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Jagoda Adamus
Department of Regional Economics and Environment, University of Lodz, Poland

How Much Are Public Spaces Worth? Non-Market Valuation Methods in Valuing Public Spaces

Ile warte są przestrzenie publiczne? Alternatywne metody wyceny w wartościowaniu przestrzeni publicznych

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Abstract

Public spaces bring a variety of social and economic benefits to cities and their residents and guests. This article presents an overview of non-market valuation methods used to estimate the economic value of public spaces, distinguishing between direct (stated preference) methods and indirect (revealed preference) methods. Several important applications of these methods are also reviewed. In addition, the article highlights the usefulness of individual non-market valuation methods for estimating the market value of a broader set of non-market goods.

Streszczenie

Przestrzenie publiczne przynoszą miastom oraz ich mieszkańcom i użytkownikom różnorodne korzyści społeczne i ekonomiczne. Niniejszy artykuł przedstawia przegląd nierynkowych metod wyceny stosowanych do szacowania wartości ekonomicznej przestrzeni publicznych, z rozróżnieniem na metody bezpośrednie (preferencji deklarowanych) i metody pośrednie (preferencji ujawnionych). Autorka dokonała przeglądu kilku ważnych zastosowań tych metod i wskazała przydatność poszczególnych metod wyceny nierynkowej do szacowania wartości rynkowej szerszego zestawu dóbr nierynkowych.

Introduction

Public spaces are an integral part of urban space. Their role in urban development has changed and evolved over the centuries. Nowadays, a well-designed and actively used public space generates various benefits and values for the city, its residents, and users. The significant impact of well-designed and managed public spaces on social, market, cultural, and communicative behaviours makes them poles of city development, increasing their economic role in the life of the city.

When discussing the value of public spaces, their social value is usually indicated first. This results from the definition of public space (e.g., **Dymnicka** [**2008**: 35]; **Lorens**, **Martyniuk-Pęczek** [**2010**: 10]; **Rembarz** [**2005**: 146]; **Wejchert** [**1993**: 16]; **Collins, Stadler** [**2020**: 103–111]). Social value is subjective and related to users' needs. The diversity of these needs makes it possible to distinguish several dimensions of the value of public spaces, such as cultural, recreational, educational, and aesthetic. The assessment of social value is most often subjective and considers the individual opinion of the user. For this reason, social value studies are usually qualitative [**Adamus, Przygodzki, 2022**: 47; **Anderson et al., 2016**: 687–689; **Cladera et al., 2019**: 505–517].

It is more complicated to estimate the economic value of public spaces. Valuations using classic methods (comparative, income or cost approaches) may be difficult to implement due to the non-market nature of public spaces. In addition, these spaces are usually unique, fulfilling cultural, historical, and scientific functions, which further complicates their valuation. For this reason, non-market valuation methods are the most appropriate for estimating the value of public spaces. Thus, in this context, the paper aims to adapt non-market valuation methods to estimate the economic value of public spaces. The paper is a review article based on a literature review and desk research. The author also evaluates the usefulness of non-market valuation methods for estimating the market value of public spaces by indicating possible areas where these methods can be used.

Public space as a public good

Due to its interdisciplinary character, defining public space is a challenging task. Public space is the subject of research in different scientific disciplines, which is why its different features are emphasised in the various definitions. Sociologists focus on interpersonal relations and the building of social ties, treating public space as a social space. Meanwhile, architects and urban planners consider functionality and form, referring to design practice. In geography, public space is analysed in terms of the city's spatial structure, which determines the study's morphological, functional, and social aspects. Economists, on the other hand, point to its utility and value, highlighting its nature as a public good [**Mantey, 2019**: 21; **Polko, 2012**: 12]. Despite this wide variety of research approaches, it is possible to distinguish two features that characterise public space: (1) it is open to the public, and access to it is equal and free for all, (2) it allows people to establish interpersonal contacts and freely exchange their opinions, views, and thoughts [**Kohn, 2004**: 2–12]. **Kohn** [**2004**: 2–12] points to ownership, preferably public, as the third characteristic of public space. This feature of public space makes its definition even more complicated. It creates many categories of public spaces, such as quasi-public spaces, pseudo-public spaces, and privately-owned public spaces. Examples of these types of public spaces are shopping malls or private parking lots. Importantly, in such spaces, restrictions and regulations are often imposed on users. This can affect public accessibility, one of the basic features of public space.

In the economy, public spaces are classified into a category of goods known as public goods. The literature points to two basic features of public goods. First, once produced, the good can be consumed by the next consumer at no additional cost. This means that such a good can be consumed by many people at the same time and its resource is not reduced [**Holcombe, 1997**: 2–3]. These are the zero marginal costs of providing the goods to the next user. **Polko et al.** [**2021**: 33] refer to this characteristic as the absence of rivalry for public space. The second feature indicates that there is no possibility of exclusion from consumption. Thus, this

type of good can be used by everyone regardless of whether they participated in its creation and maintenance [**Polko et al., 2021**: 33–35].

Non-excludability leads to what is known as the free-rider effect, which is most often explained by the concepts of "the tragedy of common resources" [**Hardin, 1968**], "the prisoner's dilemma" [**Flood, 1958**] and "the logic of collective action" [**Olson, 1965**]. Each of these concepts points to the inevitability of the free-rider effect. The free-rider effect can be legitimated; in such a case, it is treated as a violation of established norms and is acceptable and involves merit goods. So a public space can also be considered a merit good. **Stiglitz** [**2004**: 104] defined the merit good as a product or service which is judged that an individual or society should consume or have open access to, regardless of the ability and willingness to pay. The public sector provides merit goods, free or cheap, to encourage their consumption. Typical examples of merit goods are education and health care. Consumption of merit goods provides external benefits. In the case of public spaces, external benefits stem from their social and cultural functions. Public facilities and spaces such as museums, libraries, and parks should be delivered at an appropriate level of quality regardless of the behaviour and needs of real estate markets and economic agents.

