Guest editorial

The value, risks and myths of public sector data analytics.

Technological advancements, especially in the past decade, have transformed how business, social and governmental activities are undertaken. The field of data analytics has taken off during this period, with it gaining popularity and attracting much interest from both practitioners and researchers. Despite receiving much attention across public and commercial domains, the academic focus on data analytics has largely been dominated by research into the business, rather than on public values which can be extracted through it. Recent events such, data-driven elections, data in political campaigns and electorate profiling have all highlighted both the potential, yet many unanswered questions of public sector data analytics. Amidst other factors, the Covid-19 pandemic has also drawn attention to the pivotal role of data analytics, data dissemination, and data sharing between public and private sector organisations and agencies for timely, adequate and comprehensive responses to the pandemic situation. During such unprecedented and disruptive times, where lines are continuously being blurred across sectors, policymakers require much-needed insights into how data may assist in overcoming the social and economic challenges presented by the current situation. As such, this special issue aimed at tackling some of these issues by gaining a greater understanding into the effective techniques, approaches and preconditions of applying data analytics in the public sector and by attempting to unravel the values, risks and myths concerning public sector data analytics.

This special issue offers meaningful and timely insights into the utilisation of data by public sector agencies. The research and practical contributions range from providing insight into the necessary prerequisites for public data analytics, such as big data maturity models specific for public sector use, to how public sector data can be exploited to assist governments for policy creation, during economic crises, whilst also exploring challenges associated with the reuse of open data sources.

A number of key factors need to be taken into consideration to ensure data analytics in the public sector has all the opportunities to succeed. In our Special Issue, Okuyucu and Yavuz (2020) explored big data maturity model for the public sector contexts. As is the case with other research areas within the field of data analytics, maturity models for big data have also been developed, though largely for the business domain, but not taking into account the public sector nature. Therefore, if public sector organisations are to understand how to effectively implement big data analytics in public settings, there is a need for encompassing public sector-specific characteristics of big data maturity. In response to this need, Okuyucu and Yavuz (2020) contribute to the existing literature on maturity models by comparing the models of Klievink et al. (2017) and Kuraeva (2016), which are specifically designed to assess maturity in the public sector, one at the state level and the other at the organizational level. In their article, the authors contribute a detailed discussion on big data maturity models and highlight how Klievink's model, sheds light on the micro-level factors, such as considering the specific data collection routines and needs of the public organizations, whereas Kuraeva's maturity model more broadly looks into the preconditions essential for government big data maturity, such as legislative framework and national policy dimensions (strategic plans and actions). Based on a detailed review and analysis of these models, their paper provides insights regarding the development of integrated models to evaluate big data maturity in the public sector, thus their integrated model can help to

describe and prescribe how public sector organisations can implement and realise public values from the use of big data analytics.

To fully grasp the perceived benefits and value of data analytics in the public sector, it is essential for researchers to not only "do the research", but to also develop future agendas, and identify relevant and key areas of research in this space. In doing so, one must understand the broad, yet very intertwined nature of data science, as well as the domain knowledge, which in this context is public sector policy. Accordingly, Mureddu *et al.* (2020) responded to this by investigating how and at what point to apply new data science methodologies to design big data analyses, as efficient as possible, within the policy-making phases. The authors achieve this through providing a much needed, holistic overview of the interdisciplinary research challenges in the field of data-informed policy-making, made up of six research clusters, namely; public governance framework, privacy, transparency, trust, data acquisition, cleaning and representativeness, data clustering, integration and fusion, modelling and analysis with big data and data visualisation. In doing so, the authors have done the groundwork and identified pertinent areas that can be explored further by researchers interested in either or both data analytics and public policy development.

In addition to these factors, our Special Issue also features a timely and important contribution from Mehri and Bregu (2020), who focus on the subsequent stages and application of big data, by presenting a dynamic big data model for use by both policymakers and researchers. Their big data model aims at uncovering how public sector organisations can effectively and efficiently use big data analytics. In doing so, the authors first present a holistic, flexible and dynamic model, then they offer insights into how the model's factors lead to effective and efficient usage of big data; and finally, the authors generate indexes based on experts' input, to rank them based on their importance. Through developing this model, the authors suggest governments and government agencies can improve their efficiency and effectiveness by using the model to create better policies. Their model consists of techno-centric, governmental-centric and user-centric categories, with results of the analytical hierarchy process indicating techno-centric factors as the most important of all three categories. Moreover, through their quantitative decision-making method of analytical hierarchy process, the study identifies technological advancements and data security as amongst the most important factors that may impact the effectiveness and efficiency of big data usage within public sector contexts.

