

TeMA

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Land Use, Mobility and Environment

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THE TIMES THEY ARE A-CHANGIN'

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GREEN IS THE COLOUR

STANDARDS, EQUIPMENT AND PUBLIC SPACE AS PARADIGM FOR THE ITALIAN SUSTAINABLE CITY

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ABSTRACT

The speed of the urban systems is related with a series of social, economic, and environmental transformations bringing often to a critic state that needs the redefinition of urban elements and relationships, in order to guarantee quality and safety to the inhabitants' lives. Related to the new spatial conditions of planning is the topic of urban equipment that is an open matter in the urban politics.

Their relevance for Italian cities made them a symbol of democratization and quality of the cities, due to the obligatory of minimum quantities of spaces for public services. The 50 years from the issue of DM 1444 allows to express a series of evaluations on the role of the public equipment in the processes of urban transformation and governance. Starting from this analysis, the paper proposes adequate and updated solutions in terms of evolution of the standards categories and their quantitative and qualitative characteristics, deepening the role of the urban facilities as potential sources of innovation.

The first part of the paper highlights some elements related to the long period of application of the law, and the results of this application in terms of increase and quality in the urban equipment of the city. The second part explores the motivations behind the need for a comprehensive updating of the subject, referring to concepts such as sustainability, and quality of urban systems. In the third part, starting from new requirements, new needs, new risks affecting urban systems, as well as from critical points of the Italian law structure, the paper proposes new categories of urban planning standards and the related functional requirements they must to satisfy.

KEYWORDS:

DM 1444/1968; Public city; Urban equipment; Standard; Italy

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绿色是主色调。标准、设施和公共空间堪称意大利可持续城市的典范

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摘要

城市系统的发展速度与社会、经济和环境等一系列变化息息相关，这些变化常常伴随着城市元素与诸多关系的重新定义，以保证居民生活的质量与安全。城市设施与规划的全新空间条件相联系，这是城市政治中的一个开放性问题。

受到公共服务空间最少数量的限制，意大利城市设施成为城市民主化与生活品质的象征。自发布以来的50年里，DM 1444对公共设施在城市转型和管理过程中发挥的作用进行一系列评估。从这一分析结果出发，本文就标准类别的演变及其定量和定性方面的特征提出了最新合理解决方案，不断深化城市设施作为潜在创新来源的作用。本文第一部分重点介绍了与适用时间长的法律相关的部分要素，以及该法律的运用在增加城市设施与提升其质量方面取得的成果。第二部分探讨了不断扩大改善城市设施需要的动机，涉及可持续性、城市系统质量等概念。第三部分，从新要求、新需求、影响城市系统的新风险以及意大利法律结构的关键问题出发，本文提出了城市规划标准新分类方法及其必须满足的相关功能要求。

关键词:

DM 1444/1968; 城市; 城市设施; 标准; 意大利

1 INTRODUCTION

In the last decades, urban systems have been dealing with a series of new challenges due to economic, social and environmental issues.

The 2008 economic and financial crisis had impacts on the world of real estate business, on public and corporate housing policies, and on large-scale urban development projects in metropolitan city regions (Bauman & Bordoni, 2014; Harvey, 2012; Kunzmann, 2016). The entity of these effects was obviously different, depending on the territorial contexts (and therefore the relative response capacities). However, in general, the economic recession amplified the already inherent complexity of the governance's processes of urban and territorial transformations (Donald & Gray, 2013; Fregolent & Savino, 2014). In Italy, in particular, we register a fall in investments in connection with the reduction of trade in the construction sector that has contributed to slowing down the urban growth trends (ANCE, 2014; Bank of Italy, 2014).

The differentiation in the growth of urban population – due to new social scenarios and technological innovations – has provoked the emergence on new needs and aspirations calling an answer by the cities.

Just think of the structure of the population in developed countries, characterized by an increasing presence of elderly people and by the decrease in the younger population, with a consequent increase of old age and dependence indices that, in Italy, are among the highest in Europe (Eurostat, 2016). This scenario requires new forms of governance with the aim to increase the quality of life of elderly (Battarra et al., 2018; Gargiulo et al., 2018).

From a spatial and environmental point of view, cities are testing more and more the effects of climate change and soil sealing, two phenomena connected by an one-to-one relationship requiring changes of space form and use both at city and architecture levels (Blanco et al., 2011; De Gregorio Hurtado et al., 2015; Mazzeo, 2012; Zucaro & Morosini, 2018).

The speed with which these problems invest the urban systems and the multiplication of their effects, is mostly incompatible with the speed of transformation (and adaptation) of activities and spaces. This gap can be traced back to the rigid system of land use rules still characterizing traditional urban planning. The associated structural crisis of the urban systems needs the redefinition of their elements and relationships, with the identification of new ways of organizing and managing the urban system in order to guarantee quality and safety to the inhabitants' lives (Gargiulo et al., 2017; Papa, 2018).

Related to these new spatial conditions of planning is the topic of urban equipment that is an open matter in the urban politics, even for Italian cities. Their relevance in the Twentieth century urban landscape made them a symbol of democratization and quality of the cities (Astengo, 1967; Wilensky, 1975), due to the obligatory of minimum quantities of spaces for public services below which urban livability cannot be considered to be satisfied (Caldarice, 2018).

On April 2, 1968, Ministerial Decree (from now, DM) no. 1444 of 1968 was issued. It represents a unique in the evolution of the Italian planning laws because it is characterized by the identification of specific public equipment whose provision within the urban plans becomes mandatory and is quantified according to specific dimensional values (Falco, 1978). The mandatory nature and clarity of the formulation has made this law one of the most applied in the planning field and a reference point in the administrative litigation.

Inside the residential settlements, the "maximum ratio" are measured in 18 square meter for inhabitant. These spaces are devoted to public services, to mass activities, to public green, and to parking lots. The spaces for the streets are excluded by the measure. The value of 18 square meter for inhabitant is a minimum imperative quantity and it is "normally" composed by four categories:

- 4.50 square meter of areas for schooling, in particular nurseries, kindergartens and primary schools;
- 2.00 square meter of areas for common interest activities, i.e. religious, cultural, social, welfare, health, administrative, public services (Post and Telecommunication offices, civil protection, etc.) and other;

- 9.00 square meter of public spaces equipped as green park and areas for the game and sport effectively available for such installations. Of these spaces are not part the green bands along the roads;
- 2.50 square meter of parking areas that, in specific cases, can be distributed on different levels. They are added to the parking areas provided for by article 18 of the Law 765 of 1967.

