



Original article

Systems approach to the sustainable management of urban public parks

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ARTICLE INFO

Handling Editor: Ian Mell

Keywords:

Urban governance
Sustainability
Green space
Place keeping
Maintenance and operation
Strategic management

ABSTRACT

Public green spaces are becoming crucial components of any sustainable community because of their multiple ecological, economic and sociocultural benefits. More efforts are being directed towards creating livelier spaces. Unfortunately, there is less adequate attention to their long-term upkeep. Both research and practice focus more on design aspects of public spaces and parks than on their management. Realising the importance of management, this research is addressing this recognised gap by providing a comprehensive study of the management process. It draws on previous public spaces and green spaces management literature to define four main management requirements: *being responsive to context, setting direction, managing performance and dealing with resources*. Guided by the systems approach and sustainability concepts, the management requirements and process are presented in a framework that combines different levels of management with the internal dynamics of the public park. This framework can be a useful tool for researchers, designers, decision-makers and managers.

1. Introduction

Research focus and practice related to public spaces and green spaces are less directed to the management process and more towards design and placemaking. Considerations and resources put into the design and realization of any space are crucial and can have long-term impacts, but they represent the shorter period of its total life cycle. Accordingly, a similar focus is required for the long-term management to sustain any initial value the design and construction have created (Carmona and Magalhães, 2006; Collomb, 2015; Dempsey and Burton, 2012; Jansson and Lindgren, 2012; De Magalhães and Carmona, 2009, 2007; Tahir and Roe, 2006). Public space management is a complex process that requires different skills, handling multiple activities and the integration of different disciplines (Chan et al., 2014; Collomb, 2015; Dempsey and Burton, 2012; Jansson and Lindgren, 2012; De Magalhães and Carmona, 2009). Some researchers started to point out the importance of management and its role in sustaining the value of any public space. No matter how well-designed and implemented a public or green space is, if it is not well-managed, it will start to deteriorate and gradually lose its value (Carmona and Magalhães, 2006; Collomb, 2015; Dempsey and Burton, 2012; Jansson and Lindgren, 2012; De Magalhães and Carmona, 2009, 2007; Tahir and Roe, 2006).

Furthermore, users' perception of any public space quality was found to be more closely related to its management than to its original design

(Carmona and Magalhães, 2006). Public spaces that are not well-cared for convey a notion of neglect and isolation which undermines the feeling of safety (Carmona and Magalhães, 2006; Collomb, 2015; Dempsey and Burton, 2012). On the other hand, a well-managed public space preserves its quality, attracts more users and allows the best use of its potentials which provide more benefits for users (Collomb, 2015). Green spaces, in particular, can play a significant role in improving people's quality of life and offer them multiple environmental, socio-cultural and economic benefits (Aly et al., 2018; Bolliger and Kienast, 2010; de Groot et al., 2010; Haq, 2011; Lafortezza et al., 2009; Lee et al., 2015). Without an efficient management practice, these contributions will not be realised (Carmona et al., 2008).

Despite the recognised importance of management, in practice it faces some challenges. In many countries, public space managers have to deal with limited financial resources, reduced budgets, and the loss of skilled staff (Carmona and Magalhães, 2006; Collomb, 2015; Dempsey and Burton, 2012; Hawthorn et al., 2002). The practice of public space management often lacks an over-arching and holistic approach, clear visions and strategic goals, and works within fragmented responsibilities and structures (Carmona and Magalhães, 2006; Collomb, 2015). Day-to-day operational activities, such as maintenance and cleaning are more in focus than long-term strategic approaches despite their importance in achieving better management (Jansson and Lindgren, 2012; Lindholm et al., 2016; Randrup and Persson, 2009; Tahir and Roe,

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<https://doi.org/10.1016/j.ufug.2022.127482>

Received 26 July 2021; Received in revised form 11 January 2022; Accepted 17 January 2022

Available online 19 January 2022

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2006). “Over-management” also projects a problem similar to “under-management” because of its relation to issues of “commodification and homogenisation” which could lead to the loss of public spaces identity, their privatisation and exclusiveness (Carmona et al., 2008).

The previous discussion established the importance of management and the challenges facing them. A shift from the traditional approaches of management is required to more innovative approaches that can deal with this complexity and with the contemporary urban challenges (Dempsey and Burton, 2012; Haq, 2011; Phong and Xiao, 2016). This research aims at developing a comprehensive management framework that addresses the previously mentioned common practice problems; lack of strategic management and focus on routine operation activities, fragmentation, ineffective operational processes and miscoordination, in addition to standardised practices that lead to loss of identity and homogenisation. The framework builds on previous management research; however, it is structured differently to capture all the important aspects of the previously defined management frameworks and provide a more comprehensive view for managing urban public parks, an important public space and green space type, on different levels of management.

The research focusses on a specific public open space type which is public parks. Public parks have specific benefits and impacts for cities' dwellers and visitors that other open spaces do not have (Aly and Dimitrijevic, 2021). Definitions of open spaces, public parks and other guiding concepts are examined in the next section. Afterwards, previous management research is discussed and the need for proposing a new framework is justified. Thirdly, four public parks management requirements are defined. Finally, these requirements are elaborated into a management framework for urban public parks.

2. Definitions and interpretations of key concepts

This section clarifies important principles and definitions this research is built on. Public parks are initially defined. Secondly, the different perspectives in defining sustainability and sustainable development are examined including the systems dynamics perspective which is especially important for the managerial side this research focuses on. Afterwards, management and sustainable management are defined and the role of sustainability and systems in managing public parks is shown.

