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DEVELOPMENT OF COMFORTABLE URBAN ENVIRONMENT IN MOSCOW AND LEADING CITIES WORLDWIDE

PUBLIC REPORT



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COMFORTABLE URBAN ENVIRONMENT AS A FACTOR IN THE WELL-BEING OF RESIDENTS OF MEGACITIES

Quality of urban environment as a component of well-being

A key challenge most countries are facing today is to find a way to convert wealth into well-being for their populations. According to our studies, a country's national welfare quite often does not directly correlate with its residents' perceived well-being. Some countries are prosperous, but their populations are not satisfied with their lives, while other states are not as wealthy, but people there feel happier.

The Challenge of Converting Wealth into Well-Being report¹ emphasizes that this task is a tall order for any country and success in dealing with this challenge does not depend on the maturity of an economy. Having analysed 162 countries across 44 various parameters, our experts identified those that are efficiently converting their wealth into well-being for their citizens (they are shown above the red line in Figure 1) and those that are still failing to tackle this task.

Under the conditions of continuing urbanization, when the share of the planet's urban population is rapidly approaching 60 %² and large urban agglomerations and megacities are becoming increasingly more important

in people's lives, the well-being of a nation cannot be assessed separately from the well-being of urban residents. In this context, the ability to create a comfortable urban environment as a material factor of an urban resident's well-being is becoming crucial for any country striving to ensure the well-being of its nation.

Moreover, a comfortable urban environment is a critical driver of development and greater competitiveness for large megacities such as Moscow, because they need to attract and retain talent in order to maintain a competitive advantage (see box, "Cities' competition for talent").

Key elements of a comfortable urban environment

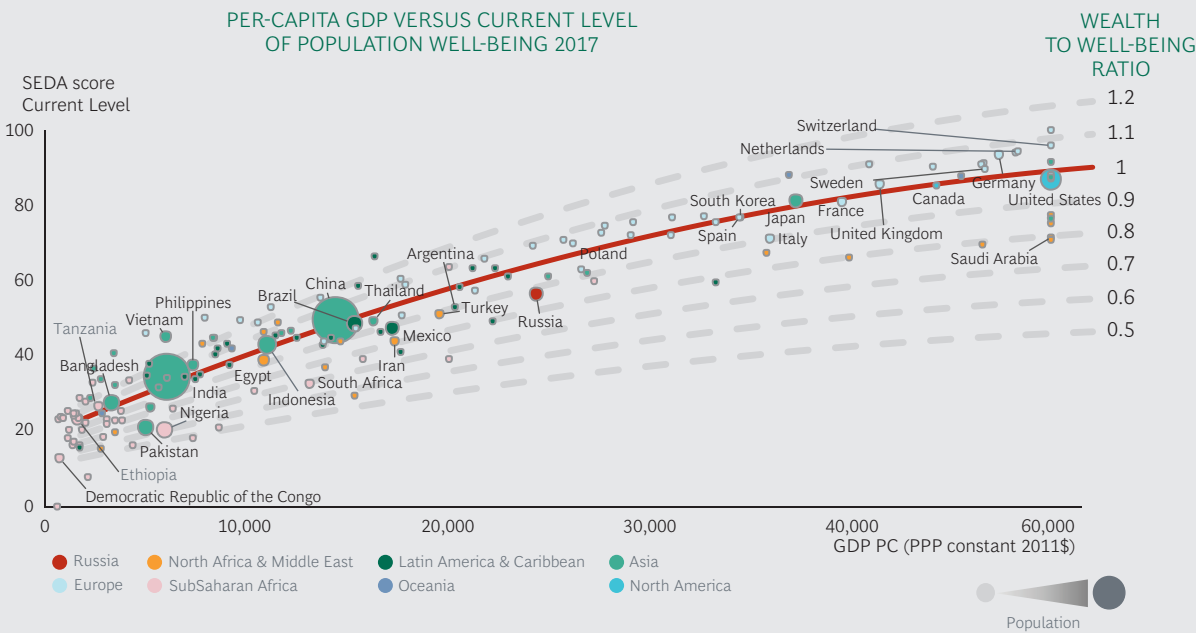
A crucial factor impacting a city's ability to attract talent is the availability of a comfortable environment for living.

There is currently no single definition for a comfortable urban environment. There are such terms as 'liveability' or 'quality of living' in the global practice – they have a similar sense and encompass a rather broad range of elements. In particular, they can be assessed based on such indicators as thermal comfort, presence of hazardous animals and insects, risk of natural disasters, level of bureaucracy, foreign exchange regulation, etc.

