, but also played a powerful role in shaping them when local objectives were still under development. Thus, the indicator lists from organisational and academic sources affected the Milan city team’s action of constructing performance indicators, presenting themselves as important non-human actants instead of mere objects (Latour, 2005). The organisations selecting the sources (who here ‘speak in one voice’, although their individual members likely have their own claims) also had a vast influence on the final form of indicators, delimiting the boundaries of the longlist.

The next step in developing performance indicators was ‘calibration’. Here, the city team was asked to adapt the indicators selected by them into the context of their activities. The calibration of indicators also included the definition of units of measurement, scale of measurement, monitoring rates, and targets for each of the indicators. During the first ‘calibration workshop’, which took place the same time as the co-creation action in Milan, the city team adapted the shortlisted indicators. The additional knowledge gathered at this point using stakeholder engagement, mapping, and research, was translated into the new version of indicators. Various options were considered and debated—for instance,

when an additional KPI was suggested to track the *'Number of customers of products derived from local supply chains'*:

Municipality employee 2: *In my view, we would need to reframe that KPI. It is interesting if we imagine building something related to short supply chains for food products, but we are not so sure about the possibility of doing this kind of activity. Although, one of the scenarios we are imagining is related to the possibility of introducing new products to the municipal markets. Based on our research, it is very clear that these kinds of products are not available now and the supply chains are very long. So it is one of our points of interest, and we could use this KPI but only if one of the scenarios that we are imagining will happen in a reasonable time.*

Project manager: *But isn't it easier to monitor the number of farmers, local farmers from peri-urban areas, because it's easier to detect the number of suppliers rather than number of customers?*

Municipality employee 2: *Yes, it would be easier... but it's the same: this could only be measured if this scenario happens, because at the moment it's just one possible line of work for us.*

Fab Lab member 2: *Just a comment here – we can suggest solutions that imply that the owners or sellers should change their supply chain, but our suggestion might not be effective. We have more leverage on other things, rather than on the products they choose... it was a gut feeling during our research that the market owners were less open to that. So I like the suggestion to track the partners involved in co-creation workshops more than this KPI. (Observation transcript, KPI calibration workshop, 02-09-2020)*

Given the lack of clear objectives and uncertainty regarding which scenarios will be pursued, the adjustments in performance indicators were closely linked to the co-creation, co-design, and co-production actions identified as the ideal action net. On one hand, the indicators intended to measure the process of creating CE solutions were modified to reflect the three actions identified—for instance, *'Number of stakeholders involved in activities'* became *'Number of stakeholders engaged in co-creation, co-design, and prototyping activities'* (KPI calibration workshop, Observation notes, 17-04-2020). On the other hand, the output indicators were adjusted to reflect the most current focus and activities of the initiative—for instance, *'Citizens' awareness regarding urban nature and ecosystem services'* became *'Citizens' awareness regarding peri-urban farming and agri-food local chain'* (KPI calibration workshop, Observation notes, 17-04-2020).

One of the Fab Lab members explained that: *'I would say that from the stakeholder engagement, from the plain initial interviews to the deep co-design process, where we sat down with them, and we highlighted all the points where there were problems throughout the value chain... I don't know if you remember our very complicated scheme – that made us understand much better how we could deal with the KPIs. And it was a back and forth in fixing them along the way.'* (Fab Lab member 2, Interview, 23-09-2022).

When the co-design action was locally implemented with the relevant stakeholders, the envisioned impact and understanding of underlying conditions for the food system's transition to CE also changed. The desired impact was later expressed as *'Key players of the urban food systems have access to a new way of operating within the value chain, based on materials and processes tracking as a condition for the transition to CE'* (Project meeting, Observation notes, 6-12-2021).

The requirements for transition to a circular food system in Milan were then largely understood in terms of technological advancements and abilities to track material flows and collect and analyse large portions of data. The prototypes to be developed were based on this vision and included a tracking device for fresh fruits and vegetables delivered and sold in municipal markets, a tracking and communication device for food waste in the wholesale market, and a transaction platform for food waste to be exchanged as a potential resource for alternative uses. Based on the new clarity in the vision of a circular food system and objectives for the project, the performance indicators were accordingly adjusted. As the actions progressed, the indicators were 'calibrated' by the Milan city team four more times. The final set of performance indicators for the Milan city team is presented in Table IV.