2.1. Public open spaces and public parks

Open spaces are the outdoor areas in or near a city that are kept free and protected from development and dominating built structures. They are used for mobility, recreation or the preservation of a natural or a cultural landscape, and play a significant role in shaping the city and the experience of its dwellers and visitors (EPA, 2020; Evert et al., 2010, p. 441; Swanwick et al., 2003). The ownership of these spaces can be private with controlled access, for example, residential private open spaces, or public as a part of the city's infrastructure with complete public access (Evert et al., 2010, p. 527 and 541). Public open spaces in cities include two categories: green spaces, and civic spaces such as public squares and streets (Swanwick et al., 2003). This research focuses on public parks in cities which are public open spaces under the category of green spaces.

Green spaces, also referred to as landscaped open spaces, are the open spaces in the city, either public or private, that have vegetation as a dominating feature (Evert et al., 2010, p. 282 and 778; Farinha-Marques et al., 2011; Gairola and Noresah, 2010; Swanwick et al., 2003). They have different typologies, among them are “amenity green spaces” that can be further divided into several categories, one of them is “recreational green spaces”. Urban public parks are one of the types of recreational green spaces. Accordingly, they are: *man-made urban open, public and green spaces designed mainly for recreation* (Swanwick et al., 2003).

2.2. Sustainability and sustainable development

To sustain something is to maintain it and keep it in operation over time (Cambridge Dictionary, 2020a). Sustainability, in return, expresses the ability of something to be sustained (Cambridge Dictionary, 2020b; Jeronen, 2013). It is considered as “a paradigm for thinking about the future in which environmental, societal, and economic considerations are balanced in the pursuit of an improved quality of life” (Jeronen, 2013, p. 81). Policies related to sustainability are mainly concerned with managing the relationship between human development and their natural environment (Brinsmead and Hooker, 2011). Human development that is guided by the sustainability thinking paradigm is known as “sustainable development” (Brundtland Commission, 1987 in Jeronen, 2013). Managing green spaces plays a significant role in sustainable development (Jansson and Lindgren, 2012).

In applying sustainability, different perspectives can be noted. The earliest perspectives focused mainly on guiding human development in a way that minimizes its negative effects on the environment. The basic notion is in protecting the natural environment from human activity. Another wider perspective treats nature as a “capital” whose value is driven by the services it provides for humans. Protecting nature is dealt with differently; nature is where humans get resources for their development and sustainability lies in finding a suitable way to balance the use of these resources between “over-exploitation” and “over-protection”. Over-exploitation harms the opportunity for future development and over-protection prevents achieving benefits necessary for people's lives (Brinsmead and Hooker, 2011; Redclift, 1992).

Both perspectives are criticized for being limited in dealing with sustainability. Focusing only on protecting the environment from human activities fails to account for a long-term dynamic and inevitable nature-human relationship where also man-made systems require consideration. The capital perspective, on the other hand, overlooks the intrinsic value of nature (Brinsmead and Hooker, 2011; Redclift, 1992). The natural environment, in this view, is not the main concern of sustainability, but sustaining “present and future levels of production and consumption” (Redclift, 1992). It also requires a high degree of predictability for future productivity that might not be possible in practice (Brinsmead and Hooker, 2011).

A counter-view, discussed by Brinsmead and Hooker (2011), adopts a systems dynamics perspective. The core idea is that systems are complex and dynamic; constantly subjected to change. Their management requires to be more “adaptive” and “interactive”. Instead of relying on predictability, “feedback” is seen to be a more appropriate approach to sustainability (Brinsmead and Hooker, 2011; Sardi and Sorano, 2019). Sustainability is seen here “as maintenance or enhancement of adaptive resilience, the capacity to robustly preserve continued functioning through short-term perturbations and long-term change” (Brinsmead and Hooker, 2011, p. 810). The feedback from any output is not only a result of a certain action, activity or process but also the basis for future decisions regarding the three (Größler and Strohhecker, 2011). This makes the process of management itself also dynamic and flexible to change according to the feedback.

In addition to feedback, systems dynamics consider “accumulation processes” and “delays” in systems (Größler and Strohhecker, 2011). A certain effect is rarely resulting from a direct cause in a linear relationship. Judging these cause-effect relationships tends towards attributing them to single causes, to the closest time and spatial factors or mixing correlation with causation. However, in reality, causes and effects can be separated in time and space and a certain effect can result from a variety of causes which also produce unintended consequences (Stermann, 2002). This recognises that systems shift gradually through the accumulation of changes where a time lag exists between actions and their impacts (Größler and Strohhecker, 2011). Within the systems perspective, sustainability as a concept can be applied to both natural and social environments and achieve a dynamic balance between people, the systems they create and their environment (Jeronen, 2013).

2.3. Sustainable management of public parks

The previous discussion showed that management is at the core of dealing with the relationships between different systems. Management is generally defined as “a dynamic, complex, flexible, and rational process of setting and accomplishing goals through the select use and coordination of human, technical, and financial resources within the context, the environment(s) in which the organization is embedded” (Schiopoiu and Mahon, 2013, p. 59). A management approach that considers sustainability will be following the same definition but will also be oriented towards ensuring that the goals and processes are supporting sustainability. It will consider the three pillars of sustainability and be responsible towards both the environment and society. It will not focus only on short-term organizational gains, but also the long-term effects on future generations. Overall, sustainable management can be defined as “a complex process of decision making related to practices of a business involved in maintaining and improving the quality of life of the community, society, and planet in order to ensure the well-being for the present and for the future generations” (Burlea, 2013, p. 4). Accordingly, the management of a public park, a man-made system, can apply sustainability concepts. Managing a park is not by any means less complex than managing any other natural resource. Sustainable management of parks requires the consideration of ecological, sociocultural and economic pillars of sustainability and the relationships between the three have to be managed. Human activities in parks should not be carried out in a way that threatens the parks’ resources and undermines their ability to continue providing services for future users - hence the need for applying sustainability concepts in their management (Manning et al., 2011).