1. The Challenge of Converting Wealth into Well-Being, BCG, August 2017

2. The World's Cities in 2016: Data Booklet, UN, 2016

FIGURE 1 | Converting wealth into well-being in various countries worldwide



Source: BCG analysis

In Russia³, a comfortable urban environment is defined in a narrower sense. It comprises the high-quality maintenance of a city, the improvement of backyards, and the creation and improvement of public spaces⁴.

Within this study, the list of elements for a comfortable urban environment was defined based on the interpretation adopted in Russian practice as that which is most applicable. We identified six elements and grouped them into three main categories (Figure 3):

3. Federal priority project “Creating Comfortable Urban Environment”
4. <http://gorodsreda.ru/gorodskaya-sreda/>

1. House and backyard are elements related to urban residents’ dwelling.
2. Transit spaces are elements related to urban residents’ movements, either from one facility to another or inside a facility⁵, and the protection of their safety in the course of such movements.
3. Attraction spots are elements related to facilities and territories used by urban residents to spend time outside of their homes.

5. Urban residents’ travels in private transport and on public transport were not a subject of this study.

FIGURE 3 | Six elements of a comfortable urban environment grouped into three categories



Source: BCG project team analysis

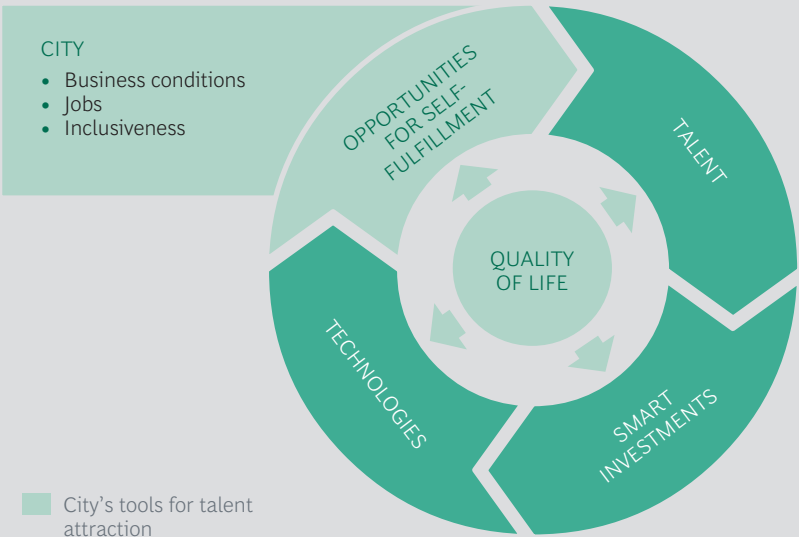
CITIES' COMPETITION FOR TALENT

“What tools can cities use to win competition for talent? The cause analysis of highly skilled labor migration reveals two key motives for moving to another country, which can be influenced by city authorities, namely opportunities for talent development (both economic and related to personal fulfilment) and quality of life.

In particular, sociological studies of causes of high-skilled migration from Russia and European countries , as well as the results of focus groups conducted during this study, suggest that <...> [most important criteria for the respondents are] availability of social infrastructure, quality of education and medicine, opportunities for leisure and recreation, and penetration of modern technologies

<...> In this context, the nature of global competition between megacities changes, the focus shifts to their ability to create conditions for attracting talent. To attract talents, a city shall, first of all, ensure the quality of life for those talents and their families, as well as conditions for their development: create new “smart” jobs, build a favorable business environment, ensure inclusiveness, i.e. conditions allowing everyone to be in demand and realize one’s potential.

FIGURE 2 | New economy – new model of competition among megacities



Source: BCG, Study of Moscow's competitiveness in the new economy

How can the comfort of an urban environment be measured?

There are several approaches that may be suggested to measure the level of comfort in an urban environment. First of all, such rankings as The Global Liveability Ranking (EIU) or Quality of Living City Ranking (Mercer) can be used as an integral assessment. The advantage of these rankings is that they generally cover a long list of cities and are regularly updated. For instance, the EIU ranking comprises over 140 cities and is updated on an annual basis. However, such an approach has one main defect: rankings are mostly based on expert opinions, not on measurable quantitative indicators, and the above examples are no exception.

Another approach to an integrated assessment can be based on a summarized index measuring urban residents' relationship with a place or the strength of their social ties there. Generalized trust or a sense of community can be examples of such indices⁶. Such indices are measured based on sociological polls of the population and they enable an urban environment to be assessed not by its objective characteristics, but in terms of its impact on urban residents, i.e. whether they feel safe, whether staying (and spending their free time) in a place is comfortable for them, whether conditions allow more frequent contact with neighbors. However, values of such indices largely depend on the method of a poll. Therefore, it is hard to collect commensurate samples of data to compare cities.

