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Does Project Portfolio Management Approach Fit Smart City Management?

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Abstract: Nowadays public administrations have to face many challenges related to Smart City initiatives and must coordinate these projects executing effective Smart City strategies with the adoption of an efficient portfolio management framework. Except for a few aspects, literature about this topic is scarce so this study was carried out as an attempt to evaluate the feasibility of adopting PMI's Project Portfolio Management methodology to handle Smart City initiatives. A specific survey investigating how much Smart City projects mirror portfolio dynamics has been submitted to experts across the globe and the collected results have been analysed according to our possibilities. Results are twofold: on the one hand, it appears that the Project Portfolio Management approach could be beneficial for managing Smart City project sets, on the other hand, the Project Portfolio Management seems to be a very suitable tool when the Smart City project portfolio is heavily influenced by external stakeholders.

1 INTRODUCTION

In 2017 the world population exceeded 7.5 billion and was estimated to grow up to 9.77 billion by 2050 (United Nations, 2017), setting urban areas at the centre of the demographic trend. Urban growth represents a problem and poses a multitude of threats to both the environment and the wellbeing of modern city dwellers, ranging from physical risks, such as pollution, exposure and weather anomalies, to social and economic risks, such as unemployment and inequalities (Tanda and De Marco, 2018). City managers need to find innovative solutions to such challenges and this very environment makes the paradigms of the Smart City (SC) emerge. The SC's goal is to foster urban economic and social growth, to guarantee the city's global competitiveness and to improve its environmental sustainability and the quality of life of its citizens (Caragliu et al., 2011; Michelucci et al. 2017).

How to implement the SC and how to achieve its objectives have sparked ample debate among experts. Several authors envision the SC as a top-down endeavour that city governments must plan and execute (Zygiaris, 2013). However, this conceptualization attracts strong criticisms (Hollands, 2014; Greenfield, 2017), especially when it comes to the privatization and commercialization of public spaces and data in the pursuit of private profits over social gains. Meanwhile, other authors argue that a SC emerges from the fuss of bottom-up independent initiatives developed and implemented by private organizations and citizens (De la Peña, 2013). Given the criticisms to this approach, such as the lack of strategic vision or synergies (Dameri, 2017), several authors (Walravens, 2015; Breuer et al., 2014) argue that the truth lays in the middle: while bottom-up initiatives are essential to the development of the SC, its success depends not only on the capacities and capabilities of the separate stakeholders, but also on how they relate and collaborate with each other.

Therefore, one of the key roles of local and national governments is to develop strategies able to focus these bottom-up efforts and drive all the relevant stakeholders towards the maximization of both economic and social values. In other terms, it is

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about driving these efforts toward the creation of public value (Fontana, 2014).

To this end, several authors conceptualize the SC as a portfolio of "cross-sector collaboration initiatives" (Chatfield and Reddick, 2015:1) where the government plays the role of coordinator, funder and regulator (Rodriguez Bolivar, 2015). Dameri and Ricciardi (2015) argue that SCs are described by their portfolio of smart projects and that a successful SC strategy depends on the success of several individual projects developed by varied stakeholders and enabled by different technologies. It's the role of local governments to integrate these initiatives and to create a collaborative network of stakeholders to meet the challenges of the modern urban environment (Rodriguez Bolivar, 2015; Dameri and Ricciardi, 2015).

To focus and drive the SC bottom-up efforts and manage this complex network of stakeholders, technologies and competing interests, public administrations need effective management tools. Several studies develop tools for supporting the planning of SC initiatives. It is the case for example of Mattoni et al. (2015) who develop a model for the integration of different SC characteristics across stakeholders, actions, and objectives. Similar efforts can be found in Yenchun and Jeng-Chung (2019), who present a structured framework supporting the SC planning decisions of local governments, while Chatfield and Reddick (2015) present a governance framework to support the planning of environmentally conscious SC projects. Other studies focus on the evaluation of SC and their portfolios of smart initiatives (Tanda et al., 2017).

It is the case, for instance, of the Smart City Wheel presented by Cohen (2014) who proposes an exhaustive set of indicators to evaluate the maturity of a SC plan, or Lombardi et al. (2012) who present a set of indicators for the evaluation of a city's performance, focusing on the relationships between the main stakeholders. Similarly, Fernandez-Anez et al. (2018) propose a numeric framework for the of the alignment of the SC portfolio alignment to the city's strategic objectives.