The emphasis in this approach is on interactions, relationships, including both natural and artificial systems, and considering feedback, accumulation processes and delays. Concepts related to systems approach can be also found in Carmona et al. (2008) definition of public space management: “The set of processes and practices that attempt to ensure that public space can fulfil all its legitimate roles, whilst managing the interactions between, and impacts of, those multiple functions in a way that is acceptable to its users” (Carmona et al., 2008, p. 66, emphasis added). In addition, aspects of sustainability are emphasised in Dempsey and Burton (2012) definition of “place-keeping”: “long-term management which ensures that social, environmental and economic quality and benefits the place brings can be enjoyed by future generations” (Dempsey and Burton, 2012, p. 13, emphasis added).

The idea of feedback was incorporated in creating the public park system that was proposed in a previous research (Aly and Dimitrijevic, 2021), and is included as a part of the framework this article proposes. A management system can benefit from feedback and redefine or rearrange its components for better future output. Moreover, it is important to realize that every action will have an output that might not be perceived immediately, i.e., it could be delayed, and this could be related either to the intended results aimed by this action or to unintended negative consequences that were overlooked. Actions and processes are also not in isolation from one another and the accumulation of them will result in changes within the system.

Table 1 summarises the main definitions that are discussed in this section. The article focuses on the management of the natural and man-made systems of a public park through a sustainable practice guided by the systems approach. In the following section, the requirements for managing parks following such approach are examined. Afterwards, these requirements are structured along with other management components and the system of the park into a management framework

3. Previous research on management of public parks

James et al. (2009) proposed a framework for urban green spaces research, including five main research themes and key research

Table 1
Summary of Main Research Definitions.

Public Parks	The man-made urban, open, public and green spaces designed mainly for recreation (Swanwick et al., 2003)
Sustainability	“Maintenance or enhancement of adaptive resilience, the capacity to robustly preserve continued functioning through short-term perturbations and long-term change” (Brinsmead and Hooker, 2011, p. 810). It can be applied to both natural and social environments and achieve a dynamic balance between people, the systems they create and their environment (Jeronen, 2013)
Sustainable Management of Public Parks	The adaptive and interactive processes of management that deals with both the constructed natural and man-made systems of a public park and the relationships between their components to ensure the dynamic balance between different ecological, sociocultural and economic goals (Burlea, 2013; Carmona et al., 2008; Dempsey and Burton, 2012; Manning et al., 2011; Schiopoiu and Mahon, 2013).

questions. They identified two important themes related to the topic of this article: “the management of urban green spaces” and “the governance of urban green spaces”. Jansson and Lindgren (2012) cited this article and commented that it identified the shortcomings in not having “an effective theoretical basis and common models concerning the management of urban green space” (Jansson and Lindgren, 2012, p. 140). Accordingly, despite the presence of literature that discuss the management of green spaces, it is agreed that there is a need for further research input to develop a better understanding of a variety of managerial aspects (Carmona and Magalhães, 2006; Collomb, 2015; Dempsey and Burton, 2012; Jansson and Lindgren, 2012; De Magalhães and Carmona, 2007; Tahir and Roe, 2006; Takyi and Seidel, 2017).

Chan et al. (2018, 2014) developed a framework for park management that can be used to evaluate parks and their management success through a set of measurable indicators. It can help managers in determining issues requiring more attention, and they can use it to evaluate their parks, but the framework itself cannot be directly used to guide a park management. These indicators also, similar to most measurement tools, are presented more as checklists not showing any relationships between them which can fragment the view of a park as a whole.

Randrup and Persson (2009) also discussed parks management and provided three graphical representations for park management: “the park management model”, “the park-organisation-user model” (POUM) and “the strategic park management model”. The strategic management model describes three levels of management encompassing not only the short-term operational level, but also the tactical and policy management levels. Jansson and Lindgren (2012) present, with slight modifications, the POUM by adding descriptions to the relationships between the three main components: the green space, its users and its management authority. They suggest that more comprehensive management models are required “to obtain a wider understating of urban landscape management within adjacent fields of knowledge” (Jansson and Lindgren, 2012, p. 143). They state that their model of management, “provides a comprehensive framework for urban landscape management but remains open to be informed by theories within many different fields of knowledge” (Jansson and Lindgren, 2012, p. 144).

The previous ideas are considered in the framework of management of public parks in this research and presented more comprehensively by including the feedback process, the effect of external influences, including users in the management process, considering the three levels of management and defining a detailed public park system (Aly and Dimitrijevic, 2021) that covers multiple public parks aspects. The relationships that were described by Jansson and Lindgren (2012) are also considered in detail within the public park system and the management framework.

More broad management frameworks that discuss public spaces are also found in the literature. Carmona et al. (2008) have a detailed and extended study of public space management that has influenced other researchers too. Their book has several diagrams that discuss different issues of management, its requirements and related processes. It also highly influenced the development of the framework of this research. The key management dimensions diagram, for example, has three levels starting from aspiration, then management, which finally provides the public space quality (Carmona et al., 2008, p. 67, Fig. 4.1). The management framework of this research has the same three levels, 1) aspirations and policies are related to setting goals and direction, 2) the four management dimensions are covered at the operational level of management, and 3) the public space quality is defined in the public park system that consists of a man-made system and a natural system that determines several qualities in the park and a number of corresponding benefits and impacts on humans' life (Aly and Dimitrijevic, 2021). However, the framework that is proposed in this article also differs in not being represented in a linear format.

Finally, Dempsey and Burton (2012) place-keeping research also discussed another public space management framework. They provided a conceptualisation of place-keeping that: 1) defines the place itself, 2) the process of place-keeping, and 3) the product which is a high-quality place (Dempsey and Burton, 2012, p. 13, Fig. 1). Place is determined by its "characteristics" and "aspirations", in addition to "user needs", "behaviours" and "perspectives". Secondly, the process and the product are determined through "governance/decision-making", "policy/regulation", "evaluation/monitoring", "partnership", "investment/finance/resources", and "maintenance". The public park system, that was proposed in previous research, defines the place (a public park) in more detail except for the behaviour part which is complex and requires a separate study. The conceptualisation of place-keeping provides a broad list of management-related components; however, the illustration has a fragmented presentation. The proposed management framework in this research incorporates aspects of the processes and product but presented in a different structure to show the interrelationships, processes and feedback.