A plethora of studies have emphasized the seemingly endless opportunities presented through applying artificial intelligence (A.I.) techniques to big data sets, though largely in the context of organisations operating in the private sector. Though recent trends have seen A.I. being explored in the public sector, this has been largely for operational purposes. In response to this, Loukis *et al.* (2020) developed an AI-based public sector data analytics methodology to support policy-making in the context of economic crises. Accordingly, public and private sector data sets are processed with an advanced big data-oriented A.I. feature selection algorithm, to identify characteristics of a firm (e.g. resources, capabilities, practices, etc.) as well as its external environment that affect (positively or negatively) its resilience to economic crisis. This study offers new insights into the potential of public sector data analytics by firstly developing an approach to support policy-making through exploiting big public and private sector data. Furthermore, it also highlights how A.I. techniques can be applied to big data sets, which can assist in public policy-making for challenged economies. From a practical context, it enables policymakers and governmental organisations to design policies which can assist in reducing the impact of economic crises on organisations, whilst also identifying the types of organisations most likely to suffer during an economic crisis, whilst also offering valuable insights into the characteristics,

resources, capabilities, practices, etc. which are most favourable in coping and surviving during an economic crisis, again, insights which can be highly valuable in shaping public policies to supporting firms which lack such conditions.

In exploring the issues more closely, Washington (2020) contributed towards an under-researched area in the context of public sector open data sources, in which this study aims to understand the practical challenges faced by data consumers looking to reuse open data. More specifically, in seeking to understand why and how data consumers experience risks of uncertainty when considering specific open data resources, the study highlights the availability of open data through robust data portals is essential for successful public sector analytics. However, a number of challenges remain. Through the qualitative analysis of more than 2,900 questions data was collected on StackExchange during 2013–2018. The research teases out, how approx. 15,000 open data consumers expressed doubt relating to data sources in terms of its availability, interoperability, and interpretation. Moreover, scant metadata and documentation released by government agencies, as well as limited people having domain-specific expertise to leverage open government assets, were identified as key challenges. Accordingly, this study proposes a data signal framework that explains uncertainty about open data within the context of control and visibility. The proposed framework provides exploratory evidence based on US Government data, which may require refinement if used across other contexts such as cities.

In supporting economic development, Carrroll (2020) addresses how information can be effectively be used to assist in economic development of inner-city neighbourhoods in the USA, given that its inner-city is frequently overlooked by private investment, adversely impacting the economic livelihood of residents within these areas. Moreover, increasingly evidence indicates "survey-based" studies such as the National U.S. Census have shown to inaccurately represent the economic conditions of inner-city neighbourhoods. Accordingly, Carroll's (2020), exploratory study centres on the Social Compact's Neighborhood Market DrillDown report, in four United States cities and examines the relationship between data intermediaries and governments and focuses on information utilization over time across these four distinct decision-making environments. Data intermediaries in this context are referred to as independent, non-profit institutions that bring advanced information technology, research methods, and advanced modelling to government and other development stakeholders. The study adds value to public sector literature by attempting to understanding how and why government decision-makers use information produced by data intermediaries, highlighting in the process the importance of local government members, referred to as "information champions" who have interest in the commissioned study, the need for greater length of time in which information can be utilised before becoming outdated, and the ability to use the study to spur dialogue with development stakeholders outside of local government. This study is important in identifying the potential of technology and the use of data intermediaries, to understand how government officials interact with the studies which they commission.

Overall, this Special Issue offers valuable insights into the potential value of big data, data analytics and A.I. within the public domain, articulated through the contributions of a Big Data Maturity model for the public sector, a Big Data Model for the effective and efficient use of data in the public sector, pertinent insights into practical challenges faced by data consumers reusing open data and a data signal framework to support this, the identification of six research clusters for future explorations, relevant insights into A.I. techniques to support economic policy-making and also important empirical insights into how and why government decision-makers use information produced by data intermediaries. We believe these theoretical and practical insights and contributions will

assist in furthering our understanding of how the public sector can achieve much benefit and value from disruptive technologies and large data sets.

Uthayasankar Sivarajah
School of Management, Bradford University School of Management, Bradford, UK
Kamran Mahroof
Bradford University School of Management, Bradford, UK, and
Marijn Janssen
Faculty of Technology, Policy and Management, Delft University of Technology, Delft, Netherlands

References

Carroll, J. (2020), "One study, four cities: information impact in neighborhood economic development", *Transforming Government: People, Process and Policy*, Vol. 14 No. 4.

Klievink, B., Romijn, B.-J., Cunningham, S. and de Bruijn, H. (2017), "Big data in the public sector: uncertainties and readiness", *Information Systems Frontiers*, Vol. 19 No. 2, pp. 267-283.

Kuraeva, A. (2016), "Big data analysis influence on public administration processes", (Master's thesis). Higher School of Economics University, Moscow, available at: www.hse.ru/en/edu/vkr/182647584

Loukis, E.N., Maragoudakis, M. and Kyriakou, N. (2020), "Artificial intelligence-based public sector data analytics for economic crisis policy-making", *Transforming Government: People, Process and Policy*, Vol. 14 No. 4.

Mehri, M.I. and Bregu, K. (2020), "Effective and efficient usage of big data analytics in public sector", *Transforming Government: People, Process and Policy*, Vol. 14 No. 4.

Mureddu, F., Schmeling, J. and Kanellou, E. (2020), "Research challenges for the use of big data in policy-making", *Transforming Government: People, Process and Policy*, Vol. 14 No. 4.

Okuyucu, A. and Yavuz, N. (2020), "Big data maturity models for the public sector: a review of state and organizational level models", *Transforming Government: People, Process and Policy*, Vol. 14 No. 4.

Washington, A. (2020), "Uncertain risk: assessing open data signals", *Transforming Government: People, Process and Policy*, Vol. 14 No. 4.