Nevertheless, to our knowledge no study focuses on a comprehensive approach to manage the city's portfolio of SC activities. The goal of the Project Portfolio Management methodology is to link the overall organizational strategy with the project execution (PMI, 2017). Hence, a comprehensive approach to portfolio management should help planners focus on the organization's long-term objectives (Munson and Spivey, 2006), ensure the optimal distribution of resources between projects (Archer and Ghasemzadeh, 1999), guarantee the fruitful collaboration between stakeholders (Dameri and Ricciardi, 2015), and improve the overall value generated by the projects in the portfolio (Laursen and Svejvig, 2016). At first glance, a structured approach such as the Project Management Institute's (PMI) Project Portfolio Management (PPM) appears to be a perfect fit to help cities manage and align their SC initiatives toward achieving their strategic objectives. However, the PPM approach has its focus on managing project portfolios inside an organization, where the full portfolio life cycle can be planned, executed, and monitored. In their analysis, Maceta and Berssaneti (2019) highlight that external stakeholders have a strong influence on the management of public project portfolios. Indeed, as discussed earlier, the SC is a multi-stakeholder phenomenon developed by different actors, with different technologies, to achieve possibly conflicting objectives (Rodriguez Bolivar, 2015).

Given the lack of studies on the feasibility of implementing a PPM approach in multi-stakeholder SC portfolios, this study proposes an investigation about the possibility of using it as a framework to support public administrations in their SC management efforts. Through an exploratory survey, this paper investigates whether cities can manage their SC portfolios with a PPM approach, and which of the six PPM performance dimensions SC PPM they are more focused on.

To this end, this study is structured as follows. First, the methodology and survey design are explained, followed by a discussion of the responses. Then, conclusions are drawn and possible future research directions are proposed.

2 METHODOLOGY

The intent of this study is to investigate whether PPM could represent an effective approach to handle the SC initiatives according to their reflecting, as a collection, the project portfolio dynamics.

We designed a survey containing eight main questions and addressed it to decision-makers working in public SC and innovation offices.

The first question, Q1, aimed to understand whether public SC and innovation offices approach the management of their SC initiatives through a PPM approach. The possible answers to this question ranged from 1 (not at all) to 5 (absolutely) on a Likert scale.

Q1. To your knowledge, does the office involved in guiding, enabling and supporting the

development of SC projects follow a Project Portfolio Management approach?

Question 2 to 7 were designed to investigate the portfolio management dimensions, i.e. the best practices areas where cities are mostly focused, following the definitions given by the 4th edition of the Portfolio Management standard (PMI, 2017). A 1 to 5 Likert scale was used to gather the responses of these questions, with 1 being the minimum and 5 the maximum values.

Q2. To your knowledge, to what degree does your city ensure that investments and efforts in developing and implementing SC projects are aligned with the city's strategic plans?
Q3. To your knowledge, to what degree does your city implement a formally structured form of governance for the management of SC projects?
Q4. To your knowledge, to what degree is your city able to assess its capabilities and capacities when managing the development and implementation of SC projects?
Q5. To your knowledge, to what degree does your city focus on citizens and, more in general, stakeholder engagement when managing the development and implementation of SC projects?
Q6. To your knowledge, to what degree does your city focus on value creation when choosing and managing the development and implementation of SC projects?
Q7. To your knowledge, to what degree does your city focus on the identification, assessment and management of risks emerging from the development and implementation of SC projects?

Finally, the last question Q8 aimed to understand the type of approach taken by the cities in fostering their SC initiatives and to evaluate whether the implementation of PPM is actually related to the type of approach undertaken by the cities to handle SC efforts or not. Three possible answers were presented: completely top-down driven by the local government (A1, chosen by 32% of the respondents), bottom-up efforts driven by the city's top-down strategic direction (A2, chosen by 61% of the respondents) and, finally, purely bottom-up with minimal intervention from the public administration (A3, chosen only by 7% of the respondents).

Q8. How would you describe the approach taken by your city in developing and implementing SC projects?

The survey was submitted as follows. First, interviewees were asked both in which city they worked in and what their role is inside the public administrations, the default options to choose were "politician", "director", "manager", and "other". Then, questions Q1, to Q8 were asked. As the terminology and definitions used may have not been shared by the interviewees, each of these questions where preceded by a brief explanation. Finally, the survey was introduced by a cover letter that explained the objective of the study and announced the possibility to receive feedbacks once results were collected and analysed, as in this study. Interviewees were also informed about the expected time required to complete the survey and that their data anonymity would have been be protected.

The survey was administered online to 190 SC and innovation offices distributed worldwide. Cities were selected considering the degree of development of their SC programs, highlighted by their promoted SC activities and initiatives and by their positions in national and international SC rankings. By sending the survey to the specific offices in charge of the city SC development, and therefore receiving answers from informed professionals and decision makers, we were able to mitigate the central tendency bias typical of any Likert scale-based investigation (Weisberg, 1992).