In view of that, establishing a strong theoretical base and further research into the managerial aspects of public parks are recognised requirements in that field. Some frameworks had been proposed for dealing with the management of public spaces, green spaces and public parks. This research is synthesising this previous work to make use of their points of strength in one comprehensive framework. The framework that is proposed avoids the concerns that were outlined in each one: a) being limited only to evaluation, b) fragmented and oversimplified definition of the public parks' components, c) list-like structures that lack the illustration of relationships, and d) linear representation of the process of management. These issues are being tackled by merging evaluation within the management process, defining the public park system and its management in a detailed way that shows the interrelationships of their components, and following the general system theory model to structure the framework to avoid a linear structure of the management processes and show the relationships between all the framework components.

4. Park management requirements

The definitions section examined important concepts related to public parks and their sustainable management which guides the structure of the framework. Public spaces in general and in return public parks can be managed through different models depending on the main responsible actors (De Magalhães and Carmona, 2009; Eagles, 2008; (Glover and Burton, 1998; Graham et al., 2003) in Eagles, 2008; More, 2005). According to De Magalhães and Carmona (2009), common management models are state-centred, user-centred, and market-centred models, in addition to the potential partnerships between the three. Regardless of the model, park management deals with

common issues and performs similar processes to deal with the parks' requirements.

This section explains the specific requirements for managing public parks. Requirements for managing a public park were synthesised from different public spaces and public parks management literature (Carmona et al., 2008; Collomb, 2015; Dempsey and Burton, 2012; Jansson and Lindgren, 2012; Lankford et al., 2017; Randrup and Persson, 2009). To manage a park, four main concerns require to be dealt with: 1) being responsive to context, 2) setting direction, 3) managing performance and 4) dealing with resources. Table 2 shows how different literature determined management components and the equivalent requirement defined by this research.

4.1. Being responsive to context

Parks are not all the same and dealing with them through generalized standards and guidelines can be harmful. The public park system includes certain desirable qualities, benefits and impacts which are general aspects to be considered in managing parks (Aly and Dimitrijevic, 2021). However, they have to be a reflection of what gives the park its special character within its context and the expectations of its actual users (Carmona et al., 2008). Several factors determine the speciality of each park, firstly, its internal characteristics and surrounding external influences that shape some of these internal characteristics. Five external influences can affect public parks, also applicable to other public spaces, "major land-use category", "relative urbanity", "relative sensitivity", "socio-economic context" and "specialist category" (Carmona et al., 2008, p. 17, Fig. 1.7). On a wider scale, the "political context" also affects the management process (Dempsey and Burton, 2012). Relative location is another important factor to be considered. Together, these seven factors influence the use of the park and give it a special character.

These factors are expected to have influenced the design of the park giving it some of its internal characteristics. Parks differ in area, in the diversity of their elements and their configuration. Together, internal characteristics and external influences, determine use intensity, the park's outreach, users' types, their diversity and expectations, and the park's capacity to accommodate specific activities. For example, managers of parks in lower-income districts face different challenges than those in richer ones, and spaces in dense urban areas will differ from those in less dense suburban regions (Carmona et al., 2008; Hastings et al., 2005 in Carmona et al., 2008). Accordingly, sensitivity to context is very important because it raises different challenges and priorities to be dealt with.

Involving users is another important aspect related to responsiveness. A variety of users are expected to be using parks; they differ in age, gender and sociocultural and economic backgrounds. Their interests in the park will accordingly be diverse too. Parks' beneficiaries can also be indirect users like surrounding business owners or residents who may not use the park but enjoy its view from their homes (Jansson and Lindgren, 2012; Takyi and Seidel, 2017). Management authorities, regardless of the management model they apply, can encourage public participation and input from users of the space. However, the degree of participation may vary.

Firstly, park management can establish modes for receiving users' feedback and suggestions. For this not to be pseudo participation, a system of follow-up and taking actions according to feedback is required (Carmona et al., 2008; Lankford et al., 2017). Another way of involving the community is through "active consultation" by setting up regular meetings to discuss issues related to public spaces and green spaces. The third and most proactive way is partnerships with the community where the community takes an active role through volunteering or interest and "friends of" groups, to complete delegation of the management leading to a user-centred model of management (Carmona et al., 2008; Lankford et al., 2017). Urban environments are often subjected to continuous changes that management needs to be always aware of. This will allow

Table 2
The Public park system, the 4 synthesised management requirements and how they are expressed in different literature.

	The public park system (Aly and Dimitrijevic, 2021)	Being responsive to context	Setting direction	Managing performance	Managing resources
Key Management Dimensions (Carmona et al., 2008)	Public space quality Public space policies and aspirations			Regulations Coordination Interventions Maintenance	Investment
Place-keeping (Dempsey and Burton, 2012)		The place Governance / Decision making Policy		Regulations Evaluation / Monitoring Maintenance Partnerships	Investment / Finance / Resources
The POUM (Jansson and Lindgren, 2012)	Urban green open space	Users		Management Organisation Skills Regulations Coordination Managing Use Physical Maintenance Grounds Maintenance Management Planning Partnerships	Funding
The Governance and Management of Public Green Spaces (Collomb, 2015)					

the development of management strategies and goals in line with these changes, requiring flexible governance to incorporate them (Carmona et al., 2008; Dempsey and Burton, 2012; Hawthorn et al., 2002; Tahir and Roe, 2006).

Some of the previously mentioned factors can be understood by directly examining existing facts about and around the park. However, actual users' demands, and community aspirations are better understood through communication. Managers must understand the context clearly and establish effective communication with the users to be able to set their management direction and determine the specific performance-related processes and resources. Managing a park with this kind of understanding is a first step towards improving its quality and meeting its users' needs. The following parts discuss three further management requirements that come after this first step and are highly influenced by it.