Performance indicator	Target
Number of agri-food specific city actors and resources identified	150
Number of agri-food specific city resources identified with partners	30
Number of business models/applications developed	3
Overall stakeholder satisfaction with new technological solutions for better implementation of circular business models and practices	75%
Willingness to pay for regenerated products and materials	75%
Number of citizens reached through events/awareness campaign	250
Circular material use rate	+5% increase
Food waste index	~10% increase in agri-food saved and donated
Circular intervention on specific agri-food flows	~10% increase in agri-food tracked and traced
Number of policy makers involved in adapting policies and strategic plans and participating to workshops/dissemination activities	15

Table Error! No text of specified style in document.-4. Final list of KPIs for the Milan pilot city. Table by authors.

The final set of performance indicators reflected the ‘proposal KPIs’ and ‘co-constructed KPIs’, both of which were modified in the process of calibration to better fit the emerging vision of a circular food system in Milan. The calibration of performance indicators was deemed necessary to respond to emerging outcomes of the co-creation, co-design, and co-production actions. A Milan city team member reflected that, *‘if you don’t know the solution you are working on, it is impossible to define the KPIs. So if you have a co-creation process in the pipeline to define solutions to work on, it doesn’t make sense to define KPIs beforehand’* (University employee 1, Group interview, 08-11-2021). Thus, the action net required to develop CE solutions for the food system in Milan had a vast impact on the construction of performance indicators.

However, the development of performance indicators also impacted the development of CE solutions, which is highlighted in the following statement: *‘In a way, the process of creating KPIs forced us to be more precise and identify better the solutions. There was a kind of cooperation between the KPIs and the rest of the path. Because it happens that sometimes you start with the co-creation, then you go deeper with the co-design, but by the end it is not so clear what the solution should do. [...] So the KPIs helped us to design the last step of our workflows’* (Municipality employee 2, Interview, 23-09-2022).

We observed that process was often challenged, that is, the usefulness of constructing the indicators while the overall vision of circular solutions in Milan was still unclear was questioned on numerous occasions. The team members expressed their dissatisfaction and pointed out the lack of clarity and relevance of the process at the time when it was underway. However, as seen in the aforementioned quote and information gathered from other team members’ reflections, the iterative process of creating performance indicators was in fact closely connected with the local action net, which was recognised by the project team members *post-factum*.

Reflecting on the iterative process and its relation to solution development, one project member said that: *‘I think it stays in the name – the circularity of it. Everything is connected to one another and it’s impossible that one thing wouldn’t affect the other one. If something changes at the beginning, then you must adjust it in the middle to get it right at the end. So it continues, from that point of view.’* (Fab Lab member 2, Interview, 23-09-2022). In the case of Milan, the vision of CE and solutions related thereto were developed through co-creative processes, in which an important role was played by the iterative creation of performance indicators.

Discussion

This study contributes to the literature on accounting for a city (Lapsley *et al.*, 2010; Argento *et al.*, 2020; Parisi and Bekier, 2022) by providing a greater understanding of how cities and city initiatives respond to the pressures of measuring and reporting performance on issues that are vague and ill-defined. Knowing that cities are characterised by ‘messy realities’ (Stafford *et al.*, 2020), where a variety of actors with conflicting interests and visions coexist (Zapata Campos and Zapata, 2012), this study first elaborated on how city initiatives organise themselves across functional boundaries

to develop CE solutions. Understanding the organising of a circular food system initiative in Milan, which was closely related to the development of a common vision and objectives, helped us illuminate the processes of performance indicator construction related thereto. The empirical case confirmed the need for broad, multi-level stakeholder engagement and flexibility and innovation in operationalising CE in cities (Prendeville *et al.*, 2018). Adopting the lens of an action net (Czarniawska, 2004; 2010b) helped us identify the interconnected actions of co-creation, co-design, and co-production, all of which are required for the development of CE solutions at a local level.