We received 28 answers for a 14.7% response rate. Figure 1 displays the distribution of the respondents' roles in the public administration while Figure 2 shows their geographical distribution.

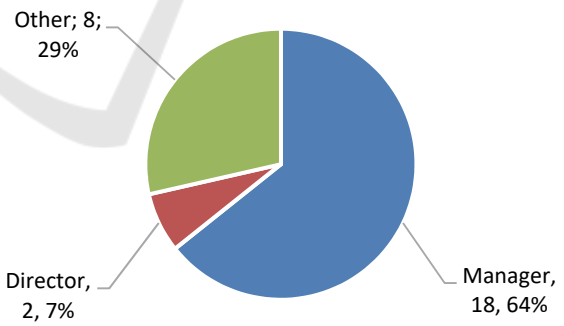


Figure 1: Respondents' roles distribution.

3 RESULTS AND DISCUSSION

Figure 3 shows the box plot distributions of the responses to questions Q1 to Q7.

The responses show a relatively consistent medium to high degree of adoption of the PPM approach and a consistent focus on its six main dimensions, without showing any major differences



Figure 2: Respondents' geographical distribution.

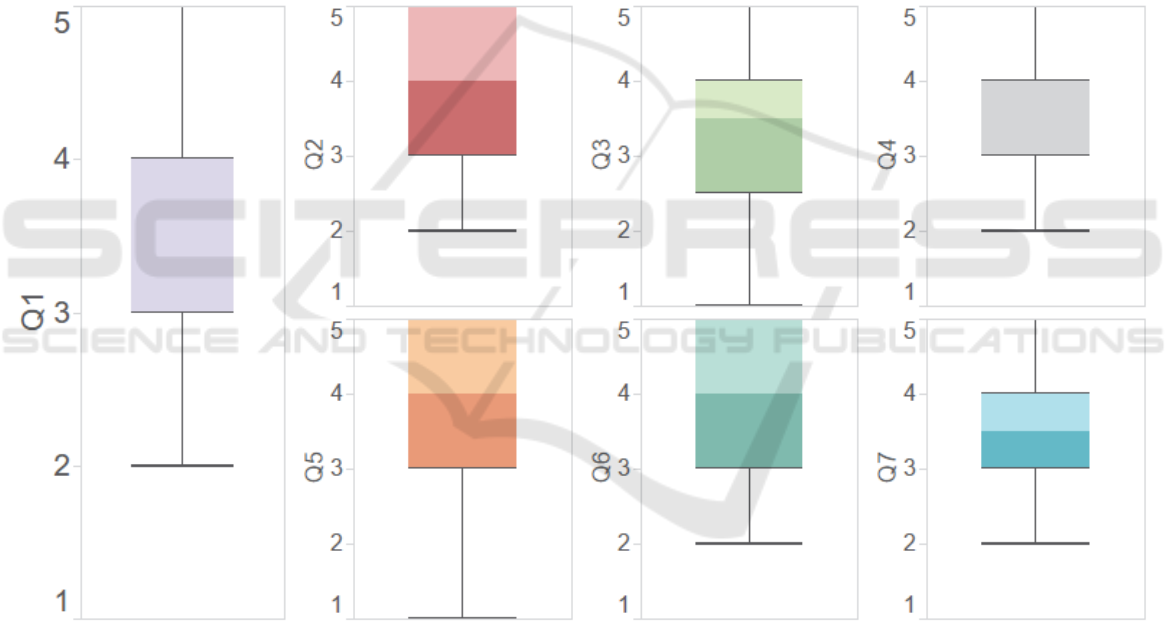


Figure 3: Box plot distributions for responses Q1 to Q7.

between them. Hence, from these data it is possible to draw the first main consideration for which cities appear to adopt the PPM approach when managing their SC initiatives and to focus on all six PPM performance dimensions in similar measure. Nevertheless, while the central tendency bias has been addressed during the design of the survey, the results presented in Figure 3 do not allow to ignore the possibility of having an acquiescence bias, also a typical criticality of a Likert scale-based investigation (Watson, 1992). However, the results in Figure 4 allow to discard this occurrence.

Figure 4 shows the box plot distributions of how each city responded to all questions. From these results it is possible to observe that most cities have either a medium to high or a medium to low degree of adoption of both PPM and its main dimensions and that no city shows a neutral position. Hence, these results allow to discard the possibility of an acquiescence bias within the responses.