4.2. Setting direction

Managing parks is often criticised for being fragmented, carried out through separate tasks without being aware of the relations between them and their effects on the overall process. Management activities are carried out routinely without having a certain direction or goal. This can happen on different scales: fragmented processes within a single park, a system of different parks or green spaces of different types being managed in separation from one another, or fragmented management of a whole system of different types of public spaces (Collomb, 2015; Dempsey and Burton, 2012; Jansson and Lindgren, 2012; Lindholst et al., 2016; Randrup and Persson, 2009; Tahir and Roe, 2006).

Fragmentation can be a result of an organizational structure. Several measures can be taken to remedy its effect. For example, in the UK, some local authorities' initiatives introduced a "cross-cutting" structure that can deal with multiple dimensions and provide a strategic view instead of the speciality focus. Coordination was made possible also by "task forces" and "working groups" that monitor different departments and connect them (Carmona et al., 2008). On the other hand, a complete change in an organisational structure is not the only way to deal with fragmentation. There are examples of good quality spaces managed within traditional hierarchies which "suggests that the way different management responsibilities are coordinated is probably more important for the quality of management and open space, than the formal distribution of those responsibilities" (Carmona et al., 2008, p. 154).

Processes related to managing public parks require to be divided and

singled out to be easily handled by an assigned staff member/s. Depending on the park scale and its elements' complexity, a degree of specialisation will be determined. Specialised staff members must have complete awareness of their roles but not in isolation from other tasks. A degree of awareness is required about the effects of what they do on other processes and the overall park system. On a higher level of management, a complete and more holistic awareness is needed to set a strategic vision, determine the required processes to achieve it, establish an optimum level of tasks division or grouping, and coordinate between them efficiently in terms of timing and resource allocation to avoid conflict and unnecessary repetition of activities. Depending on the management model a certain park follows, coordination between processes can be required within the same sector, for example, a local authority, or between different sectors in case of partnerships. Coordination is also required between the established directions and actual operation (Carmona et al., 2008).

A certain strategy can be set internally for a specific park and it can also be part of a larger strategy related to a whole system of green infrastructure (Collomb, 2015). Green spaces with all their types have a variety of benefits that goes beyond their direct use. Their development and management can relate to strategies that extend outside their site to a neighbourhood, city or country level. For example, green spaces can be part of a national strategy dealing with climate change or a local strategy addressing environmental degradation in a certain neighbourhood or city. They can also be part of a health program or a program to enhance tourism (Carmona et al., 2008; Lindholst et al., 2016). Specific goals and related processes require to be identified at the park level to correspond with these strategies. Linking park management to higher political levels protects them from being vulnerable to other development-related goals and provide more long-term stability (Carmona et al., 2008). This does not necessarily mean a top-down approach in setting direction where managers simply apply a dictated approach from a higher organizational or governmental level. It is more about collaboration and communication across different levels and also reaching out to stakeholders outside of the managing authority including private and community actors (Lindholst et al., 2016). Parks managers are expected to "orientate themselves 'outward' and 'upward' in the quest for defining and providing services of public value through networked governance" (Lindholst et al., 2016, p. 167).

4.3. Managing performance

Understanding context and setting direction require to be translated into actual performance on the operational level. Management plans set the link between the daily operation of the park with its direction and context. They consist of action plans, in addition to the standards and level of quality that must be achieved (Carmona et al., 2008). This must be complemented with methods of evaluation, “performance measurement” - “what to measure”, and “performance management” - “how to manage performance”. Performance measurements are the methods of collecting and analysing data to evaluate and follow-up on the actual performance and to determine adherence to standards and achievement of goals. On the other hand, performance management is more about dealing with the results of the measurements, i.e., how they are communicated, how achievements will be rewarded, and how shortcomings will be handled and penalised if necessary, in addition to extracting learnt lessons and ways to move forward (Sardi and Sorano, 2019).

Continuous feedback is important as management plans are not supposed to be static or fixed. It allows updated awareness of their effectiveness and to decide on any required changes to achieve better performance (Carmona et al., 2008; Dempsey and Burton, 2012; Hawthorn et al., 2002; Tahir and Roe, 2006). Flexibility and reflection on the actual changes in requirements stemming from seasonal use or a change in users’ demands are also vital (Dempsey and Burton, 2012). For parks, action plans include plans for three main processes (Collomb, 2015): “managing activities”, “physical maintenance”, and “grounds maintenance”. These processes keep a high performance level of different qualities in the park (Aly and Dimitrijevic, 2021), for example, grounds maintenance is important for ecological and aesthetic qualities, physical maintenance affects the standards of the park’s cleanliness and utilities and in return its sittability and walkability (Tables 3 and 4).

Activities are one of the essential factors that determine the success of public spaces and parks (Carr et al., 2007; Collomb, 2015; Francis, 1988; Montgomery, 1998; PPS, 2009). The characteristics of each park determine the nature of these activities and their varieties. Activities can be spontaneous resulting from the space configuration, like people sitting or playing a game in a dedicated or multi-use space, or they can

be services and programmed activities and events like food and beverages provision, concerts, awareness campaigns or street markets. Both require to be managed through taking care of the elements required for these activities, their functionality, the availability of necessary utilities and level of performance, in addition to creating suitable programmes for more active events and providing various services either directly or through concessions (Collomb, 2015; Lankford et al., 2017) (Table 1).

Secondly, activities require to be coordinated to avoid conflict (Collomb, 2015; Lankford et al., 2017). Green spaces, as a land use, are often in competition with other land uses. They are sometimes under the threat of being lost in favour of development-related goals. Therefore, the protection of green spaces at a policy and legislative level is very important (Benedict and McMahon, 2006; Lankford et al., 2017; Takyi and Seidel, 2017). Conflict can also happen within the park between different activities, users, and their interests. Users’ interests in a park vary, for example, between active and passive usage which can cause a conflict between users expecting tranquility and those who are engaged in louder and more active recreation. Usages can be managed to avoid conflict through, for example, spatial separation and temporal phasing (Kato and Ahern, 2009; Lankford et al., 2017).