Article 5 of the DM 1444 defines also the maximum ratios between the spaces designed to productive settlements and public spaces designed to collective activities, public parks or parking areas.

Although the standards required for production areas facilities are not subject of study in this paper, it is worthwhile to make some considerations in this regard.

For these areas can be hypothesised specific indications, for example, for the parking areas, because they are often very extensive, as in areas designed to the great shopping centre, for the green areas and for the control of the soil quality. This last aspect is fundamental if potentially dangerous or harmful activities for the quality of the soil and subsoil are presents.

Tab. 1 shows a list of public equipment and the corresponding category, according to the Italian legislation. The issue of urban planning standards has to be placed in a more general reasoning affecting the urban infrastructures. In fact, they are subjected to increasing pressures such that to require a systemic answer affecting all the elements making up the public city.

	Urban planning standard (1)	General interest equipment (1)	Primary urbanization works	Secondary urbanization works	Infrastructures
Residential street			Y		
Cycle and pedestrian paths			Y		
Technological networks			Y		
Public lighting			Y		
Communication networks			Y		
Nursery schools	Y			Y	
Primary schools	Y			Y	
Secondary schools		Y		Y	
Neighborhood markets	Y			Y	
Municipal delegations	Y			Y	
Churches, religious buildings	Y	Y		Y	
Social centers	Y			Y	
Cultural facilities	Y	Y		Y	
Equipped public green	Y		Y		
Neighbour. sports facilities	Y			Y	
Green parks		Y			
Car rest areas	Y		Y		
Parking		Y		Y	
Sanitary equipment	Y	Y		Y	Y
Security equipment	Y	Y		Y	Y
Urban waste plants				Y	
University and research		Y			Y
Great communication roads					Y
Railways, ports, airports					Y
Energy networks					Y

Tab. 1 Classification of urban and territorial public equipment. (1) Standard and equipment contained in DM 1444/1968¹.

¹ The urban plan, among other tasks, identifies and delimits the "urban planning standard" and the "equipment of general interest". When we move on to the implementation phase we talk about "primary urbanization works" and "secondary

50 years have passed since the issue of DM 1444; it is a period of time that allows to express a series of evaluations on the role of the public equipment in the processes of urban transformation and governance.

In this perspective, the present paper proposes adequate and updated solutions in terms of evolution of the standards categories and their quantitative and qualitative characteristics. It is appropriate to deepen the role of the urban facilities as potential sources of innovation, starting from new requirements, new needs, new risks affecting urban systems, as well as from critical points of the Italian law structure introducing them.

The paper is formed by three parts.

The first part highlights some elements related to the long period of application of the law. It analyses the results of this application in terms of increase and quality in the urban equipment of the city. The second part explores the motivations behind the need for a comprehensive updating of the subject, referring to concepts such as sustainability, and the quality of urban systems. In the third part, finally, the paper proposes new categories of urban planning standards and the related functional requirements they must to satisfy.

This articulation shows, in practice, a path in terms of updating of the indications of the DM 1444 and, more in general, of the significance of the public equipment in the city.

2. THE ITALIAN NATIONAL LAW AND ITS IMPLEMENTATION

2.1 IMPLEMENTATION OF THE DM 1444/1968

The application of DM 1444 has changed the way of doing planning in Italy and has made possible the creation of a new type of urban plan, closer to the construction of the public city (Gabellini, 2001; Oliva, 1999; Salzano, 2002). This consideration highlights the significant and positive impact of the law. Indeed, the attention to the retrieval of the standards has become a factor of primary importance in the design of urban plans, like the finding of the urban expansion areas, at least until the plans have been set up with an expansive philosophy. The obligation to find the standards, essential for the approval of the urban plans was, above all, the cause that made possible this result.

The enforcement of a minimum amount of public space derived from the observation that the Italian cities had grown in the second post-war period with the sole objective of maximizing land rent (Camagni, 2012). This led to the forecast and construction of new settlements with little or no public facilities, green spaces, car parks and schools.

The term "urban planning standard" indicates the minimum quantities of public (or for public use) spaces that must be obligatorily quantified and identified in the urban plans. Their implementation is delegated to a subsequent phase and takes the form of a direct intervention by the public administration or through the deployment of detailed plans.

The dimension and distribution of these standards translates, within the municipal plan, in the identification of the areas necessary for their realization and in the imposition of restrictions finalised to their acquisition to the municipal asset. There are three considerations to make.

Primarily, this obligation has had as a straight consequence the strong growth of the public real-estate assets. The counterpart to this outcome was the necessity of binding huge sums of the municipal budget for their acquisition (Mazzeo & Ceudech, 2009).

A second element to consider is related to the fairness of citizens facing the city and the plan, fairness that it is possible to reach also with public equipment that are really usable and whose management is aimed at satisfying the needs of the urban users. This way of approaching the issue should have led to the conclusion that the rights fulfilment does not impose obligatory limit values, but rather identifies mechanisms for a differentiated application according to specific territorial characteristics.

urbanization works". At the territorial level, we use the general term "infrastructure", inserting in this category linear, area and volumetric public works.

This meaning is not even recent. Even before the approval of the *Legge ponte* (Law nr. 765/1967) and of following DM 1444, there was the awareness that public equipment should be a widespread presence within the urban structure and that they should assume characters of high quality, flexibility, and modifiability so that they could maintain unaltered their role and value (Tutino, 1965).

Third point highlights that the application of the DM 1444 must also be seen from the point of view of the “multiplication of legislation” due to the contribution of the regional laws deriving from the application of the provisions of the Italian Constitution. It was implemented after a few decades with the issue of the Decree of the President of Republic nr. 616 of 1977, which carried out the transfer and delegation of a series of administrative functions from the State to the Regions. Starting from the end of Seventies, this transfer has provoked an increasingly extensive fragmentation of the planning legislation due to the implant of regional regulations on the unitary national system. Among the sectors there is also the subject of standards with their differentiation in quantitative, qualitative and applicative terms, from Region to Region (Caceres et al., 2003). On the other hand, the Regional legislations have had the merit of experimenting at local level some elements of innovation deriving from the theoretical insights developed by the town planning schools and by the associations operating in the sector (Istituto Nazionale di Urbanistica, Società Italiana degli Urbanisti and so on). Among these, we can remember the concept of performance (see section 3.2) or the establishment of the municipal and territorial service’s plans (Gerundo & Graziuso, 2014; Paolillo, 2007).