The ideal action net (Lindberg and Czarniawska, 2006) in the Milan initiative assumed broad stakeholder mobilisation in the three actions to ensure a collaborative definition of objectives and strategy. This subsequently resulted in the initiative achieving relevant and meaningful outcomes. In fact, the definition of the ideal action net preceded the development of a common vision of CE and specific objectives of the project, which became closely intertwined as the initiative in Milan progressed. The actions embedded in the net were coordinated by the Milan city team (participants to a large European CE project), who, although consisting of the municipality, Fab Lab and university representatives, often spoke in one voice, presenting itself as a macro-actor (Czarniawska, 2010b).

An analysis of how the Milan city team assembled and emerged in the European project as an actor-network is outside the scope of this study. It would be much more suited for an in-depth study adopting an ANT lens (Czarniawska, 2010b). Instead, we focused on the co-constitutive processes of organising, visioning, and constructing performance indicators, for which the lens of an action net was deemed more appropriate.

The three actions identified: co-creation, co-design, and co-production, were translated into one another with the help of various actants and mediators operating at the connecting points (Czarniawska, 2004; 2010b; Latour, 2005). Non-human actants played particularly important roles, influencing how the actions developed (Latour, 2005). For instance, the online whiteboard tool 'Miro' allowed for a specific type of visualisation of value flows, which determined how solutions were designed; the Grant Agreement provided boundaries for action and translated various interests of the project members into local action in Milan. Furthermore, the study demonstrated that the ideal action net did not unfold in isolation, but was instead influenced by various connected actions. In the case of Milan, the development of performance indicators and related activities (organised in the three phases of *longlisting*, *shortlisting*, and *calibrating*) constituted an action that was closely knotted with a larger action net of developing CE solutions at the local level.

Within the traditional management accounting literature, performance management and measurement systems have key operational and incentive purposes (Speklé and Verbeeten, 2014); they are part of the management control systems designed to ensure accountability among organisational actors in reaching certain performance targets (Merchant and Otley, 2006). There seems to exist a general agreement that '*good*

measures must reflect progress toward achievement of the organisation's objectives' (Merchant and Otley, 2006, p. 792).

In the public sector, particularly after the NPM reforms (Hood, 1995), performance was predominantly understood as a contract guiding civil servants' efforts towards the pre-defined objectives (Bevan and Hood, 2006). However, to serve its incentive- and control-oriented functions, performance measurement requires conditions of high contractibility (Speklé and Verbeeten, 2014). These conditions include the following: (1) organisational goals need to be unambiguous and specified in advance, (2) organisations should be able to identify or construct performance indicators that are aligned with the pre-defined objectives, and (3) the actors within the organisation should know and control the production function that translates efforts into results. However, as demonstrated in the case of Milan, in some situations where goals are ill-defined and objectives are debated; where multiple actors have to collaborate in a dispersed setting; and where specialised technical knowledge is required to understand and predict how efforts translate into results, the definition of what constitutes a 'good' performance and how relevant indicators should be selected or developed, becomes challenging. Thus, in this study, performance indicators were constructed in a long, iterative, collaborative process, influenced by the ongoing organising of solution development and related definition of the vision and objectives. Within this process, various actants—both human and non-human—played key roles, modifying and distorting the performance indicators (Latour, 2005).

For instance, the organisations selecting the sources for the longlist and coordinating the process had a vast influence on the final form of the indicators in Milan. They helped establish the boundaries of the longlist and the process, consistent with their own interests. Similarly, the sources from which the longlist was selected had a powerful influence in shaping the indicators by providing a plethora of possible directions for the project when local objectives were still under development.

In a situation where goals and objectives for a 'circular city' were under development simultaneously with the performance indicators, it became instrumental for these processes to connect and be translated into each other. This ultimately impacted the construction of the final set of performance indicators. The close knotting (Czarniawska, 2004; Lindberg and Czarniawska, 2006) of performance indicator construction with the broader action net reflected the co-constitutive nature of the two processes. As illustrated using the case of Milan, the outcomes of each step in the action net influence the construction of performance indicators, while the construction of performance indicators impacts the way solutions are ideated and operationalised.