In the case of public spaces, the second feature of a public good – non-exclusion from use and accessibility to the public – may not be fulfilled. This occurs when, for example, a public space or part of it is occupied by a selected group of users. Public spaces may also be subject to the effect of congestion, resulting in limited accessibility. In such cases, public space takes on the features of a club good [**Buchanan, 1965**: 1–14; **Chohan, D'Souza, 2020**: 6–7]. The consequence of limiting accessibility is competition for public space. Thus, the first characteristic of a public good is not fulfilled, either. In this way, public spaces are not always pure public goods.

Public spaces are non-market goods so they cannot be valued based on selling prices [**Fausold, Lilieholm, 1999**: 314–315]. However, competition for public spaces gives it the features of market goods, subject to market processes and mechanisms. From an economic point of view, this can be explained by referring to the resource limitation theory. The basic features of public spaces are their physicality and limitedness [**Podciborski, 2011**: 9–10]. Consequently, public spaces can also be included in the category of scarce goods. On the one hand, this determines rivalry and competition, but on the other, it intensifies congestion and restricts access to public spaces.

Value of public spaces in an economic context

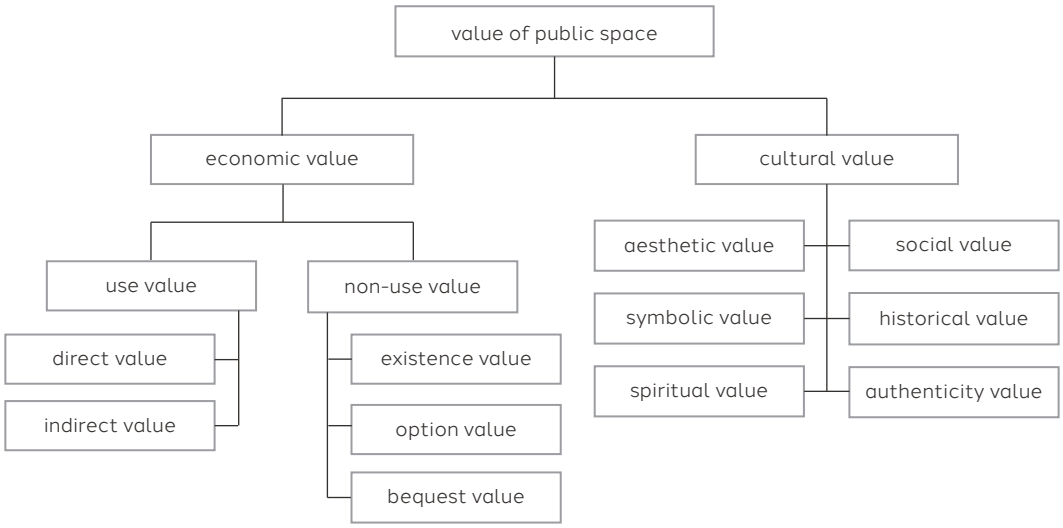
Value is one of the main economic categories, usually expressed in market prices. This understanding of value is justified by the utility of goods, that is, the benefit provided through their consumption. In neoclassical economic theory, value is given to those goods that fulfil human needs [**Anderson, 2012**: 96–99; **Giergiczny, Kronenberg, 2012**: 74]. However, in the case of public goods, common goods, and merit goods – and public space is such a good – the concept of total economic value (TEV) is relevant. In this concept, in addition to price, the value of the good is also determined by elements related to its direct or indirect use or even just the satisfaction that the good exists [**Pearce, Turner, 1990**; **Żylicz, 2017**: 115–116].

TEV consists of a good's use and non-use value (Figure 1). The use value is divided into direct and indirect values. The direct value is often related to the physical consumption of the good, but this is not a necessary condition. The direct use value of a public space can be exemplified by the value of spending time in it. In this context, it is also possible to identify those elements of public spaces which are in demand on the market. This makes it possible to directly determine their exchange value (price). The exchange value can be the value of assets (e.g., benches in public spaces) and services provided (e.g., the price of a museum ticket). One example of the indirect value of a public space can be the enhancement of its aesthetic value as a result of revitalisation. **Krutilla** [**1967**: 777–781] noted that the use value does not completely exhaust the amount that consumers are willing to pay for a good. Thus, he distinguished the non-use value of a good, which he divided into an existence value, option value, and bequest value. The existence value results from the exist-

ence of a given public space even if an individual or community does not directly use it on a daily basis and does not plan to do so in the future. The option value is related to the possibility of a given person using the space in the future. The bequest value, meanwhile, results from the possibility of leaving a public space to future generations, both individuals and society as a whole [**Plottu, Plottu, 2007**: 53–54; **Throsby, 2001**: 78–79; **Weisbrod, 1967**: 471–473].

Together, the use and non-use values constitute the total economic value of a public space. The inclusion of the non-use value in the valuation of public spaces makes it possible to capture its value as a worth good to individuals and societies for reasons other than consumption (existence, option, and bequest values). Public spaces are often cultural goods, part of the cultural and historical heritage of a city. According to utility theory relying on individual preferences, all values that can be identified as cultural are contained in economic valuation. However, many authors claim that including the cultural value in the economic value is an oversimplification. The links between the economic and cultural values remain a matter of debate. Researchers such as **Pearce** [**1987**] and **Bonus and Ronte** [**1997**] believe that the cultural value is contained within the economic value. A different view is held by **Throsby** [**2001**], who argues that the cultural value influences the economic value, but they are separate categories. The separation of the cultural and economic values was also pointed out by **Hutter and Shusterman** [**2006**], **Dekker** [**2014**] and **Hutter and Frey** [**2010**]. Some researchers believe these values can be evaluated independently (e.g. **Candela and Scouru** [**1997**]).

Figure 1. Public space value in the context of total economic value and concept of cultural capital



Source: Author's own compilation based on [**Plottu, Plottu, 2007**; **Throsby, 2001**].

Therefore, it is reasonable to consider the value of public spaces from a slightly broader perspective. Based on the concept of the total economic value, **Throsby** [**2001**, **2010**, **2012**] developed the concept of cultural capital (Figure 1). According to him, the value of cultural heritage consists of an economic value (in the sense of TEV) and cultural value. He pointed to the multidimensionality of the cultural value, distinguishing aesthetic, symbolic, spiritual, social, historical, and authenticity values (Figure 1). This understanding of cultural heritage value stresses its economic value [**Thorsby, 2001**: 28–31].