Thirdly, activities also require to be regulated to ensure the adherence to agreed rules including accepted and unaccepted behaviours, safety-related issues, environmental related issues, and the relationship between different actors in the parks, for example, between users and service providers like in a restaurant. This also has to include rules for solving conflicts and methods of enforcing regulations. All these regulations can either be related to formal legislation or to informal internal regulations the park managers enforce (Carmona et al., 2008; Collomb, 2015).

On the other hand, physical maintenance is the process required for the upkeep of the physical elements and to achieve the desired outputs. Physical maintenance is not a simple reactive procedure to solve emerging damage in a park. It is also about planned and routine processes to prevent reaching serious damage that would cost more to repair. Physical elements maintenance includes, for example, cleaning, collecting trash and managing waste, maintaining the lighting system, regular check-ups and fixing or replacing damaged elements (Carmona et al., 2008) (Table 3). Moreover, water, soil and vegetation require

Table 3
Operation Management and the Park’s Physical Elements.

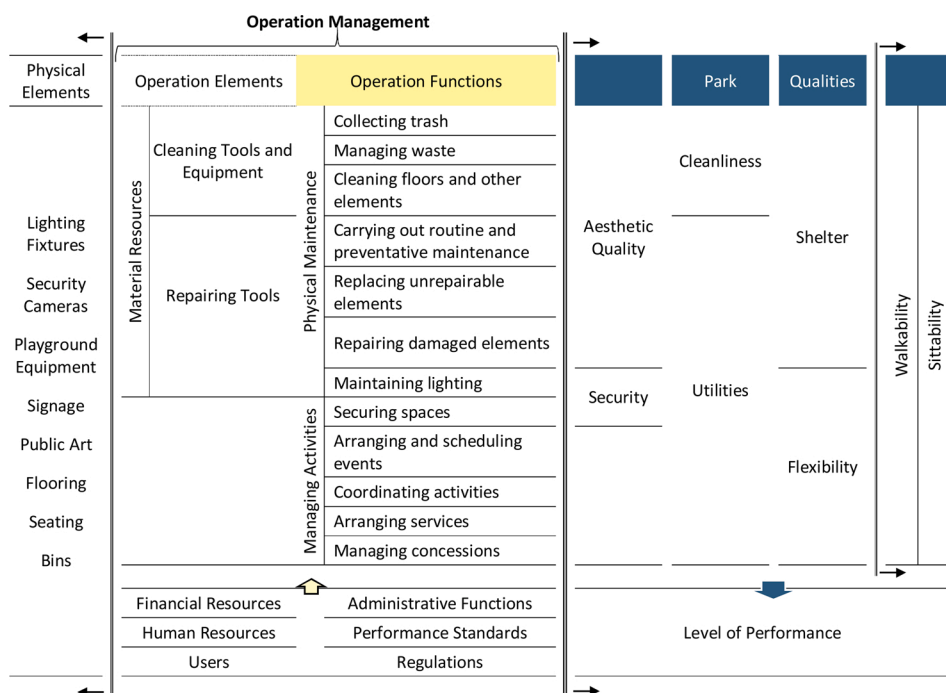
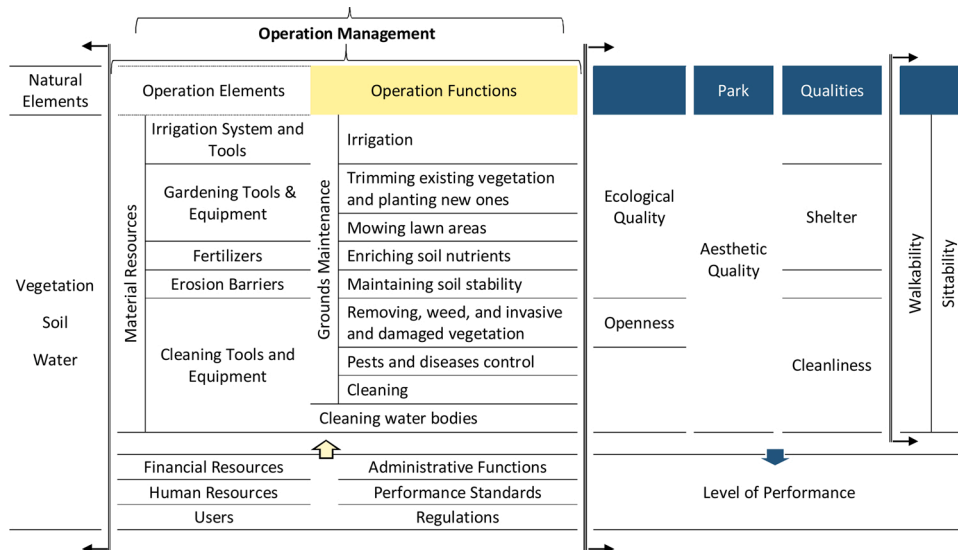


Table 4
Operation Management and the Parks' Natural Elements.



grounds maintenance to support their ecological processes. Grounds maintenance includes cleaning, pests and diseases control, irrigation, trimming and planting vegetation, mowing lawn areas, and preparing and fertilising soils (Conover, 1953) (Table 4). The frequency of maintenance processes is determined according to the requirements of each park that are defined with consideration of its internal characteristics and external influences (Carmona et al., 2008; Collomb, 2015; Dempsey and Burton, 2012; Lankford et al., 2017). Like activities, physical and grounds maintenance require to be regulated, scheduled, coordinated and monitored with a suitable allocation of required resources.