Given the co-constitutive nature of solution development, visioning, and performance indicator development, it also became apparent that how performance is measured for a 'circular city' initiative in Milan is neither based on predefined organisational objectives and goals, nor on an understanding of the production function (Speklé and Verbeeten, 2014). Instead, 'good' performance came to be understood based on translations of

various actions into the final set of performance indicators. This could have broader implications for the role of performance measurement in cities and circular transition projects because the possibility for benchmarking and using performance indicators as means of control diminishes in such settings. While some studies have pointed towards issues with top-down implementation of performance indicators based on global frameworks (Sobkowiak *et al.*, 2020), this study demonstrates that the reverse situation may also become problematic if performance indicators are used for operational or control purposes.

The literature on performance measurement in the public sector has examined situations in which performance indicators were not reflective of organisational goals largely through institutional theory and concepts of decoupling or loose coupling (cf. Modell, 2009). However, these studies have primarily focused on the roles of performance measurement in such situations, pointing towards their symbolic or ritualistic use (Agostino and Arnaboldi, 2017; Dobija *et al.*, 2019). This study draws on concepts from organisation studies and sociology of translation in order to closely examine the dynamics of the construction of specific performance indicators in the city context. Accordingly, it contributes to the body of research on accounting for the city and public sector performance management by enhancing the understanding of how performance measurement is fabricated before it becomes a 'black box' (Latour, 1987).

Conclusion

The concept of circular economy is being increasingly adopted by cities as a strategy to improve sustainability performance (Prendeville *et al.* 2018) and competitiveness (Kornberger and Carter, 2010). Its monitoring and reporting are encouraged by a host of governmental organisations and regulatory bodies (see COM, 2020; OECD, 2020). However, given the ambiguity of the concept (Kircherr *et al.*, 2017) and 'messy realities' of a city (Stafford *et al.*, 2020), cities face challenges in defining the specific performance indicators for CE initiatives. This study argues that 'circular city' initiatives present an extreme case of low contractibility (Speklé and Verbeeten, 2014), where goals and objectives are ill-defined, and actors are unable to predict the likely outcomes of various alternative courses of action. Therefore, this study contributes to the accounting literature focusing on cities (Lapsley *et al.*, 2010; Argento *et al.*, 2020) by enriching the extant understanding of how city initiatives construct performance indicators in situations of low contractibility.

This study adopts the perspective of an action net (Czarniawska, 2004; 2010b) and mobilises concepts from sociology of translation (Latour, 2005) to illuminate how the development of CE vision and specific solutions is organised in the city and how the performance indicators are constructed in relation thereto. By adopting this theoretical lens, we study the co-constitutive relationship between the two processes, uncovering the connecting points through which they are knotted together (Lindberg and Czarniawska, 2006).

This empirical study on a CE initiative in Milan has provided three main conclusions. First, the findings confirm that the operationalisation of CE within cities requires broad, multi-level stakeholder engagement and openness towards innovation and flexibility in solution development (Prendeville *et al.*, 2018). As CE remains an ambiguous and vague concept (Kircherr *et al.*, 2017; Korhonen *et al.*, 2018), its objectives are challenging to define on a local scale and the production function is not fully understood, which results in a case of low contractibility (Speklé and Verbeeten, 2014).

Second, the findings demonstrate that in cases of low contractibility, which circular city initiatives are an extreme case of, the development of CE solutions requires interconnected actions that span across organisational boundaries. In the investigated case, the three key actions of co-creation, co-design, and co-production, were identified to constitute an ideal action net (Lindberg and Czarniawska, 2006) for development of CE solutions in the city of Milan. Moreover, these three actions were closely connected and translated into one another with help from human and non-human actants and mediators (Latour, 2005).

Lastly, the findings reveal that as the action net unfolds, it becomes closely knotted with the development of performance indicators. This circumstance impacts the development of the CE vision and related solutions. Thus, in the absence of a clear vision and established objectives, the processes of their development and performance indicator development are co-constitutive of each other.

Given the co-constitutive nature of CE solution development, vision, and performance indicator development, the findings indicate that the performance of the CE initiative in Milan came to be understood based on the translations of various actions into a single set of performance indicators. As governmental organisations and regulatory bodies are increasingly encouraging cities and regions to monitor and report their CE performance (see COM, 2020; OECD, 2020), not least for control and benchmarking purposes, these findings challenge such ambitions. While extant research has demonstrated that top-down implementation of performance indicators may not bring the desired forms of calculability on local levels (Sobkowiak *et al.*, 2020), this study demonstrates that the bottom-up approaches to performance indicator development may not serve the purpose desired by the governmental and international organisations.