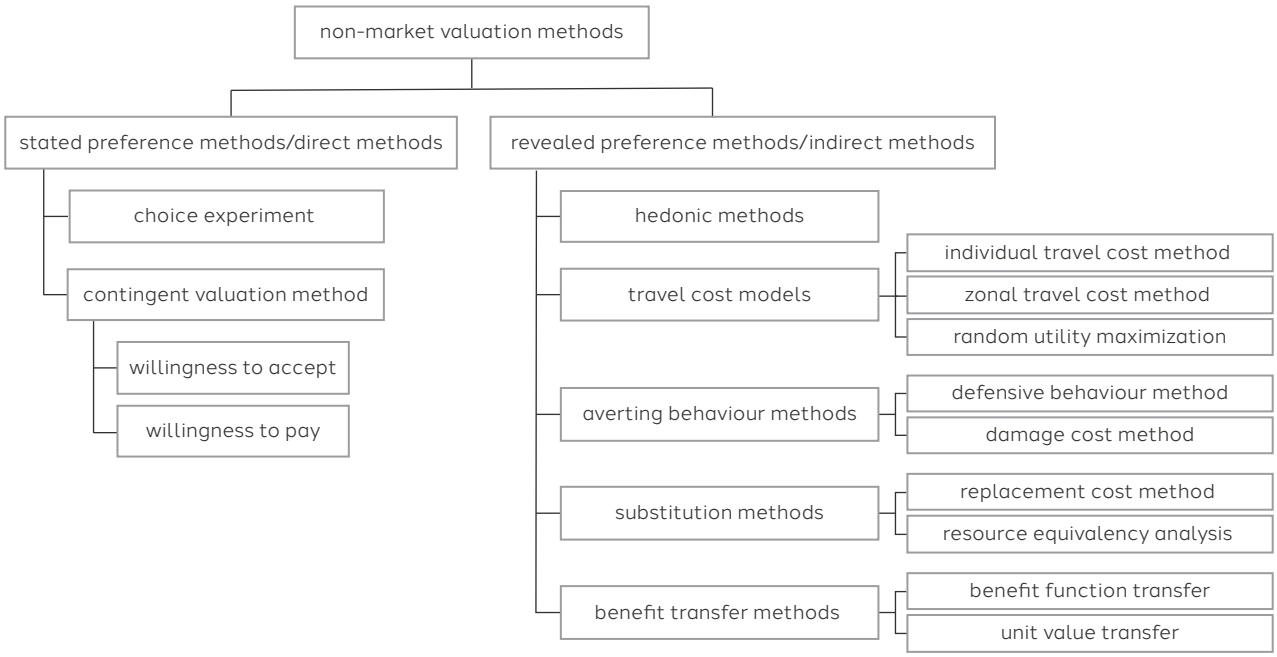
The value of public spaces, which are a specific type of good, should be considered in different aspects. Their diversity causes each of them to have a different value. In addition to the economic value, the non-use value is essential in the case of public spaces.

Methods of estimating the value of public spaces

Public spaces as atypical, unique properties with cultural and historical functions that cannot always be valued using classical valuation methods. Therefore, it is more appropriate to use alternative methods (non-market valuation methods) in the valuation of non-market goods.

Non-market valuation methods were mostly developed in the United States in the 1950s. Government agencies originally used them to analyse the costs and benefits of planned water infrastructure, such as dams. Over time, environmental economists modified these techniques and applied them to the valuation of environmental goods. The development of non-market valuation methods accelerated in the 1980s and was associated with changes in US law. Among other things, cost-benefit analyses were mandatory for planned environmental regulations and the assessment of the damage to natural resources caused by oil spills and other environmental contamination. These changes in the law and many other subsequent changes contributed to the development of non-market valuation methods and their practical use [**Segerson, 2017**: 4–5].

Figure 2. Non-market valuation methods for estimating non-market goods



Source: Author's own compilation based on [**Adamus, Przygodzki 2022**].

Non-market valuation methods are divided into two groups: direct and indirect (Figure 2). Direct methods, also called stated preference methods, include the contingent valuation method (CVM) and choice experiments (CE) [**Champ et al., 2017**: 20–22]. They involve creating a hypothetical market in which potential consumers value goods that are not present on the market and are not subject to market exchange [**Kroes, Sheldon, 1988**: 11–13; **Sokołowicz, Przygodzki, 2020**: 2–3; **Przygodzki, Waleski, 2021**: 13–14]. Indirect methods include revealed preference methods and refer to substitute markets. They rely on observing the prices of goods and services shaped by the market. It is assumed that, although a given good is not present in the market, it can be associated with another market good that has a price [**Segerson, 2017**: 20–22; **Żylicz, 2017**: 117]. These prices are shaped by actual consumer behaviours and are therefore considered reliable [**Rykała, 2019**: 112–113]. Indirect methods include Travel Cost Models (TCM), the Hedonic Method (HPM), Averting Behaviour Methods (ABM), Substitution Methods, and Benefit Transfer Methods (BTM).

Contingent Value Method – field of application

The contingent valuation method is the most used method to assess demand for non-market benefits. The CVM belongs to stated preference methods and is based on surveys. A hypothetical market is described in a survey questionnaire, and it provides researchers with information about the respondents' willingness to pay for the benefits received or accept compensation for the losses incurred [**Bogdani, 2015**: 15; **Boyle, 2017**: 83–86]. It is assumed that, despite the hypothetical situation, respondents will behave as they would in a real market [**Diamond, Hausman, 1994**: 46; **Wróblewska, 2014**: 157–158]. This determines whether an economic goal is achieved or compensation for the loss of opportunity to use a good is accepted. The willingness to pay (WTP) for a good is the maximum amount the respondent can pay for it. In contrast, compensation (willingness to accept, WTA) defines the minimum value that a person can accept for the loss of the good [**Rykała, 2019**: 113]. The CVM is established in classical welfare theory and determines the monetary value of goods that are difficult to exchange in the market [**Freeman, Herriges, Kling, 2014**: 383–385].