Presidential Decree 380/2001 (Consolidated text of laws and regulations on building) in Article 2-bis, (Derogations on the limits of distance between buildings) reaffirms that the rules on the right of ownership are the responsibility of the State. It establishes also that the Regions can provide exceptions to DM 1444/1968 with «own rules on spaces intended for residential settlements, productive plants, collective activities, green areas and parking areas, as part of the setting or revision of urban plans destined to an overall and unitary development or to specific territorial areas».

Among the other, this possibility was taken up by the Emilia Romagna Region, which in 2017 issued the new regional urban planning law (from now, LR). LR 24 “Regional regulation on the protection and use of territory” provides, in fact, a specific definition of «differentiated urban standards» (article 9).

In particular, the Region, with a specific rule of procedures, establishes «provisions regarding the system of territorial equipment, infrastructures and public services that contribute to achieving the minimum standard of urban and ecological-environmental quality to be guaranteed throughout the regional territory. The technical rule of procedure differentiates the services to be implemented in the urbanized territory compared to the requirements for new settlements, with the aim of promoting urban re-use and regeneration interventions». This differentiation takes place according to a series of principles tending to favour the regeneration activities compared to those producing new consumption of soil, the reduction of which, by the way, is another of the cornerstones of this regional law.

Among the principles, the following are particularly interesting:

- the preservation of the current overall share of public areas for services;
- the primarily allocation of the public areas to meet the needs for new equipment or to modernize the existing ones;
- the possibility of allocating the areas in which no equipment must be created for the realization of social housing with the private participation or the completion of the regeneration and reuse interventions. This is possible only after verification of the satisfaction of existing or forecast equipment in the area;
- the permeable areas within the urbanized territory are destined to ecological and environmental equipment and to the maintenance of the green wedges;
- the derogation to the density and height limits in the operations of urban densification or substitution;
- the possibility of identifying areas of the urbanized territory in which the urban renewal, densification and substitution interventions can lead to the assignment of lower areas for territorial equipment than

those established by DM 1444. This is possible if they are otherwise satisfied within the area, in surrounding areas, in areas accessible through protected cycle paths or by public transport;

- the reduction of the use of the private car and the associated reduction of the parking areas, both public (from standard) and private (internal to buildings) in the urbanized areas with high sustainable accessibility, in which are planned reuse and regeneration interventions. Part of the parking standard ratio can be transferred in private buildings. These forecasts can also be applied to new urbanizations;
- the compensation measures, environmental and territorial rebalancing measures, and ecological equipment cannot reduce the construction contribution and cannot be monetised.

A last account to do is the possibility that the standards defined by Ministerial Decree 1444/68 might also be implemented under a convention between the public administration and a private entity. In this case, we talk about the affixation of a “conformation constraint” (Urbani, 2014).

This type of constraint, unlike the “expropriation constraint”, does not involve a loss of ownership of the land, but only a reduction of its availability in relation to the presence of higher-level objectives of public interest (for example a landscape constraint) or in relation to the conclusion of an agreement allocating a property to a public use.

In this way, a relationship is established between public and private, for which the former specifies the destination of an area to public use equipment and the second remains the ownership of the property and its management. Public use is implemented by means of the provisions contained in the agreement. They force the private entity to specific conditions in the way the equipment is managed.

2.2 OUTCOMES

The need to threat an important section of the plan for the recognition of public equipment, with the aim of defining its size and distribution, as we can see in the case of Florence shown in Fig. 1, has had as primary outcome the growing of the ground stock belonging to the public land patrimony.

However, this process has had significant costs for the local authority’s finances. We need only look that at least three types of costs must be identified with each property to be acquired to the public patrimony:

- the cost of ownership acquiring the of the property. Traditionally, the used tool is the expropriation;
- the transformation cost of the area, necessary to make it usable;
- the management costs, necessary to maintain the efficiency levels, to comply with the safety laws and to improve the conditions of use in relation to the evolution of the laws and of maintenance techniques.

These three categories of costs, connected with particular steps of their life, can be associated to any public good that is labelled as “standard” or, more generally, as public equipment.

In practice, however, it happens that many of these goods lack one or more phases of the process, to mean that they have never been acquired to public assets (therefore never expropriated), or have been acquired but not transformed, or have been transformed but not maintained. This state of beings creates a lot of problems to the cities because the extension of these unprocessed or abandoned areas causes degradation and loss of quality in urban areas, as well as a significant waste of land and an economic damage because they are unavailable for other purposes (Fabbri & Mascher, 2009).

Closely linked to the resources is the issue of usability. If, in a first phase, the costs of expropriation and transformation were fully borne by the public administrations, it was immediately realized that this mechanism would have been unsustainable in the long term.

To solve this important issue, some solutions were proposed at different times.

The first solution was the involvement of citizens or other stakeholders in the construction of the public city, through the payment of charges to build (Law 10/1977, then repealed and merged in Presidential Decree 380/2001) when they require permits for the construction of new buildings or for radical transformation of existing ones.

The need derives from the link existing among increasing of soil value, urban transformation actions and increase in urban load, in terms of demand, that goes to weight on equipment and network infrastructures. As a result, it was established that the possession of this advantage would have as counterpart the fee of a share of the costs to equip these areas with infrastructures. In this way the community re-appropriates part of the increases in value, allocating them to the realization of public works.