However, this study allows us to speculate that performance management for 'circular city' initiatives does not serve as means of control, but could take on more symbolic, ritualistic roles (see Agostino and Arnaboldi, 2017; Dobija *et al.*, 2019) or be put to exploratory use (Speklé and Verbeeten, 2014).

Accordingly, the results suggest avenues for further research into roles of performance measurement practice in 'circular cities', especially those created based on self-organised, bottom-up approaches (cf. Sobkowiak *et al.* 2020). It is important to understand that such construction of performance indicators can be '*a means of conversation, rather than a means of control, and an expression of values, rather than an instrument for action*' (Czarniawska-Joerges and Jacobsson, 1989 in: Dobija *et al.* 2019).

As more cities turn to more sustainable approaches for city management and operations, not least within CE, further research could explore how and to what ends various technologies of management and control can be used in such settings.

References

- Agostino, D. and Arnaboldi, M. (2017). "Rational and ritualistic use of key performance indicators in hybrid organizations", *Public Money and Management*, Vol. 37, No. 6, pp. 409-416.
- Alvesson, M. and Kärreman, D. (2007). "Constructing mystery: empirical matters in theory development", *Academy of Management Review*, Vol. 32, No. 4, pp. 1265-1281.
- Argento, D., Grossi, G., Jääskeläinen, A., Servalli, S. and Suomala, P. (2020). "Governmentality and performance for the smart city", *Accounting, Auditing & Accountability Journal*, Vol. 33 No. 1, pp. 204-232.
- Arjaliés D. L., Rodrigue, M. and Romi, A. (2020). *Special Issue of Accounting Forum: "Accounting for the Circular Economy"*, *Accounting Forum*, Vol. 44, No. 3, pp. 311-313.
- Arnaboldi, M. and Azzone, G. (2010). "Constructing performance measurement in the public sector", *Critical Perspectives on Accounting*, Vol. 21, pp. 266-282.
- Arnaboldi, M. and Lapsley, I. (2010). "Asset management in cities: polyphony in action?", *Accounting, Auditing & Accountability Journal*, Vol. 23, No. 3, pp. 392-419.
- Arnaboldi, M., Lapsley, I. and Steccolini, I. (2015). "Performance management in the public sector: the ultimate challenge", *Financial Accountability & Management*, Vol. 31, No. 1, pp. 1-22.
- Bevan, G. and Hood, C. (2006). "What's measured is what matters: targets and gaming in the English public health care system", *Public administration*, Vol. 84, No. 3, pp. 517-538.
- Briers, M. and Chua, W. F. (2001). "The role of actor-networks and boundary objects in management accounting change: a field study of an implementation of activity-based costing", *Accounting, Organizations and Society*, Vol. 26, pp. 237-269.
- Bruno, A. and Lapsley, I. (2018). "The emergence of an accounting practice. The fabrication of a government accrual accounting system", *Accounting, Auditing & Accountability Journal*, Vol. 31, No. 4, pp. 1045-1066.
- Burdett R., Philipp, R. (2018). *Shaping Cities in an Urban Age*. Phaidon, UK.
- Chua, W. F. (1995). "Experts, networks and inscriptions in the fabrication of accounting images: a story of the representation of three public hospitals", *Accounting, Organizations and Society*, Vol. 20, No. 2/3, pp. 111-145.
- COM (European Commission), (2020). *A New Circular Economy Action Plan. For a Cleaner and More Competitive Europe*. Brussels.
- Corvellec, H., Böhm, S., Stowell, A. and Valenzuela, F. (2020). "Introduction to the special issue on the contested realities of the circular economy", *Culture and Organization*, Vol. 26, No. 2, pp. 97-102.