The CV method was initially proposed by **Ciriacy-Wantrup** [**1947**]. **Davis** [**1963**] was the first to use the CV method empirically to estimate the value of goose hunting in Maine. Also crucial for developing the CVM was the paper of **Samuelson** [**1954**], who pointed out the problem of strategic consumer behaviour toward public goods. The breakthrough for the implementation of the CVM was an oil spill off the coast of Alaska in the late 1980 s, known as the Exxon Valdez oil tanker disaster. The event was unprecedented in terms of the amount of oil that entered the environment and the damage it caused. There was no economic loss. Nevertheless, the Alaskan authorities demanded USD 3 billion in compensation from Exxon Valdez for the losses suffered by Americans. The contingent valuation method was used to estimate the amount of compensation. The use of CVM valuation methods has become widespread in legislative processes in the United States [**Venkatachalam, 2004**: 89–91]. Also important to the development of the method were studies criticising it and pointing out its shortcomings. Among the most essential papers in this regard were those by **Eberle and Hayden** [**1991**], **Diamond and Hausman** [**1994**] and **Whitehead** [**2005**]. These studies led to improved reliability and consistency with the reality of the research results and emphasised the need to consider the utility of the studied goods. Utility is now one of the most important issues in identifying the economic value of assets such as cultural heritage, public space, and natural resources.

The CVM can estimate various types of public goods, such as transportation, health, education, and arts. However, it is most commonly used to value the environment [**Carson et al., 1994**; **Boyle, 2017**, Table 1].

Table 1. Areas of application of the CVM for the valuation of environmental goods

Examined problem		Examples of studies
water	protection of waters against pollution	**Sheppard et al., 1993**; **Sutherland, Walsh, 1995**; **Markowska, Żylicz, 1999**
	improvement of inland water quality (rivers, lakes)	**Desvousges et al., 1987**; **Stumborg, et al. 2001**; **Azevedo et al., 2012**; **Jala, Nandagiri, 2015**; **Carson, Mitchell, 1993**
	quality of tap water and sanitary facilities	**Howe et al., 1994**; **Griffin et al., 1995**; **Whittington, 1998**; **Merrett, 2002**; **Gnedenko et al., 2000**; **Egan et al., 2009**; **Rauba, 2016**; **Wróblewska, 2014**
	drinking water supply	**Piper, 1998**; **Adamowicz et al., 2011**
air	improvement of air quality	**Wang, Zhang, 2006**; **Chau et al., 2011**; **Akhtar et al., 2017**; **Dziegielewska, Mendelsohn, 2005**; **Ligus, 2017**; **2018**; **Afroz et al., 2005**; **Wang, Whittington, 1999**; **Wang, Mullahy, 2006**; **Wang et al., 2006**
	reduction of the risk of diseases due to air pollution	**Ortiz et al., 2009**; **Desaigues et al., 2011**; **Huang et al., 2012**; **Sun, Yuan, Xu, 2016**; **Istamto et al., 2014**
other environmental goods	rare and endangered plant and animal species	**Brookshire, Eubanks, Randall, 1983**; **Richardson, Loomis, 2009**
	wilderness, forests, national parks	**Czajkowski, Buszko-Briggs, 2008**; **Bateman, Langford, 1997**
	protection of natural resources	**Blomquist, Whitehead, 1998**
	recreational value of environmental goods	**Czajkowski et al., 2007**; **Fuzyova, Lanikova, Novorolsky, 2009**; **Bateman, Langford, 1997**; **Carson et al., 2001**

Source: Author's own compilation.

Table 2. Areas of applying the CVM to value different types of public spaces

Examined problem		Examples of studies
Cultural and historical heritage	Material cultural heritage	**Kling et al., 2001**; **Mourato et al., 2002**; **Maddison, Mourato, 2002**; **Carson et al., 2002**; **Tuan, Navrud, 2007**; **Tuan, Navrud, 2008**; **Kim et al., 2007**
	Intangible cultural heritage	**Lockwood et al., 1996**; **Lee, 2015**; **Verbič, Slabe-Erker, 2009**
	Cultural asset restoration	**Báez i Herrero, 2012**; **Del Saz Salazar, Montagud Marques, 2005**
	Access to monuments	**Maddison, Foster, 2003**; **Mazzanti, 2002**; **Batzias, Kopsidas, 2020**
	Value of cultural heritage for different user groups	**Beltrán, Rojas, 1996**; **Sanz et al., 2003**; **Ji et al., 2018**; **Giannakopoulou et al., 2017**; **Cuccia, Signorello, 2002**
Green public spaces		**Rykała, 2019**; **Grandstaff, Dixon, 1986**; **Verbič et al., 2016**
Sports infrastructure		**Johnson, Whitehead, 2000**; **Groothuis et al., 2004**; **Owen, 2006**; **Johnson et al., 2006**; **Johnson et al., 2007**; **Fenn, Crooker, 2003**; **Walker, Mondello, 2007**

Source: Author's own compilation.

The CVM has been rarely used to value urban public spaces. A literature analysis reveals that most goods valued with this method are public goods and refer directly to public spaces. Protected green areas, waterside areas, sports infrastructure, and elements of tangible cultural heritage (e.g., museums, monuments, and squares) are types of public spaces. These places meet the essential criteria for identifying public spaces. They are open to the public and allow contact with people. As the most widespread of non-market valuation methods, the CVM should find wider and more ambiguous applications in the valuation of typical public spaces.

Choice experiment for identifying the value and utility of public spaces

The choice experiment is also based on a respondents' preferences survey whereby they make hypothetical choices. The difference from the CVM is that the CE is used to value goods or services that are best described by a set of characteristics (attributes) that the consumer identifies with utility. The CE is useful in determining the value of a good in many dimensions [**Lancaster, 1966**: 144; **Marks-Bielska, Zielińska, 2014**: 38–39].