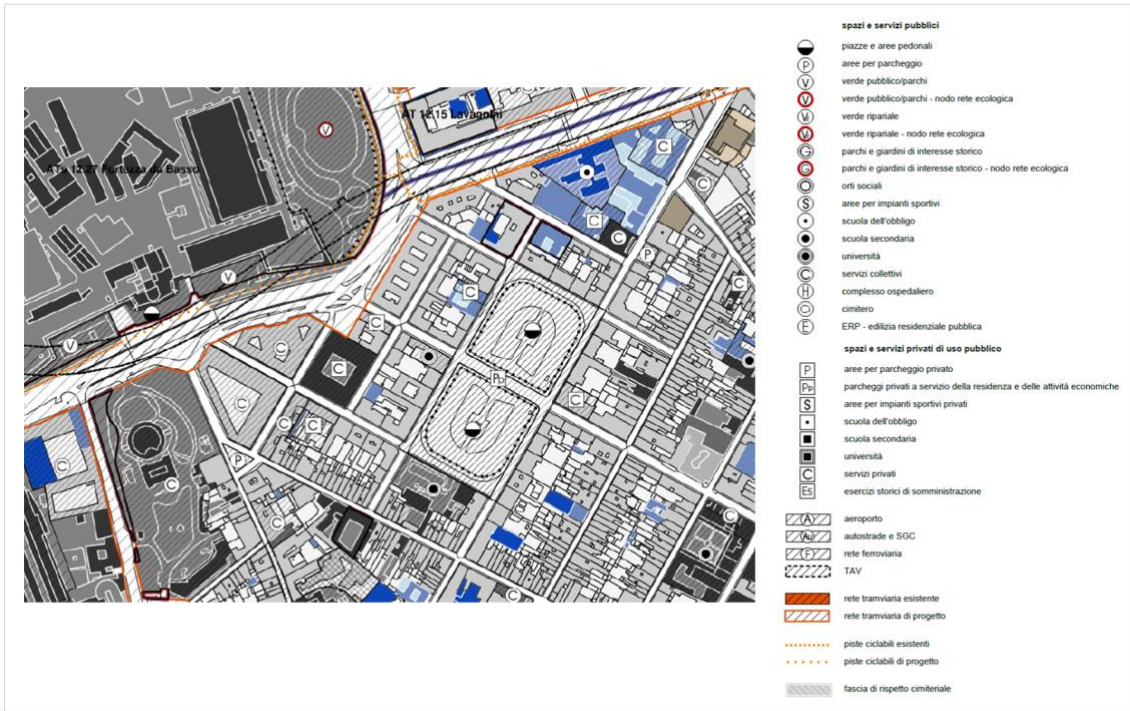


Fig. 1 Florence, Structural Plan. Equipment in the urban rule and discipline of soil and settlements. <http://pianostrutturale.comune.fi.it/mappe/>.

The scheme assumed that this fee was sufficient to cover the costs of urbanization. Often, this did not occur especially for the setting up of secondary urbanizations, the most significant ones (Fabbri & Mascher, 2009). We found the reason in the fact that, moreover, the funds reserved to this chapter of the local authorities' budget were often used for other purposes than the implementation of standards and urbanization. In any case, the amount of sums available did not guarantee the coverage of the above mentioned costs.

About this, Italian 2017 Budget Law (Law 232/2016) confirmed that the incomes deriving from the urbanization costs must be tied to specific destinations, that are:

- construction and maintenance of ordinary and secondary urbanization equipment;
- rehabilitation of buildings located in historic centres and degraded suburbs;
- reuse and regeneration interventions;
- demolition of illegal buildings;
- purchase and construction of green areas for public use;
- protection and rehabilitation of the environment and landscape, also for purposes of prevention and mitigation of the hydrogeological and seismic risk and of the protection and requalification of the rural heritage;
- interventions to encourage the establishment of agricultural activities in urban areas.

Second solution is the identification of public-private exchange mechanisms that would guarantee the public the cost-free property of the areas required for the implementing of standards and other equipment, in the face of the possibility for the private subjects to concentrate volumes and functions on the remaining surface area (Urbani, 2002; Micelli, 2004). These equalization mechanisms have the advantage of eliminating the costs

necessary for the first phase of acquisition but do not fully guarantee coverage of the second and, above all, of the third phase.

The third solution is to consider as standard private areas and equipment after the signing of specific conventions for public use.

In this case, the private sector, in the face of advantages identified from time to time, provides the community with a service of public use otherwise not feasible or feasible with high costs for the public administration. In this case, the public eliminates at least the first two types of direct costs. The advantage is obvious, even if to be verified case-by case basis and the costs are focuses on the third component. It may be a direct payment in the case of rents or other charges, or an indirect disbursement in the case of tax benefits.

The aspect related to the outcomes is not limited only to the financial issue, but it should be extended to the quality of the public works.



Fig. 2 Naples, Via Argine. Areas for urban standard and for public equipment. A, Green. B, Equipped green. C, General interest equipment, ABC headquarter. D, General interest equipment, sports hall Palaponticelli.

The application of the standards regulation has had a relevant quantitative feedback but a much more limited response in terms of quality. Generally, equipment falling into this category has not been able to raise the quality of cities, especially in areas where they should have acted more effectively.

In the urban expansions of the first crown and suburbs, for example, where the main poles of residential expansion formed after the Second World War have been concentrated, as in the case of Naples shown in Fig. 2. These areas require a greater attention, because their social and economic weakness caused by their recent formation.

It is also clear that this reasoning must be contextualised geographically and in relation with the urban dimension, and that there are cases marked by a great intrinsic quality. But, overall, it is not possible to dispute the fact that the design was "basic", using a magnanimous expression, with spaces and volumes often further degraded from a poor ordinary management.

Lastly, specific considerations must be made for the general interest equipment, which, according to DM 1444, should have been identified by the urban plans within specific areas designated for them (F zones).

Such equipment are necessary when there is the need to cover a demand for services whose catchment area is considerably higher than those of a neighbourhood are. These equipment may be existing or may be newly

established. In both cases it is necessary a constant checking of current and potential basins and of their extension. However, it is clear that they, unlike the DM 1444, derive from a forecast associated more to a territorial level than to a municipal one. It follows, therefore, that the programming of these allocations must be made at a supra-local level and that the urban plan should be up only the task of identifying the settlement area.

3. UPDATING

We comprise from the above the purely operational character of DM 1444. This character is a starting point for the building of a hypothesis of updating and adaptation under strongly changed conditions.

Standards are formulated as numerical limit values (measured in square meters for inhabitants) down below an urban plan cannot come down. They, in turn, are structured as an overall value divided, in turn, into four functional categories that are portions of the total.