- Corvellec, H. and Czarniawska, B. (2014). "Waste Prevention Action Nets", Ekström, K. M. (Ed.) *Waste Management and Sustainable Consumption: Reflections on Customer Waste*, Routledge, London, pp. 88–101.
- Czarniawska, B. (2002). *A Tale of Three Cities, or the Glocalization of City Management*, Oxford University Press, Oxford, UK.
- Czarniawska, B. (2004). "On time, space and action nets", *Organization*, Vol. 11 No. 6, pp. 777-95.
- Czarniawska, B. (2010a). "Translation impossible? Accounting for a city project", *Accounting, Auditing & Accountability Journal*, Vol. 23, No. 3, pp. 420–437.
- Czarniawska, B. (2010b). "Going Back to Go Forward: On Studying Organizing in Action Nets", Hernes, T. and Maitlis, S. (Ed.s) *Process, Sensemaking, and Organizing*. Oxford University Press, Oxford, pp. 140-160.
- Dembek, A. (2020). "Knitting an action net to reduce plastic waste: reusable takeout food containers in New York City", *Culture and Organization*, Vol. 26, No. 2, pp. 159-174.
- Dobija, D., Górska, A.M., Grossi, G. and Strzelczyk, W. (2019). "Rational and symbolic uses of performance measurement: Experiences from Polish universities", *Accounting, Auditing & Accountability Journal*, Vol. 32 No. 3, pp. 750-781.
- Flick, U. (2018). *An introduction to qualitative research*. Sage, London.
- Fontana, A. and Frey, J. H. (2000). "The interview. From structured questions to negotiated text", Denzin, N. and Lincoln, Y. (Ed.s) *Handbook of Qualitative Research, 2nd Edition*. Sage, Thousand Oaks, pp. 645-672.
- Ghisellini, P., Cialani, C. and Ulgiati, S. (2016). "A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems", *Journal of Cleaner Production*, Vol. 114, pp. 11-32.
- Gioia, D., Corley, K. and Hamilton, A. (2012). "Seeking qualitative rigor in inductive research: notes on the Gioia methodology", *Organizational Research Methods*, Vol. 16, No. 1, pp. 15-31.
- Gregson, N., Crang, M., Fuller, S. and Holmes, H. (2015). "Interrogating the circular economy: the moral economy of resource recovery in the EU", *Economy and Society*, Vol. 44, No. 2, pp. 218–243.
- Hood, C. (1995). "The 'new public management' in the 1980s: variations on a theme", *Accounting, Organizations and Society*, Vol. 20 No. 2-3, pp. 93-109.
- Hsieh, H. F. and Shannon, S. E. (2005). "Three approaches to qualitative content analysis", *Qualitative Health Research*, Vol. 15, No.9, pp. 1277-1288.
- Johnsen, Å. (1999). "Implementation mode and local government performance measurement: a Norwegian experience", *Financial Accountability & Management*, Vol. 15, pp. 41-66.

- Kirchherr, J., Reike, D. and Hekkert, M. (2017). "Conceptualizing the circular economy: an analysis of 114 definitions", *Resources, Conservation and Recycling*, Vol. 127, pp. 221-232.
- Korhonen, J., Honkasalo, A., and Seppälä, J. (2018). "Circular economy: the concept and its limitations", *Ecological Economics*, Vol. 143, pp. 37-46.
- Kornberger, M. and Carter, C. (2010). "Manufacturing competition: how accounting practices shape strategy making in cities", *Accounting, Auditing & Accountability Journal*, Vol. 23, No. 3, pp. 325-349.
- Lapsley, I. (2009). "New Public Management: the cruelest invention of the human spirit?", *Abacus*, Vol. 45, No. 1, pp. 1-21.
- Lapsley, I. and Miller, P. (2019). "Transforming the public sector: 1998-2018", *Accounting, Auditing & Accountability Journal*, Vol. 32, No. 8, pp. 2211-2252.
- Lapsley, I., Miller, P. and Panozzo, F. (2010). "Accounting for the city", *Accounting, Auditing & Accountability Journal*, Vol. 23, No. 3, pp. 305-324.
- Larrinaga, C. and Garcia-Torea, N. (2022). "An ecological critique of accounting: The circular economy and COVID-19", *Critical Perspectives on Accounting*, Vol. 82, pp. 1-10.
- Latour, B. (1987). *Science in action: How to follow scientists and engineers through society*. Harvard University Press, Cambridge, MA.
- Latour, B. (1990). "Drawing things together", Lynch, M. and Woolgar, S. (Ed.s.), *Representation in Scientific Practice*. MIT Press, Cambridge, MA, pp. 19-68.
- Latour, B. (2005). *Reassembling the Social. An Introduction to Actor-Network Theory*. Oxford University Press, Oxford, UK.
- Lindberg, K. and Czarniawska, B. (2006). "Knotting the action net, or organizing between organizations", *Scandinavian Journal of Management*, Vol. 22, No. 4, pp. 292-306.
- Marrone, M., Linnenluecke, M. K., Richardson, G. and Smith, T. (2020). "Trends in environmental accounting research within and outside of the accounting discipline", *Accounting, Auditing & Accountability Journal*, Vol. 33, No. 8, pp. 2167-2193.
- Merchant, K. and Otley, D. (2006). "A review of the literature on control and accountability", Chapman, C., Hopwood, A. and Shields, M. (Ed.s.) *Handbook of Management Accounting Research*, Vol. 2, pp. 785-802, Elsevier.
- Modell, S. (2003). "Goals versus institutions: the development of performance measurement in the Swedish university sector", *Management Accounting Research*, Vol. 14, No. 4, pp. 333-359.
- Modell, S. (2009). "Institutional research on performance measurement and management in the public sector accounting literature: a review and assessment", *Financial Accountability & Management*, Vol. 25, No. 3, pp. 277-303.