The choice experiment was formed from a combination of value theory [**Lancaster, 1966**] and random utility theory [**Manski, 1977**]. Value theory assumes that utility is achieved using the characteristics of the consumed goods rather than from consuming the goods themselves. It assumes that certain attributes can characterise each good, and the CE makes it possible to value them. In a survey, the respondents are presented with several propositions characterised by a set of attributes. One choice proposition is usually given as the status quo, while others refer to change. The respondents choose the scenario they consider best [**Giergiczny, Kronenberg, 2012**: 79; **Sokołowicz, Przygodzki, 2020**: 1–4]. The price is based on a cost estimate agreed upon in relation to the actual costs necessary to implement the proposed scenarios. The price of the proposal is always included in the set of attributes, which allows for multifaceted value estimation and survey results to be used in cost-benefit analysis or other non-market valuation methods [**Holmes et al., 2017**: 134–135]. Sometimes the respondents are asked to rank the proposals from best to worst [**Louviere, 2001**: 13–17]. Thus, market values are used to estimate attributes for scenarios. Non-market goods, i.e., public goods and common goods, are valued indirectly based on market prices.

The CE method was originated by **Louviere and Hensher** [**1982**] and **Louviere and Woodworth** [**1983**], who conducted research in marketing and transportation. Meanwhile, studies by **Adamowicz et al.** [**1994**] were also vital to the development and wider application of the CE.

However, like the CVM, the choice experiment primarily values environmental goods. For example, **Layton and Brown** [**2000**] examined the preferences for mitigating the effects of global climate change, while **Rolfe et al.** [**2000**] estimated issues related to rainforest conservation. **Christie et al.** [**2006**] valued biodiversity in the UK, and **Giergiczny and Kronenberg** [**2012**] valued trees in the central Polish city of Łódź. **Do and Bennett** [**2009**], **Othman et al.** [**2004**], **Carlsson et al.** [**2003**], and **Birol et al.** [**2006**] valued wetlands. CE has also been

used to study drinking water supply and quality (e.g., **Abou-Ali, Carlsson [2004]**; **Gordon et al. [2001]**), while **Das et al. [2010]** and **Jin et al. [2006]** used it to estimate solid waste management efficiency values. **Chèze et al. [2020]** studied the willingness of farmers to reduce the use of synthetic pesticides. **Mangelkamp et al. [2019]** focused on the value of local electricity. The choice experiment has also been used to determine the value of cultural heritage (e.g., **Sokołowicz, Przygodzki [2020]**; **Kinghorn, Willis [2008]**).

Although the complex structure of the choice experiment seems the most appropriate for valuing public spaces, it has rarely been used for this purpose. Estimating the value of individual features of a given good makes it possible to value those elements that create public spaces. This makes it possible to indicate the characteristics of highly valued spaces, but also those that do not meet user expectations and should be changed. The scenarios help the respondents to make a decision. The complexity of potential changes in public spaces can be difficult for respondents to imagine and evaluate. The presentation, even in the form of a description, illustrates the possible changes and should facilitate the respondents' decision-making.

Travel Cost Models and application in the valuation of public spaces

The Travel Cost Model was created by **Hotelling [1949]**, who valued national parks in the United States. The method was further refined by **Trice and Wood [1958]** and **Clawson [1959]**. The TCM is based on the assumption that the more people visit a place, the more valuable it is. The distance covered by the visitors and the price of the trip indicate the value of the place [**Moeltner, 2003**: 214–220; **Żylicz, 2017**: 117–118]. The amount of money spent to get to it, stay there, and return is equivalent to the value of the site [**Giergiczny, 2016**: 120–122]. Travel costs are estimated in three ways: the individual travel cost method (ITCM), the zonal travel cost method (ZTCM), and random utility maximisation (RUM) [**Torres-Ortega et al., 2018**: 4; **Parsons, 2017**: 188–190; **Trice, Wood, 1958**: 195–207].

The TCM allows the valuation of use values related to the recreation site data used. Recreation sites include places of natural attraction and those associated with cultural heritage, including public spaces. Using the TCM, one can estimate the value of:

- the entrance to a recreation site (determining the total recreational value of a site),
- the use value, which is related to changes in the quality of a recreation site,
- specific recreational activities at a given place [**Bartczak, 2013**: 12–20].

The TCM has been used to value various natural recreation sites. For example, **Bockstael et al. [1984, 1987]** and **Zhang et al. [2015]** researched the value of beaches, while **Fleming and Cook [2008]** and **Jala and Nandagiri [2015]** focused on the recreational value of lakes. The value of national parks and protected areas have also been investigated (e.g., **Herath, Kennedy [2004]**; **Zambrano-Monserrate et al. [2018]**; **Gürlük, Rehber [2008]**). Various forms of recreation, such as fishing, swimming, boating, climbing, beachcombing, hiking, hunting, and skiing, have also been referred to (e.g., **Carson et al. [1987, 2009]**; **Shaw, Yakus [1996]**; **Provencher, Bishop [1997]**; **Offenbach, Goodwin [1994]**; **Grijalva et al. [2002]**; **Massey et al. [2006]**). The recreational value of cultural heritage was also estimated. The TCM method has been used to value museums (e.g., **Torres-Ortega, Pérez-Alvarez et al. [2018]**; **Martin [1994]**) and monuments [**Bosek, Mazurkiewicz, 2015**; **Alberini, Longo, 2006**; **Tourkolias et al., 2015**; **Pérez-Álvarez et al., 2016**]. **Poor and Smith [2004]** estimated the value of restoring Historic St. Mary's City in the US state of Maryland, while **Bedate et al. [2004]** estimated the value of cultural tourism in Spain. Finally, **Boter et al. [2005]** compared the values of competing cultural institutions in the Netherlands.

A review of the literature on the TCM indicates that this method is mainly applied to valuation goods with tourist and recreational functions. Public spaces are undoubtedly such places, as they generate both external and internal tourist and recreational traffic (among residents of the city where the space is located). The cited examples of the TCM use also refer to different types of public spaces, such as beaches, national parks, and monuments. However, there is a lack of TCM-based research on public spaces that are not monumental or environmental.

Hedonic Pricing Method – properties and use

The hedonic pricing method assumes that goods are valued for their utility, and the value of a non-market good can be decomposed into the smaller values that create that good [**Lancaster, 1966**: 133–135]. The value of the attributes that may have influenced the difference is determined based on differences in market prices. This provides an indirect estimate of the value of the studied component [**Bajerowski, 2007**: 8–16].