Dealing with activities and maintenance are significant in the day-to-day operation of the park. However, achieving better quality and wider benefits for users will sometimes require going beyond dealing with existing elements to carrying out developmental activities. The management process, in this case, will include activities of planning, design and project management (Dempsey and Burton, 2012; Gustavsson et al., 2005; Jansson and Lindgren, 2012). On-going feedback on the park performance may reveal a missing quality or a lost opportunity. Interventions will accordingly be made, adding new features to the park or modifying existing ones. Changes could also be made for the efficiency of the operation performance or for environmental, social and economic considerations. These may include, for example, changes to more sustainable materials or native, more adaptive and less care demanding vegetation types and introducing a better waste management process.

4.4. Dealing with resources

Managing parks requires the allocation of several resources and managing them effectively through management plans. Achieving high quality in maintenance and managing activities depends on the sufficiency of resources assigned for these processes. Firstly, management agencies need to have secure financial resources. They rely on specific or a combination of funding resources which can be external like public fund, private investment, community funding, financial endowment, or internal through revenue created in the park (Carmona et al., 2008; Collomb, 2015; Eagles, 2008; Lankford et al., 2017; More, 2005). However remarkable parks have a higher probability of attracting private funding, while smaller parks, especially in poorer neighbourhoods, will mainly depend on public funding (Collomb, 2015). Management agencies need to advocate for having sufficient funding from public resources, make better use of existing resources and also investigate alternative ones either by creating them directly in the park or by

forming partnerships with the community or the private sector (Carmona et al., 2008; Collomb, 2015; Dempsey and Burton, 2012). Financial resources are required for routine operations in parks and also to carry out changes and required interventions from time to time (Carmona et al., 2008).

Secondly, parks need human resources with a specific set of skills. Staff working in a park requires the skills of “management”, “leadership”, “ability to engage the community”, and “ability to raise funds” (Collomb, 2015). They can be divided into three main categories, administrative staff who deals with supporting managerial processes like finance, clerical tasks and procurement, and operation staff who perform the day-to-day tasks. Parks also require having planning units that oversee the park direction and its goals, coordinate activities, assign resources and set developmental requirements. The tasks, responsibilities and authority must be defined clearly and also methods of evaluation and reporting. It is expected that staff may require training when they start or from time to time to improve their skills (Lankford et al., 2017).

Thirdly, tools, equipment and other supplies also support carrying out management processes. Tools and equipment will vary between parks according to their characteristics and the available financial resources. They will range from simple hand used ones to more complex equipment or heavy machinery. The allocation of material resources also requires management and coordination. Some tools and equipment will be available in each park while others, especially ones with higher costs, may be shared between several parks to maximize their benefits or rented when needed. In the case of having shared resources or renting externally, coordination becomes more crucial. It is important to also consider that these tools and equipment are subjected to wear and tear themselves which means that they will require maintenance or replacement from time to time (Lankford et al., 2017).

In this section, four park management requirements were discussed. They require careful examination and planning. Each park has to have a plan that describes clearly the park context, characteristics, desired direction and goals, in addition to the action plan to achieve these goals, standards of performance and allocated resources. The management process is continuous and modifying management plans along the process is to be expected. A certain degree of flexibility is required to allow the needed changes for better performance and to achieve the defined objectives.

5. The public parks system and management requirements

This research proposes a management framework that illustrates the process of management by integrating public parks definition as a system and their managerial aspects (Fig. 1). The public park system is defined to show in detail the interrelations between the components of that system. It merges the public park natural and man-made systems which have different elements with processes or assigned functions resulting in park qualities, benefits for humans, and impacts on their lives. These components together give a park its internal characteristics (Aly and Dimitrijevic, 2021). Defining the park in that form can support the management process in understanding the characteristics of an existing park, examining the dependencies between its components, evaluating its condition, setting goals for enhancements that can balance the ecological, sociocultural, and economic benefits of the park, and determining the scale of effect of any decided goals and interventions.

Likewise, the process that responds to the management requirements is demonstrated in the framework adopting a systems perspective. It is represented in the form of a cycle, instead of a linear process, with inputs, conversion mechanisms, outputs, and feedback. Elements or inputs of management are the *human, financial and material resources*. They perform the functions of *physical maintenance, grounds maintenance, managing activities and administrative functions* on the operational level resulting in a certain level of performance that should be identified internally (for individual parks or group of parks) through action plans, resources management, regulations, and performance standards.

Moreover, the framework also integrates different management levels to help guiding the operation of the park. Simpler terms are used

to describe these levels; the tactical level as setting *internal direction*, and the strategic level as *external direction* which can relate the park to networks of parks or goals that are beyond its internal benefits. Required resources and functions - management inputs - are determined according to the internal direction and goals for the park. These goals can be defined as desired outputs: park qualities, benefits, and impacts, using the public park system as mentioned earlier. The park operation level and internal direction handle three management requirements: setting direction, managing performance and dealing with resources.

Setting internal direction for the park and its operation can be extended to be a part of a wider scale direction at neighbourhood, city, region, or national level. The internal operation of the park will then reflect these ambitions too and the park can contribute to achieving wider benefits and long-term impacts. Mutual influences between the park internal characteristics and its external environment are important to be considered in being responsive to context as each park requires to be dealt with as a unique place knowing that the “one-size-fits-all” approach is less successful.