OECD (2020). *The Circular Economy in Cities and Regions. Synthesis Report*. OECD, Paris.

OECD (2021). *The OECD Inventory of Circular Economy Indicators*. OECD, Paris.

Otley, D. (1999). "Performance management: a framework for management control systems research", *Management Accounting Research*, Vol. 10, pp. 363-382.

Parisi, C. and Bekier, J. (2022). "Assessing and managing the impact of COVID-19: a study of six European cities participating in circular economy project", *Accounting, Auditing and Accountability Journal*, Vol. 35, No. 1, pp. 97-107.

Prendeville, S., Cherim, E. and Bocken, N. (2018). "Circular cities: mapping six cities in transition", *Environmental Innovation and Societal Transitions*, Vol. 26, pp. 171-194.

Preston, A., Cooper, D. and Coombs, R. (1992). "Fabricating budgets: a study of the production of management budgeting in the National Health Service", *Accounting, Organizations and Society*, Vol. 17, No. 6, pp. 561-593.

Propper, C. and Wilson, D. (2003). "The use and usefulness of performance measures in the public sector", *Oxford Review of Economic Policy*, Vol. 19, No. 2, pp. 250-267.

Scapens, R. W. (2004). "Doing case study research", Humphrey, C. and Lee, B. (Ed.s.) *The Real Life Guide To Accounting Research*. Elsevier, Oxford, pp. 257-279.

Sobkowiak, M., T. Cuckston and Thomson, I. (2020). "Framing sustainable development challenges: accounting for SDG-15 in the UK", *Accounting, Auditing & Accountability Journal*, Vol. 33, No. 7, pp. 1671-1703.

Speklé, R. and Verbeeten, F. (2014). "The use of performance measurement systems in the public sector: effects on performance", *Management Accounting Research*, Vol. 25 No. 2, pp. 131-146.

Stafford, A., Stapleton, P., Wei, H. and Williams, K. (2020). "The imaginary of the city versus messy realities", *Financial Accountability & Management*, pp. 1-17.

Stake, R. E. (2000). "Case studies", Denzin, N. and Lincoln, Y. (Ed.s.) *Handbook of Qualitative Research, 2nd Edition*. Sage, Thousand Oaks, CA, pp. 435-454.

Star, S. L. and Griesemer, J. (1989). "Institutional Ecology, 'Translations', and Boundary Objects: Amateurs and Professionals on Berkeley's Museum of Vertebrate Zoology", *Social Studies of Science*, Vol. 19, pp. 387-420.

UNCTAD (2021). "E-handbook of statistics 2021", available at:

<https://hbs.unctad.org/total-and-urban-population/> (accessed 1 July 2022).

Zapata Campos, M. J. and Zapata, P. (2012) "Changing La Chureca: organizing city resilience through action nets", *Journal of Change Management*, Vol. 12, No. 3, pp. 323-337.