The HPM became one of the main economic tools in the mid-1970s, when the seminal work of **Rosen** [**1974**] was published, presenting a model of analysis for a market with perfect competition. However, as **Nijkamp** [**2012**: 95–97] points out, the HPM is also applicable in imperfect market conditions and is used in various markets (e.g., cars, wines, agricultural products, household appliances, cultural goods, and environmental goods). However, it is most often used in housing markets to determine the impact of environmental goods on housing prices. One can point to, for example, **Bayer et al.** [**2009**], **Kim et al.** [**2003**], and **Borkowska et al.** [**2001**], who related housing price to air quality. **Liebelt et al.** [**2018**], **Jiao and Liu** [**2010**], **Geoghegan** [**2002**], and **Czembrowski and Kronenberg** [**2016**] analysed urban green spaces and housing prices. The HPM has also been used to estimate the value of trees (e.g., **Anderson, Cordell** [**1988**]; **Luttik** [**2000**]; **Donovan, Butry** [**2010**]; **Price** [**2003**]), wetlands [**Tapsuwan et al., 2009**; **Bin, 2005**], beaches [**Gopalakrishnan et al., 2011**], and landscapes [**Geoghegan et al., 1997**; **Benson et al., 1998**; **Waltert, Schläpfer, 2010**; **Jim, Chen, 2009**]. There has also been research on the negative impact of changes in the natural environment on housing prices (e.g., **Mueller, Loomis** [**2014**]; **Chen** [**2017**], **Gamper-Rabindran, Timmins** [**2013**]), while **Brandt et al.** [**2014**] analysed how the price of housing is affected by the neighbourhood of religious sites. HPM has also found application in heritage valuation, including in relation with the housing market (e.g., **Moorhouse, Smith** [**1994**]; **Lazrak et al.** [**2014**]; **Rudokas et al.** [**2019**]; **Narwold et al.** [**2008**]). It has been used to estimate whether the designation of an object as heritage affects its value (e.g., **Deodhar** [**2004**]; **Ahlfeldt, Maenning** [**2010**]; **Coulson, Lahr** [**2005**]; **Heintzelman, Altieri** [**2011**]; **Noonan** [**2009**]).

The HPM is thus used to value public spaces in the context of the real estate market. The prices of apartments are analysed, which are influenced by various factors, such as neighbouring parks, other green areas, or historic spaces. However, in this method, there is another area for analysis related to public spaces. The choice of place to live is also influenced by urban amenities, which are also public spaces. Urban amenities that are public spaces include transport infrastructure (car parks, cycle paths, stations, public transport stops), backyards and their arrangement (urban furniture and playgrounds), public services (e.g., kindergartens and schools), and cultural institutions (such as libraries, museums, and health services). The HPM can also value these amenities, and their presence will shape the price of the property. Thus, the HPM makes it possible to analyse price relationships between market goods and almost any type of public space and the elements that compose this space. The main advantage of the hedonic price method is that estimates are made based on actual choices. It can also be considered universal and used to analyse the interaction between market goods and highly differentiated non-market goods.

Averting Behaviour Methods in valuing public spaces

Averting behaviour methods refer to the valuation of actions taken to avoid or protect against hazards. These actions make it possible to avoid a hazard, reduce the chances of it occurring, or mitigate its negative effects [**Lloyd-Smith et al., 2018**: 220–221]. The theoretical basis for estimating averting behaviour methods was developed, among others by **Courant and Porter** [**1981**], **Bockstael and McConnell** [**1983**] and **Harrington and Portney** [**1987**]. Also crucial to the evolution of the method were studies that used averting behaviour models to estimate changes in welfare [**Blomquist, 1979**; **Cropper, 1981**; **Watson, Jaksch, 1982**].

The ABM is based on the observed behaviour of respondents. It is assumed that people will take protective action as long as the benefits of such action are more significant than the costs [**Dickie, 2017**: 293–295; **Freeman, 1979**: 3–9]. Damage costs are either direct (e.g., costs of repairs, renovations, or pavement replacement

in public spaces) or indirect (e.g., lost productivity as a result of air pollution). ABMs include the defensive behaviour method and the damage cost method. The former refers to actions taken to reduce damage, while the latter refers to the actual damage and the resulting costs. Both methods are used to value the same endpoints – health and materials – and to make it possible to determine the value of changes caused by damage or destruction [**Dickie, 2003**: 293–295].

ABMs are most often used to estimate environmental risks associated with pollution or the threat of polluting the environment. They have been used to value, among other things, the avoidance of risks associated with drinking water contamination (e.g., **Dasgupta [2004]**; **Harrington et al. [1989]**; **Abdalla [1990]**; **Um et al. [2002]**) or air pollution [**Richardson et al., 2012**; **Bartik, 1988**; **Bresnahan et al., 1997**]. **Murdoch and Thayer [1990]** estimated the benefits of purchasing sunscreen to avoid skin cancer risk.

Various types of hazards occur in public spaces. One of the most common hazards in public spaces is car traffic, which poses a threat to the life and health of users while also contributing to environmental pollution. To avoid these risks, changes in traffic organisation are often introduced and 30 kph zones[1] are created. The costs of such changes will be borne mainly by car users, e.g., by reducing the number of parking spaces or slower speeds and, therefore, longer travel time.

Another problem in public spaces is overcrowding, which causes various inconveniences. One inconvenience may be reduced accessibility of the space and its elements and increased risk of pickpockets. In this case, the cost of avoidance will be carried by the user, who will, for example, bear the cost of commuting to other, less overcrowded, safer public spaces. The congestion of public spaces has been a particularly important threat during the COVID-19 pandemic. The willingness to use and be in public spaces obliges people to observe restrictions, i.e., to keep a distance, but also to purchase and use personal protection measures, such as face masks [**Adamus, Przygodzki, 2022**: 77–78].

Substitution methods – characteristics and applications

The group of substitution methods is based on supply-side data, i.e., data on the characteristics and production costs of goods and services sought by consumers. The cost of providing alternative services is a measure of the value of the service/good of interest. These methods estimate the cost of replacing or reproducing a lost service/good [**Brown, 2017**: 347–349]. Substitution methods include the replacement cost method (RCM) and resource equivalency analysis (REA). The former was originally known as the opportunity cost approach. As **Eckstein [1958**: 52] pointed out, when benefits cannot be evaluated by observing market prices, the benefit can be assumed to be equal to the opportunity cost. He defined the opportunity cost as the cost of providing a comparable product. The RCM has been indicated as a method for valuing public services offered by the private sector [**Brown, 2017**: 347–349]. On the other hand, the REA refers to the cost of restoring degraded/destroyed environmental resources or the costs associated with the anticipated loss of ecosystem services [**Giergiczny, Kronenberg, 2012**: 77, **Brown, 2017**: 347–349].