These results also confirm the first main consideration previously described: while the degree of adoption of the PPM approach among cities is quite different, the responses distribution for each city is

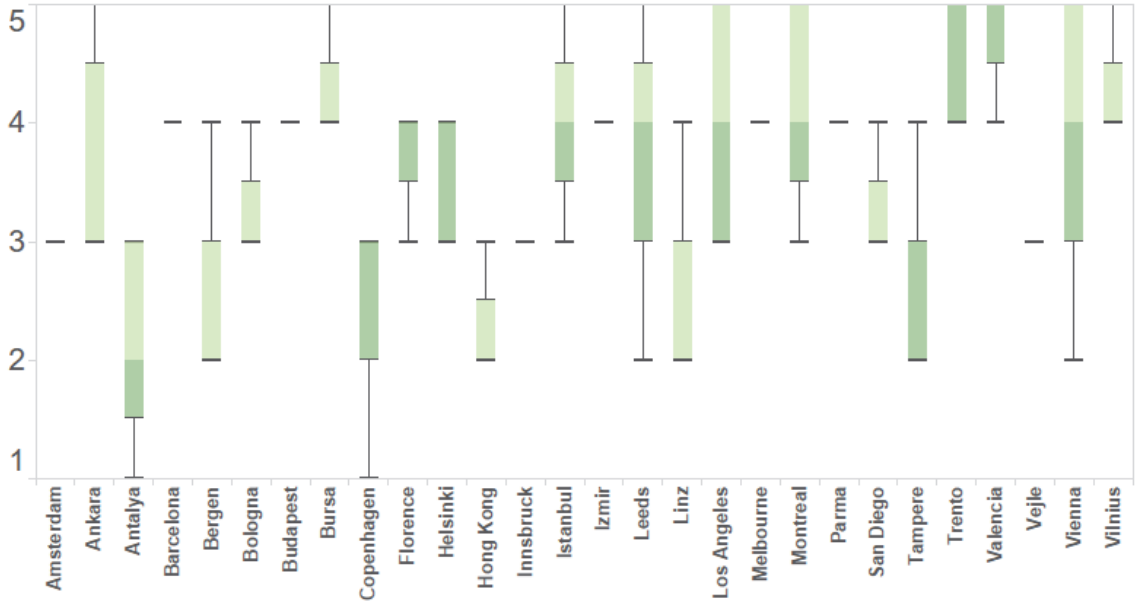


Figure 4: Box plot distributions of the responses for each city.

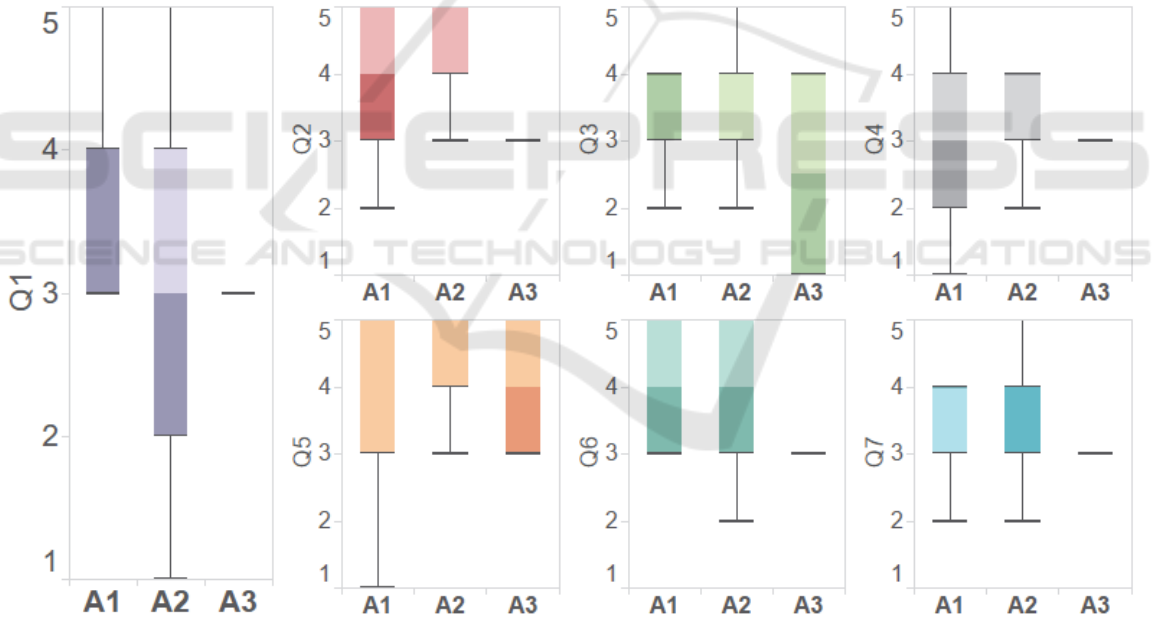


Figure 5: Box-plot distribution of answers depending on SC management approach.

quite narrow. Each city appears to be focusing on the six main PPM dimensions quite evenly, suggesting that a homogeneous and balanced adoption of the PPM approach is beneficial in helping cities manage their SC portfolios and that none of the PPM dimensions is more important than the others.