Imposed fifty years ago, these threshold values are now outdated by the state of a greatly changed territory also for the results of years of urban planning. If we only think in quantitative terms, in fact, while fifty years ago in the overwhelming majority of municipalities the standard equipment for inhabitants was lower than the limits of the decree, today the situation is as overturned.

In other words, the issue of updating is not numerical, because in this case there would be no need to change the DM 1444. What we must to deepen is the connection between new needs, new necessities, new risks for the city and adequate and updated answers in terms of quantitative and qualitative characteristics of the equipment.

The change in the overall situation of cities can be the basis for building a new system of public equipment. This change can be exemplify using three different reading levels.

3.1 CHANGE OF PRIMARY PLANNING TASKS

The first reading level is connected with the change of primary planning tasks. Planning is born as an organized design of the urban expansions and it has gradually transformed, especially in nations with an advanced economic development: from an expansive process, it has become more and more transformative and connected with the built city. The latter becomes the place devoted to the construction of the city's innovation processes and the transformations of the built spaces are the actions that shall ensure to maintain and evolve the functional characteristics and the attractiveness of the city.

Obviously this reasoning become meaningless when we consider some areas of the planet where urban growth still takes place at a sustained pace.

Urban transformation processes are an effective way to preserve the territory because reduce or reset the land consumption modulating it in very diversified way through reuse operations of already urbanized spaces that may take the form of densification, of de-sealing (Artmann, 2014), or of re-naturalization (Mazzeo, 2012). The planning tasks must be updated also considering the processes of climate change and the circumstance that cities are among the main causes of the changes underway. At the planning level, it is possible to borrow a series of practices that can reduce the weight of the city. This must be done at all levels, from the strategic to operational planning.

From a quantitative point of view, the cited processes modify the influence of the city's public facilities in the sense that the existing or forecasting ones have to cope with loads that can vary positively or negatively compared to a previous state.

From a qualitative point of view, these changes can have an even greater impact because they can become a place of experimentation and application of new ways of managing the equipment according to social changes and to the processes of urban evolution.

The public city, in this kind of operations, becomes strategic within urban policies and, therefore, it acquires a centrality overdoing the simple numerical enumeration of the urban standards.

This change of paradigm requires a greater attention to the urbanized portion of the city, in order to guarantee the pursuit of the objectives of urban sustainability.

Excluding the expansion, in fact, every action of transformation must take place within the urbanized boundary, with the aim to bring the city a step closer to the finish line of the environmental neutrality.

In this respect, also the innovation of equipment and standard, meanwhile modifies the classical meaning of these elements, it contributes to the achievement of this goal and it becomes, in themselves, factor of public interest.

3.2 PERFORMANCES

Public equipment are useless if they are not efficient and if they do not have quality. The question concern the existing standards and those that will be implemented.

Therefore, the second reading level is the evaluation of the standards in terms of performances. Performance, in this case, indicates the operation level and the ability to perform with satisfaction the task for which the standard has been designed. Functioning has to do with both management and maintenance, in the sense that their correct execution maintains the standard. If the standard is based on a performance, it means that can be evaluated by way of thresholds. On the one hand, it can be fully efficient (threshold 100, for example), on the other hand, non-existent or out of order (threshold 0), with all the possible in-between gradations that the functioning can assume.

The performance level can be determined according to status and utilization indicators. It implies the need for a continuous control on the efficiency and on the degree of satisfaction of the demand. It presumes also a radical change in the methods of construction and management of the equipment, as it must be considered a good that is really available to citizens. A further element to put in place is the possibility that the performance efficiency of existing standards becomes a reward for the municipal administration.

The reasoning starts with the observation that if the standard is an obligation it must exist and work for the citizens-users. If we associate the "performance" qualification to an equipment, we assume the existence of different levels of efficiency.

It follows that the administrations that maintain their public equipment at an optimal functioning level can get some kind of advantage, for example, when they make plans or when the upper levels of administrations distributes public funds.

3.3 CHANGE OF THE STANDARDS WEIGHTS

A third reading level still hypothesizes a change, but this time it is measured in terms of variation of the standard importance, based on the consideration that the current social, demographic and economic reality of Italy has profoundly changed to that of 50 years ago.

The new urban conditions are characterized for a population in a general situation of quantitative stasis, if not often of regression; for strong changes in the absolute composition and percentage of different age groups; for a mutation of needs in terms of specific demands; for the need to respond to the challenge of climate change. These and other factors make it necessary to rethink the relevance associated with each category of public equipment. We can give some examples:

- in a town centre that is in a phase of population reduction the amount of equipment per inhabitant tends to grow even without any increase in total surfaces. In such a case, the numerator (equipment) is steady, but the denominator (population) decreases. Such a condition could be considered objectively positive. The downside consists in the fact that if the provision for inhabitant increases in the face of a decrease

in the population, it also increases the cost that each citizen has to bear in order to keep in efficiency these facilities;

- the distribution of the population in the age groups has changed to the point that the age pyramid has been transformed into another form with the basis that has become increasingly narrow. Consequently, the amount of specific demand linked to age changes. In particular, the demand for compulsory education tends to have an ever-smaller dimension, while the demand for services for the older age groups tends to increase (Pinto & Sufineyestani, 2018). This translates into a changing of the types of standards, with the shift of physical and monetary resources from one age group to the other. Specifically, from the youngest to the oldest;
- the reasoning referred to the previous point could be reversed if we decide that devoting more resources to lower age groups is strategically more important than dedicating them to the older ones, also with the aim to recover positions on the birth front. This would mean reducing the attention to the higher age groups but it changes the reasoning on the standards by technical to political. The same reasoning applies to the weight that the lower income social groups assume. It is a way to pay attention to marginal social realities, since the wrong distribution of resources is not only a function of age groups but also of the level of marginality within society;



Fig. 3 Hellerup, Danimarca. Gammel Hellerup Gymnasium, 2013. Architect: BIG. Photo: Iwan Baan²

- efficiency of buildings, production of energy from renewable sources and reduction of water consumption are three sustainability parameters to be applied to every standard, both in presence and in the absence of volumes. The public city, as also foreseen by European regulations, becomes the means to insert and disseminate good practices in the city related to the principles of renewability and sustainability;
- a possible strategic answer is the realization of flexible or mixed-use standards. These standards can give the answer to multiple needs in the same place or in the same volume, on the basis of a diversified use of spaces and equipment (Fig. 3).