Both the RCM and REA determine the costs of providing, protecting and compensating for lost environmental or public services. Replacement and reproduction costs can be estimated when appropriate conditions for substitutes are fulfilled. First, the substitute must provide services/a function equivalent in quality and quantity to the valued services and goods. The substitute should also be the cheapest way to replace the service/good. It is also assumed that the substitute and its services will be in demand because the services were not provided by the services/goods under study [**Freeman et al., 2014**: 427–428]. In the RCM, a substitute will be provided if the service/good under consideration is not supplied. In the REA, the valued service has been lost, so the proposed alternative is a replacement [**Brown, 2017**: 349–350].

[1] 30 kph zones (30 kilometres per hour zones) and similar 20 mph zones (20 miles per hour zones) are forms of speed management used in urban road areas. In addition to a nominal speed limit, calming traffic measures (physical, such as speed bumps, and mental, such as lines and signs) are used. Streets in these zones are considered a space for people who live, work, play and learn in the area, while people who cross the zone to get elsewhere are excluded. Theoretically, this is intended to reduce rat running while improving safety and quality of life in the area [**Dover, Massengale, 2013**].

The work of **Eckstein [1958]** was crucial for the development of substitution methods. The researcher pointed out the main principles of their implementation. Substitution methods have been applied primarily in the valuation of environmental goods and services, i.e., water and flood protection (e.g., **López-Morales, Mesa-Jurado [2017]**; **Edens, Graveland [2014]**; **Adger et al. [1997]**; **Barbier [2016]**; **Levrel, et al. [2012]**), as well as in studies on wetlands [**Strange et al., 2002**; **Leschine et al., 1997**], aquatic species of animals and plants (e.g., **Jackson et al. [2014]**; **Strange et al. [2004]**) and coral reefs [**Spurgeon, 1992**]. Substitution methods have also been used to value forests and trees [**Notaro, Paletto, 2012**; **Leverkus, Castro, 2017**] and soil erosion costs [**Samarakoon, Abeygunawardena, 1995**; **Gunatilake, Vieth, 2000**].

The RCM and REA are commonly used in real estate valuation. However, substitution methods can also be used to value non-market goods, and then the subject of research and the methodology of the valuation process change. Both methods can also be used to value public spaces. Both the replacement and reproduction of public spaces can be valued, as well as the services that these spaces provide (e.g., related to organising and spending leisure time). The private sector increasingly provides the services expected from public spaces. For example, shopping centres are taking over traditional functions of public spaces. In this context, too, substitution methods can be applied. These methods can also be an interesting proposal for estimating the value of public spaces after redevelopment. These places often have no chance of being restored to their original state, and new designs need to consider the *genius loci* of a given site.

Benefit Transfer Method – properties and applications

The last method, the benefit transfer method, involves valuing non-market goods using previously conducted research. It is used when there is a lack of resources or time, or other obstacles occur, and it is impossible to conduct original empirical research [**Brouwer, 2000**: 137–141]. Both benefits and costs can be transferred [**Bartczak, 2013**: 65–66; **Plummer, 2009**: 39–40]. This method assumes that utility functions, prices of market goods, income, modifications and characteristics of the non-market good under study are the same. This assumption ensures comparability of the valued non-market goods [**Freeman, 1984**: 167–186]. Single values (unit value transfer) or functions (benefit function transfer) can be transferred [**Rosenberg, Loomis, 2017**: 431–432].

Freeman [1984] outlined some key criteria that an original valuation study should meet to provide a basis for a valid transfer. These criteria were pivotal to the evaluation of benefit transfers. The recognition of this method came with the publication of a special issue of *Water Resources Research* in 1992, which was devoted entirely to it. **Boyle and Bergstrom [1992]** proposed three "ideal criteria" for benefit transfers. A vital contribution to the development of the method also came from **Desvousges et al. [1992]**. They suggested that more information, and therefore more robust benefit transfers, could be achieved with the transfer of entire demand functions [**Desvousges et al., 1992**: 681–682].

The BTM has been used to estimate the value of wetlands [**Woodward, Wui, 2001**], water quality and supply [**Barton, 2002**; **Piper, Martin, 2001**] and coral reefs [**Brander et al., 2007**]. Other non-market goods valued by the transfer method include cultural heritage sites. Consulting company EFTEC (Economics for the Environment Consultancy) conducted a transfer method valuation of six historic sites in the UK. The result of this work was to create a database for estimating the value of similar objects. **Mourato et al. [2014]** combined environmental and cultural assets and investigated the economic benefits of reducing damage caused by climate inside historic buildings.

The BTM, as the only non-market valuation method, is difficult to implement in estimating the value of public spaces. Public spaces are mostly unique and unrepeatable in terms of many features, including location, function, equipment, and significance. Many of them are monumental. The uniqueness of public spaces often makes it impossible to transfer value from one space to others. While the BTM can be applied when estimating the value of a single feature of a public space, such as its function or elements of its equipment, it can also be used to value activities undertaken in public spaces.

Conclusions

Public spaces are an integral part of urban space, permanently embedded in its structure. Over the centuries, their meaning in urban development has changed. At present, it is assumed that well-managed and, therefore actively used, public spaces strengthen urban ecosystems and are capable of generating development processes relevant to the city as a whole. The influence of public spaces on social, cultural, and market behaviour makes them axes of city development. The growing importance of public spaces in the development and functioning of cities is enhanced by progressive urbanisation.