Hence, these first results appear to confirm the validity of the PPM approach and its comprehensive adoption in supporting the management of a SC portfolio. Nevertheless, from these results it is not possible to respond to the main criticality raised earlier: whether it is possible to use the PPM approach to manage a SC portfolio heavily dependent on external stakeholders. As portrayed in Figure 6, this is particularly critical as, from the responses to Q8, only 32% of the cities have a purely top-down approach in developing their SC initiatives (A1), while in 61% of cases, the city concentrate its efforts

in providing a top down strategic driving focus able to enable the bottom up efforts of multiple SC stakeholders such as private organizations, citizens, and communities (A2).

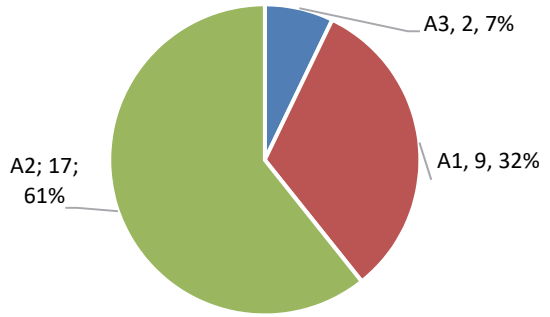


Figure 6: Q8 results.

Figure 5 addresses this critical issue as it shows the box plot distributions of the responses of the first seven questions, Q1 to Q7, similarly as for Figure 3 but divided by the relative Q8 answers: completely top-down (A1), bottom-up efforts driven by the city's top-down strategic direction (A2), and purely bottom-up (A3).

From this figure it is possible to observe that, unsurprisingly, cities with a purely bottom-up approach to the SC (A3) have a much lower degree of adoption of PPM compared to those cities that have a more structured top-down approach. However, a second more interesting consideration emerges: the average degree of the PPM adoption and focus on its six dimensions are quite similar for cities with a more structured SC top-down approach (A1) and for those with a hybrid approach where the bottom-up SC efforts are guided and coordinated by public top-down portfolio strategies (A2).

Hence, from the analysis of the data presented in Figure 5 it is possible to answer our main research question. Indeed, while the results presented in Figure 3 suggest that a balanced implementation of the PPM approach is beneficial for the management of SC portfolios, it is still unclear whether this approach could be suitable for SC portfolios heavily influenced by external stakeholders such as private organizations, citizens, and communities. The analysis of the data presented in Figure 5, however, appears to confirm this possibility, suggesting that the PPM approach can be suited in even for the management of SC portfolios heavily influenced and driven by the bottom-up efforts of external stakeholders.

4 CONCLUSIONS

The SC can be conceptualized as a portfolio of "cross-sector collaboration initiatives" (Chatfield and Reddick, 2015:1) where the government plays the role of coordinator, funder, and regulator (Rodriguez Bolivar, 2015). Given these considerations, the PPM approach appears to be a perfect fit to help cities manage and align their SC initiatives toward achieving their strategic objectives. However, there is little research about the management tools public administrations could adopt and none of these contributions address the feasibility of using the PPM to manage SC project portfolios. This study proposes to address this literature gap by investigating, through an exploratory survey, the PPM approaches adopted by cities.

From this survey two main considerations emerge. First, it appears that a balanced adoption of the PPM approach is beneficial in helping cities manage their SC project portfolios. Second, it appears that the adoption of the PPM can be a suitable tool even when managing SC portfolios is strongly influenced by external stakeholders such as private organizations and citizens.

This Paper presents a theoretical contribution in the field of the management tools approaches for the SC where little research has been made in the past. It provides an exploratory analysis on the feasibility of the adoption of the PPM approach to manage SC portfolios, giving scholars a clearer understating on how cities manage their SC portfolios and their priorities. Future studies will need to expand the reach of this investigation trough larger surveys, direct interviews and workshops with practitioners and decision-makers to better understand how public administrations can implement a correct PPM approach when handling SC initiatives. Finally, further research is needed to understand whether the adoption of a PPM approach is related to the city's social or economic characteristics such as population or GDP.

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