² The equipment is a large multifunctional space that could be used for sports, graduation ceremonies and social events. <https://www.archdaily.com/412908/gammel-hellerup-gymnasium-big>.

These examples make it necessary to continuously check the characteristics and weights of the single standards so that they can respond to as well to the changes taking place.

This is a topic connected with equity between the different components of society and with a more correct “allocation of resources”, like economists say.

4. NEW STANDARD

4.1 METHODOLOGICAL ELEMENTS

The three reading levels above discussed represent the starting point for the development of a methodological path that, through the definition of a set of functional requirements parallel to the dimensional requirements that currently distinguish the standards, reaches the identify of new standard categories.

While new standards update the urban equipment systems to meet the new needs that the city has to face, the requirements are linked to a new way of thinking about urban equipment in terms of performance in addition to quantity, by reference to the characteristics of use and functionality that are required of them.

In this perspective, in fact, the requirements are used to ensure that the urban facilities are able to ensure the response of urban systems to a given necessity in terms of usability, simplicity, low cost of management, technological adequacy, and sustainability. Practically, they are aimed at ensuring the efficiency and the functioning of the standards.

Borrowing typical expressions of marketing, the requirements want to increase the degree of satisfaction of the users (the citizens) with levels of supply that can exceed the basic level (the quantity). They want to give them higher performance or, even, to assume attractive qualities encouraging the user to identify himself with the service and to feel it as part of their experience of urban life (Hinterhuber et al., 1997).

Among the potential functional requirements, some of them are highlighted below, with the warnings that the list is open to further extensions and that there are close interrelations between the different requirements:

- quality of the materials to be used for their realization, in order to guarantee the durability of the equipment and, at the same time, the sustainability and environmental compatibility for the entire life cycle. For example, the use of materials that can help to decrease the demand for air conditioning, or local materials to decrease transport emissions;
- consumption limits. This requirement is linked above all with the installed facilities and with the amount of energy necessary for their functioning. The requirement is also linked with the origin of the used materials and with the respect for the renewal requirements of the ecological stock. For example, use of recycled materials in place of first-use materials, or use of materials from controlled sources;
- emission limits of materials. The requirement, concerning the construction and use of materials, is related to the low amount of energy necessary for its production and to the low emissive capacity during use;
- usability limits. Requirement relating to the ability of the equipment to entirely perform its service. The limit must be intended as the identification of thresholds below which the equipment must be subject to requalification;
- time flexibility. Requirement to be understood as the possibility that the equipment can be adaptively used within 24 hours. For example, a soft mobility infrastructure that can be used for exhibitions or social gatherings;
- use flexibility. The requirement must be understood as the possibility of different uses. For example, a space / building that can host different activities in the same space and in different time slots. This requirement also presupposes the possibility that space can be easily reshaped according to needs;
- public and / or private handling. This requirement is necessary to compensate for the lack of economic and financial resources, thus ensuring a continuous use of the urban infrastructure. It also aims to enhance private initiatives worthy of some recognition depending on the activities they perform.

Tab. 2 shows the relationships between the seven requirements and the three reading levels, thus highlighting the relationship existing between them and the innovation processes underway. In doing so, it is possible to move on to the next phase, the identifying the new standard categories.

Functional requirements	Reading level a – New planning tasks	Reading level b - Performance	Reading level c – New standards weights
FR1. Quality of the materials		XXX	
FR2. Consumption limits	XXX		
FR3. Emission limits		XXX	
FR4. Use limits			XXX
FR5. Time flexibility	XXX	XXX	
FR6. Use flexibility			XXX
FR7. Public/private handling	XXX	XXX	

Tab 2 Functional requirements of the new standard in relation with the three reading levels.

4.2 NEW STANDARDS

In line with what we described up to now, the evolution of the needs and demands of today's cities, and the urge to direct urban policies towards increasingly compelling conditions of environmental sustainability need the adoption of an integrated and multi-functional approach to the standards. This approach can provide answers to new demand such as the protection from the hydraulic risk, the reduction of polluting emission, the loss of biodiversity. Moreover, one factor that is increasingly important in the functioning of the cities is related to the efficiency of mobility systems and, therefore, the accessibility to the different parts of an urban area. The setting up of the proposal of standard reshaping put together two complementary concepts, that of urban standards and that of design standards for buildings. At first sight, they do not seem to be embeddable among them, but the need for a deep update of the regulation on standards also brings with it also an update of the concept of standards, as above highlighted. This deepening in itself extends the meaning of standards and involves aspects that the 1968 legislation didn't take into account.

It is worth emphasising that if on one side the construction of the standard as a characterizing element of the public city should not be abandoned because it is a reference point of the actions implementing the planning on the urban territory, on the other it is useful to consider also provisions introducing quality standards for buildings. This double value of the standard can be interesting for two fundamental reasons:

1. Public buildings can be considered as second level standards (first level are surface standards) for which to provide quantitative and qualitative norms. Because public these buildings should be a flagship of the methods of construction of the city of tomorrow, in which the standard can be not only the surface but also the quality in the use of it, the healthiness of the products used, the reduction of overall impact of buildings.
2. The good practices of the public city, deriving from the implementation of the new standards, become quality elements applicable also to the whole city, even if with different modalities and obligations. In this way, the private construction and redevelopment activities can be channelled on the same tracks as those of the public city.

The potentiality of this process lies in the circumstance that transforming the way of building and regenerating translates into a net gain for the community into the medium and long term.

In this perspective, and with reference to Table 2, which relates the reading levels with the functional requirements, we identified some new categories of potential standards.

- Energetic standard. The equipment, both two-dimensional and three-dimensional, must consume always less and produce ever-higher percentages of energy using the available renewable sources (Papa et al., 2016). The same reasoning applies to dispersions in the atmosphere, on the ground and in water.

- Emissive standard for building and areas. The choice of materials and their correct use makes it possible to reduce the emissions of heat and harmful gas from urban surfaces. To favour this aspect it is necessary, above all, the use of qualitatively superior products whose effects will be perceived in the long term.
- Advanced design of public spaces. This category of standard is one of the least classifiable within this process of updating, but it may be interesting to push towards a design that refers to the best practices. In this way, it is possible to positively influence on some territorial phenomena such as the urban heat islands, result of the impermeable waterproofing of the territory (Zanchini, 2011).