On the one hand, the growing number of urban residents contributes to stimulating and intensifying competition for urban spaces, including public spaces. The growing number of residents is also reflected in the increasing number of investors and decision makers. Thus, competition is intensifying within one group of users and between different groups of city users. On the other hand, when the role of the location factor in the development of increasingly mobile enterprises is no longer relevant, cities need to attract residents differently. Cities are thus becoming centres of consumption. The maximisation of consumption causes it to cover more areas of life, such as art and culture. Public spaces are also the subject of consumption, becoming a kind of urban product. Given the increasing pressure to consume (e.g., due to increasing investment in cities), public spaces are becoming rare goods, and it can be predicted that this trend will increase. In addition, the decreased importance of the location factor results in cities having to attract future residents with something other than an attractive labour market. In this context, public spaces are an attractor, a product offered to future residents. Public spaces are therefore one of the elements that influence the quality of life in a city and thus increase the city's competitiveness.

All this means that public spaces are considered in market terms, as it will be increasingly important to identify the value of these places in an economic context. As indicated above, public spaces are both a market commodity and a co-marketing infrastructure. This means that they directly or indirectly affect the processes of economic growth. In social terms, they determine the well-being of city users. Public spaces are one of the important multidimensional factors of urban development. Knowledge about the value of public spaces allows development policies to be shaped more effectively, and it is an important negotiating argument when competing for urban space. It is also an important determinant of the changes and transformations of public spaces. In addition to knowledge of the economic value of public spaces, it is important to consider how they interact with their surroundings and economic zone. This, in turn, will make it possible to optimise the directions of investment and property management within the range of influence of a given public space. Thus, the objectives of the economic valuation of public spaces include:

- providing information on the economic condition of public spaces, which reflects the economic condition of the entire city; it also indicates the development possibilities of both public spaces and the whole city;
- making it possible to determine the value of the space; on this basis, its manager can make decisions on the need for changes and transformations and the size of investment costs; it also supports shaping the development policy for the entire city;
- providing arguments for the seller and the buyer in negotiations; in the case of public spaces, the seller is the public space manager, while the purchasers are the inhabitants and users of the city, but also private investors. Negotiations may concern the purchase and sale of space, as well as the rental price of commercial premises in a public space. For the inhabitants and users, this knowledge can be used to justify special investments in particular public spaces.

The economic evaluation of a public space can be done using classical valuation methods, such as the comparative, income, and cost approaches. However, using these methods is difficult as public spaces are non-market goods. For this reason, their valuation should primarily use alternative valuation methods, appropriate for use with non-market goods. As pointed out by **Price** [**2003**: 123], methods for determining the monetary value of non-market goods are used in:

- evaluating the market benefits generated or lost by the existence of non-market goods in another location;
- evaluating the financial costs (expenses or savings) of investments undertaken in another location;
- comparing the price of a non-market good that is traded in another location;
- estimating optional, voluntary payments related to the availability of a non-market good;
- estimating the willingness to pay for access to a non-market good or willingness to accept compensation for loss of a non-market good (among residents, users, policy makers, and experts);
- evaluating the willingness to pay for market goods that provide access to non-market goods.

Each application identified by Price is relevant to the economic valuation of non-market goods such as public spaces.

The collection of non-market valuation methods is relatively rich. In general, they are divided into methods of revealed and stated preferences. The former is based on observing actual consumer behaviour in the market, while the latter estimates value based on surveys and declared responses. The methods differ from each other, as does the value they measure. For example, revealed preference methods evaluate utility values, while stated preference methods allow utility and non-utility values to be evaluated. The differences between the methods mean that no single method meets all valuation needs, and each provides different information. The choice of the appropriate method is determined primarily by the type of public space under study, as well as the availability of data on it. Equally important is the kind of problem being studied.

Table 3. Non-market valuation methods in valuating public spaces

Non-market valuation methods		Frequency of use in valuing public spaces (low/medium/high)	Possible implementation
Stated Preference Methods	Contingent Valuation	• **medium** • valuation of specific types of public spaces, e.g., sports infrastructure, tangible cultural heritage (museums, squares), parks, public riverside areas, green areas	• greater use for valuation of more typical public spaces that do not have a specific function or historical character, e.g., city squares, boulevards, streets
	Choice Experiments	• **low** • valuation of tangible cultural heritage (monuments)	• using all types of public spaces as a whole for valuation (the method allows for the presentation of possible changes to public spaces and their costs) • the construction of the method also allows for the valuation of individual elements (urban furniture) of public spaces
Revealed Preference Methods	Travel Cost Models	• **high** • valuation of public spaces of recreational and tourist character (beaches, national parks, lakes, museums, monuments)	• greater use for valuation of public spaces of less touristic/recreational character, used daily by the city's residents
	Hedonic Pricing Method	• **high** • many studies on the valuation of green areas in the context of real estate prices • valuation of tangible cultural heritage (monuments) in the context of real estate prices	• greater use in the valuation of more typical public spaces that do not have a specific function or monumental character, e.g., city squares, boulevards, streets • use for valuation of urban amenities of public space character (e.g., parking lots, playgrounds, backyards) in the context of their influence on the real estate price
	Averting Behaviour Methods	• **lack of use**	• use to value the avoidance and prevention of various types of hazards that are or may be present in public spaces
	Substitution Methods	• **low** • valuation of green spaces (woods)	• possible wide use to value all types of public spaces as well as the benefits and services they provide
	Benefit Transfer Method	• **low** • valuation of tangible cultural heritage (monuments)	• difficult to use in the valuation of public spaces as a whole because of their uniqueness and unrepeatability • valuation of single features of public spaces (e.g., functions, urban furniture) which are repeatable and therefore transferable.

Source: Author's own compilation.

The literature review has shown that non-market valuation methods have been widely used for a variety of environmental goods, including national parks, green areas, and beaches. These goods can be identified as public spaces. The character of those goods is different from that of urban public spaces. Few previous studies valued urban public spaces. When such issues were tackled, they usually concerned specific public spaces, e.g., historic buildings and museums. It is hard to find literature studies that have estimated the value of public spaces such as city squares, boulevards or streets (Table 3).

Public spaces are public goods that are the centre of life for a city and its residents. They have many functions and generate different types of value and benefits for the city. In the face of growing pressure on urban spaces, from residents, users and investors, it is undoubtedly important to know their economic value. This is important in order to be able to manage and plan for the development of urban space more effectively. Thus, it seems that non-market valuation methods should be increasingly used in the valuation of public spaces.

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