Finally, managing parks is not only about keeping existing elements functioning. Decisions and interventions can be made related to configuration functions: making a modification or introducing a new element, function, or quality. By doing so, the park management can be more adaptive, interactive and responsive to the context requirements. Users’ inputs in the form of feedback allows the management to keep its connection to the park’s context. They can also be considered as a management input in case of direct involvement in the management process. The whole management process should not work in isolation from the park users and the wider community but should engage with

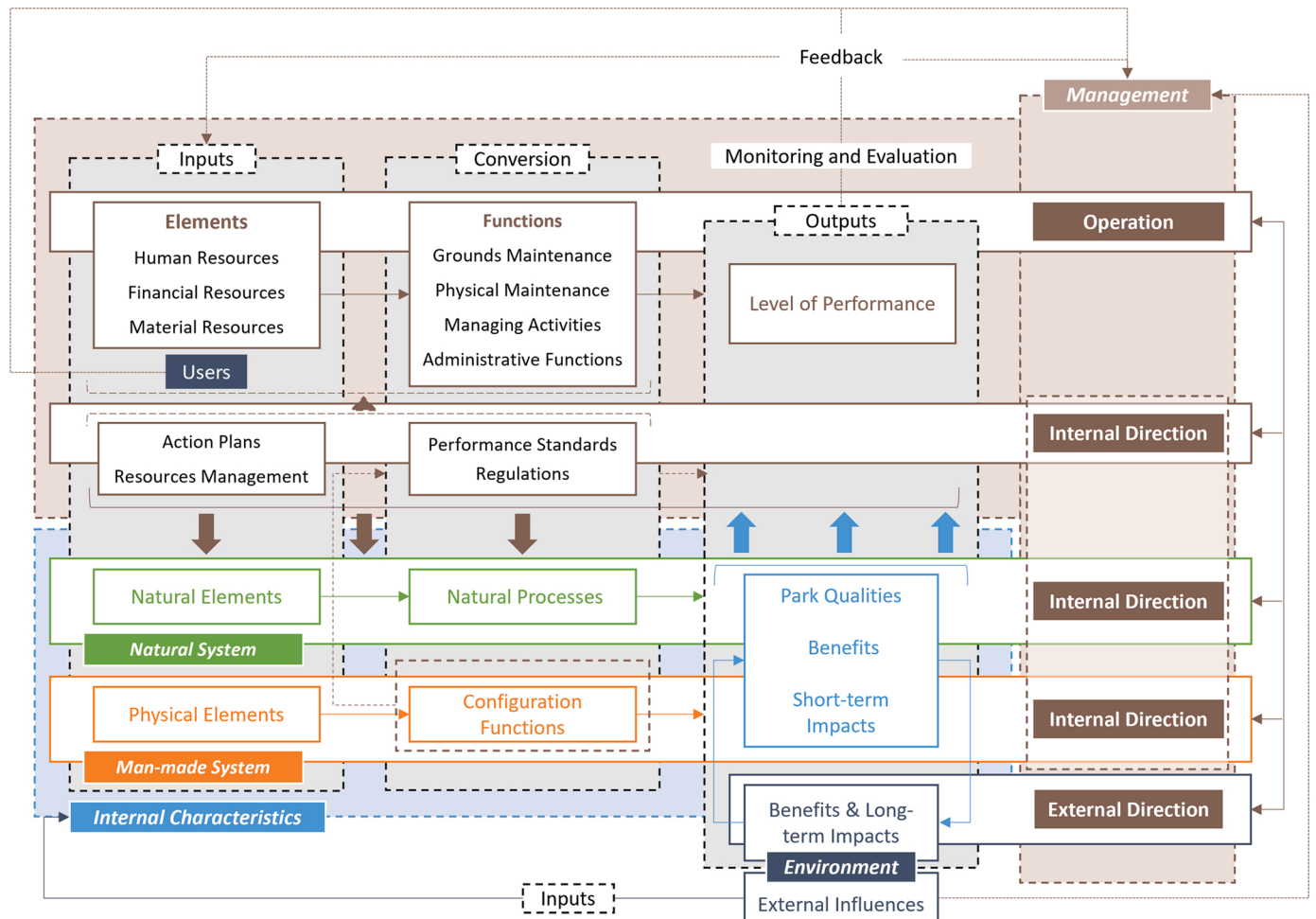


Fig. 1. Public Parks Management Framework.

them through either active involvement or continuous communications and feedback.

6. Conclusion

A public park is an amenity, open, public and green space that can provide multiple benefits for its users (Swanwick et al., 2003). It is a complex system that consists of a variety of components that act together to produce multiple outputs. Managing this system is in no way a less complex process. Successful management is not only about assigning suitable resources but also about understanding, firstly, the complexity of the system itself and, secondly, the variety of requirements and issues that require to be dealt with to keep this system working. Even with having proper resources, the quality of the public park and its management process can suffer without a good understanding of the whole process (Collomb, 2015; Dempsey and Burton, 2012; Haq, 2011; Jansson and Lindgren, 2012; Phong and Xiao, 2016).

This article complements the previous research that defined the public park system (Aly and Dimitrijevic, 2021) with the process of management. It discussed the importance of management in sustaining any public space and in creating positive perception about it. Current management practices were found to often lack a holistic approach that considers the integration of different managerial aspects on different levels of management. The article addressed the sustainable management of public parks and the importance of the systems approach to the process. Previous research on management of public parks was examined and some shortcomings were identified in both the content and structure of the existing management frameworks.

In the fourth section, four requirements for managing parks were defined. A general goal for managing parks is to balance between the activities that support users experience while protecting the park quality and minimising negative consequences (Chan et al., 2018, 2014). The final section brought together the public park system with the management requirements into one framework. The framework was structured to consider all the determined practice problems; it covers all management levels, coordination, feedback and evaluation, shows the relationships between all the components, and integrates in detail the systems of the park and its context, including users.

Park managers can use this framework as a comprehensive guide for management planning. It encompasses levels of strategic, tactical and operation management required for realising sustainable parks. A link is also made between management and how a park works internally as a system. The careful examination of that system can support the management process and guide any required development or intervention to enhance the park. Designers can also use this framework to consider management aspects at the start of the design process.

Author statement

Dalia Aly: Conceptualization, Methodology, Writing - Original Draft, Writing - Review & Editing, Visualization.

Branka Dimitrijevic: Conceptualization, Methodology, Writing - Review & Editing, Supervision.

Funding

The researcher [Dalia Aly] is funded by a full scholarship [MM5/19] from the Ministry of Higher Education of the Arab Republic of Egypt.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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