We emphasize that the issue of the quality of the design is a pre-condition in many projects at international level. It must also be extended to current design, much less attentive to these aspects.

- Ecosystem urban green. Ecosystem services (for a classification, La Notte et al., 2017) merge new meanings linked to the environmental criticalities (Giaino, 2018a). The urban green, one of the classical rates of the standard, represents a mono-functional space, generally underutilized, which instead can take on new meanings (Pelorosso et al., 2013).

We need only consider the possibility of modelling it in such a way as to become an active component in the local response to climate change and in the management of meteorological crisis conditions (storm water management) (Mazzeo & Zucaro, 2017). Water plazas, different types of essences, subsoil conformation, rainwater collection, physical connections between currently separate green areas, green corridors and bypass, are some of the working tools that can be associated with these services (Fig. 4). The expansion of new green infrastructure networks can take place with the removal of hard surfaces, with the aim to protect public and private goods and to store storm water for derivative uses. They can also help to better absorb flood events, just like they can help to rethink the importance of the infrastructure, and to modify our relation with the nature in the city.



Fig. 4 New York, Gowanus Canal, Sponge Park™ Project. Dlanstudio. <https://dlandstudio.com/Gowanus-Canal-Sponge-Park-Pilot3>.

³ Sponge Park™ re-directs, holds, and treats storm water runoff to minimize the volume of overflows that occur within the canal, reducing raw sewage contamination and thus helping to clean the watershed.

The ecosystemic urban green is both a local and urban level provision. In this perspective, thus, it falls within the category of the traditional standard as well as that of equipment of general interest, as defined in the DM 1444. The intent of its inclusion among the new standards lies in the fact that it can be formed to face requirements that are not just those of the use as green areas. As an ecosystem standard it can be built in order to function as a thermal regulator (arboreal essences, tree density, ponds, and so on), as a regulator of the water flow rate in case of heavy rains (water squares, underground tanks, and so on), as part of a network of territorial green corridors fitting within the city.

- Urban farming standard. An essential type of ecosystem services is related to the maintenance of agricultural production in suburban areas, critical areas for the proximity with the city, and its systematic introduction into urban centres. In this case the new standard assumes a double value: it preserves natural ecosystems (also using biological production techniques, with the abatement of the use of chemical products), and it produces value in terms of exchange goods and income (Collarini, 2018). Urban green and urban farming can structure a system of active areas that we can define green and blue infrastructures, forming continuity channels within the urban array (Cannas & Zoppi, 2017).
- Standard connected with mobility and accessibility function. The accessibility of urban areas qualifies in terms of possibility of using vehicles other than the car. Key elements of this potential standard are the frequency of public transport, the percentage of users of public transport, the density of pedestrian and cycle axes, the quality of the connection spaces (Fig. 5), and the existence of equipment that facilitates the move of lower mobility groups (slow mobility) (Papa et al., 2017). It also includes equipment that facilitate the use of individual non-polluting means (electric, natural gas, and so on), as well as those related to the accessibility of internet and IT services.
- Standards related to social housing, collective residence and spaces for carrying out specific working and service activities with strong innovation matrixes. This standard deepens the possibility of building flexible relationships that allow the socialization and implementation of specific projects related to periods of study and training, to non-continuous work activities, to temporary residency.



Fig. 5 Prato, Piano Operativo. Green reconnection in San Paolo neighbourhood. Source: Urbanpromo/2018.

The listed categories can be considered in a double role: as an evolution of current standards or as the insertion of new categories within planning's procedures. In both cases, the new standards must be associated with the same obligations currently in force as those contained in DM 1444/1968 (Fig. 6).

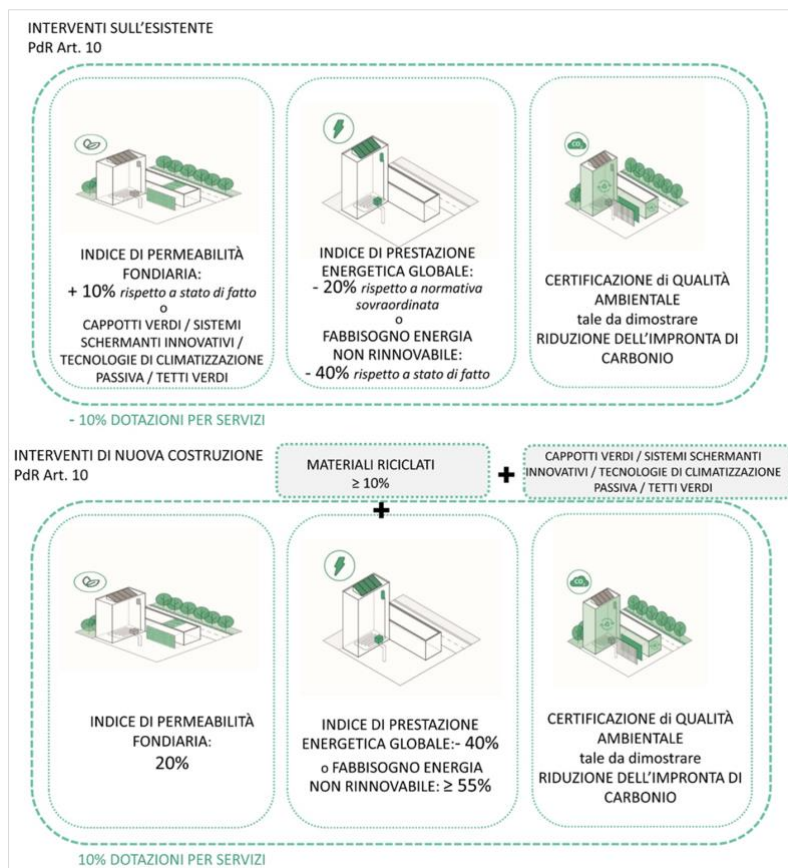


Fig.6 Milan, “Milano 2030”, Revision of the Piano di Governo del Territorio (PGT), Piano delle Regole, Norme di Attuazione, art. 10. New standard for existing and new buildings. Collarini, 2018 http://allegati.comune.milano.it/territorio/20181029_PGT_Giunta_Def/03_Piano_Regole/01PR_Norme_Attuazione.pdf

Figure 7 highlights the relation among new categories of standard and functional requirements, showing the intersections whit conditions to deepen in a next step are present. These conditions do not replace the existing quantitative limits but integrate them with new properties that can be defined either through further numerical limits or through quality assessments namely, the identify of specified characters for each of them, the dimensions, and the levels of effectiveness within urban structures. Fundamental will be the preparation of a computerized catalogue of best practices, where technologies and solutions are compared and updated.

Main standard category	Secondary elements	Existing standards (DM 1444/1968)	Requirements for checking the functionality of the standard						
			Quality of the materials	Consumption limits	Emission limits	Use limits	Time flexibility	Use flexibility	Public/Private handling
Energy Control				Y	Y				
Buildings	Schools	YES	Y	Y	Y	Y		Y	Y
	Public Equipment	YES	Y	Y	Y	Y		Y	Y
	Other	YES	Y	Y	Y	Y			
Areas			Y			Y	Y	Y	
Green Spaces			YES			Y	Y	Y	Y
Urban Water						Y	Y	Y	
Urban Farm				Y			Y	Y	Y
Mobility	Pedestrian Paths		Y			Y	Y	Y	
	Cycle Paths		Y			Y	Y	Y	
	Public Transport Hub		Y	Y	Y	Y			Y
	Roads		Y			Y			
	Parking	YES	Y			Y	Y	Y	Y
Housing	Social Housing		Y	Y	Y	Y	Y	Y	Y
	Collective Housing		Y	Y	Y	Y	Y	Y	Y
	Incubators - production		Y	Y	Y	Y	Y	Y	Y

Fig. 7 New standard categories and properties for checking their functionality

5. CONCLUSIONS

The insights made on the subject of public equipment have outlined the existence of lights and shadows and the clear need to get a grip to a profound conceptual and operational renewal.

The research of new categories of standard is not sufficient to understand the extent of the evolutionary process that urban planning practice must achieve. It is necessary, in fact, a parallel reasoning on the requirements they must possess in order to respond effectively to new questions arising from the city.

Standards in their original formulation (DM 1444/1968) had to respond to a single dimensional condition that is to respect minimum thresholds of quantity. This condition was sufficient to proceed with the approval of urban plans and left any other implementation or use specification to the build phase.

The necessary progress must be to enrich the contents of the standards requirements already in the planning stage, in order to highlight the potential benefits of their implementation adapting this aspect of the plan to the complexity situation reached by the cities.

The Italian urban planning literature has underlined the problems that the legislation on standards has generated (inter alia, Falco, 1987; Treu, 1998; Zoppi, 2003; Giaimo, 2018b). Plans characterized by highly mechanistic and deterministic arrangements, an interest based only on the quantitative aspects of the equipment, without any attention to the qualitative aspects, the poor attention to services not foreseen by the law's categories, the indifference to the territorial specificities.

The resulting application has certainly improved the life conditions in the city as it operated in a situation of serious emergency and it has introduced into the planning the principle that every citizen has the right to a share of public services. As Campos Venuti writes (2001, 43): «The *Legge ponte* and the decree on standards recommended social and environmental quality objectives for the plan».

This should not make us forget that for a long time the evolution of the concept of public services has undergone clear delays because the potential testing got bogged down on the obstacle of legislative constraints. In other words, the urban planning standards have allowed to equip the cities with new and numerous public facilities, but these, very often, have not been able to express urban quality and to become a recognized aggregation factor.

Next to the question of quality, there is the question of the adaptation of equipment to a changed urban reality, thanks to demographic, social, economic, and environmental changes.

The issue of the reuse of underused or abandoned equipment due to causes such as demographic decline, or the social changes shifting the needs within the city, is cited as one of the factors affecting the maintenance of the stock of equipment built by the institutions over the years. It is a topic of great interest with at least three critical aspects. The first is the opportunity to erode the stock of public goods, in some cases now oversized. The second has to do with the costs of maintenance and management of public goods, a cost that goes up with the decrease of inhabitants (but also with the increase in the mean age of the population), but that must be taken into account also in case of functional change. The third aspect is related to the ability of the city to adapt its equipment offer to changing needs, realizing equipment fitted with high use flexibility.

All together, these changes require a deep rethinking of the public city within an urban structure that today is radically different from that of fifty years ago.

The need to deep the reasoning on the public city results by an unprecedented combination of deeply troubling environmental problems, political changes, and innovation in technology and design. To deal with this state it is necessary an interdisciplinary work creating new urban model as result of the knowledge of planners, hydraulic engineers, transporters, ecologists, economists, and exponents of culture, with the aim to shape better-performing and more compelling cities to work, live, and raise families. It is necessary, for example, to «understanding how physical geography, ecology, and climate function is critical to the development of new types of infrastructure that are more responsive to the forces of nature» (Drake, 2016).

It is also evident that local administrations cannot implement this program if they are alone. They must have the support of upper government levels within a national program for the adaptation of cities to ongoing changes.

Based on the considerations carried out, the paper has proposed a qualitative methodological scheme. First step was the analysis of some reading levels requiring a process of adaptation of the planning techniques and contents, in general, and of public equipment, in particular. In order to get to the proposal of new categories of standards, an intermediate step was the identification of a set of general functional criteria of the equipment. The intersection between functional criteria and new categories of equipment generates a field of study to deepen by means of specific quantitative and qualitative functional criteria.

This methodological structure necessitates because DM 1444 adopted a quantitative approach, who looked at infrastructures as a machine functioning thanks to simple numerical combinations. Today the situation has changed and it became clear that qualitative processes, with greater flexibility, must support the numerical systems. In this way, they can increase the answer of urban systems to complex social and environmental events.

AUTHOR CONTRIBUTIONS

Although this paper should be considered a result of the common work of the authors, G. Mazzeo took primary responsibility for the sections 2.2, 3.1, 4.1 (with F. Zucaro), 4.2, R. Morosini for the sections 2.1, 3, and F. Zucaro for the sections 3.2, 3.3, 4.1 (with G. Mazzeo), meanwhile the part 1 (Introduction) and 5 (Conclusions) are a product of the shared reflections between the three authors.

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