Third, it is possible to use the method of detailed evaluation, using a broad range of quantitative indicators. This method enables measurement of urban environment accessibility and quality parameters and assessment of the impact of such an environment directly on urban residents. Environment parameters can comprise quantitative characteristics of infrastructure available in a city, e.g. the length of bicycle paths.

6. See, e.g. study "The Mechanics of Moscow. Research into an Urban Environment" by the Moscow Institute for Social and Cultural Programs, 2015.

The degree of influence on urban residents is measured by the current demand for such infrastructure. As a result, such assessment shows how efficiently investments into improvement of an urban environment convert into urban residents' positive perception and changes in their behavior. The efficiency factor of such conversion is actually the main indicator of demand for, and the quality of, urban infrastructure. Finally, this type of conversion is well suited to both a generalized and a more detailed comparison of urban environments in various cities, including at the level of individual indicators. Thus, given the above advantages, the study was carried out using this approach.

To identify strengths and areas for improvements in the urban environment, we analyzed Moscow versus 11 megacities in different continents that are comparable by income level and total population: Hong Kong, London, Mexico, New York, Paris, São Paulo, Seoul, Shanghai, Berlin, Singapore and Tokyo.

They were compared by all six elements of a comfortable urban environment (see Figure 4 for matrix columns of city comparisons). For each of the elements, we compared urban environment characteristics: their accessibility (e.g. the length of pedestrian areas) and quality (e.g. walkability of streets) and the degree of influence of these elements on residents – based on perception (e.g. semantics of urban residents' statements about pedestrian areas) and behavior (e.g. user activity in social networks connected to pedestrian infrastructure).

We used 45 indicators to compare cities, one-third of which are unique and were developed especially for the purposes of this study, using geoanalytical tools and analyses of social networks (see Appendix No. 1 for the full list of indicators).

Based on the results of the comparison, each element was painted a certain color: green (if a city's result is in the top-50 % versus benchmarks), yellow (from 50 % to 75 % inclusive) and red (worse than

FIGURE 4 | City comparisons matrix



Source: BCG project team analysis

75 % of the benchmarks). As a result, we made a competitiveness heat map for each city: a matrix with elements represented in different colors that enables the assessment of a city’s competitive position

to be made for every element of an urban environment, and an inference to be made about whether investment in a city’s infrastructure converts into actual positive results for its residents.

MOSCOW AND OTHER MEGACITIES WITHIN A SINGLE FRAME OF REFERENCE:

SUCCESS AND ACHIEVEMENTS

Moscow today

The competitiveness heat map of Moscow (fig. 5) based on comparison results shows that, currently, the main competitive advantages of the Russian capital, compared to the other megacities, are a high level of safety, an attractive appearance, comfortable public spaces, and vast leisure opportunities. At the same time, as we see, the results Moscow demonstrates in the housing and utility sector

are not the best, and the city is behind in terms of the quality and accessibility of pedestrian infrastructure. Besides this, Moscow does not utilize its investments in infrastructure effectively enough as a lever of influence on the perception and behavior of urban residents, in terms of its level of safety, attractive appearance and uniqueness, as well as in terms of its leisure, sports, entertainment and cultural opportunities.



In general, in comparison with other leading global megacities, Moscow holds a medium position with respect to most of the comfortable urban environment elements (between 50% and 75% of benchmarks). Below, we will analyse what Moscow did to achieve this and where Moscow was 7 years ago in terms of the accessibility and quality of its infrastructure and the impact of that on the urban residents, compared to the leading global megacities.

Moscow: the road behind

Since 2011, in building a comfortable urban environment, Moscow has been moving within a systematic logic: enhancing and renovating residential buildings and adjacent territories, improving transit spaces, and creating new attraction spots. Thanks to such an approach, in the past 7 years Moscow has achieved significant success, growing a high-quality infrastructure across most elements of a comfortable urban environment (fig. 6). A positive effect of these changes is already quite visible – renovation of Moscow resulted in the improvement of perception and a change in urban residents’ behavior across many elements of the urban environment.

Below, we will review what Moscow has done specifically to improve accessibility to, and the quality of, the urban environment, and we will assess the impact of these efforts on the perception and behavior of urban residents.

Moscow’s achievements in the development of its urban environment

The housing and utilities (area 1 in fig. 6): improvement of the housing quality and backlog in utilities

In 2011-2017, in Moscow the number of inquiries to housing and utilities provider decreased 12-fold (from 6600 to 511), every fifth elevator was replaced¹. As a result, in terms of the accessibility of high-quality housing, the city managed to rise to the level of Berlin, Singapore and Paris. However, because of the backlog in the housing and utilities sector (the high cost of utility services, compared to the income of individuals, and the low quality of such services) overall, Moscow is still in a medium position in terms of the Housing and Utilities element.

1. More than 20,000 of 110,000 lifts; source: the municipal services complex, mos.ru

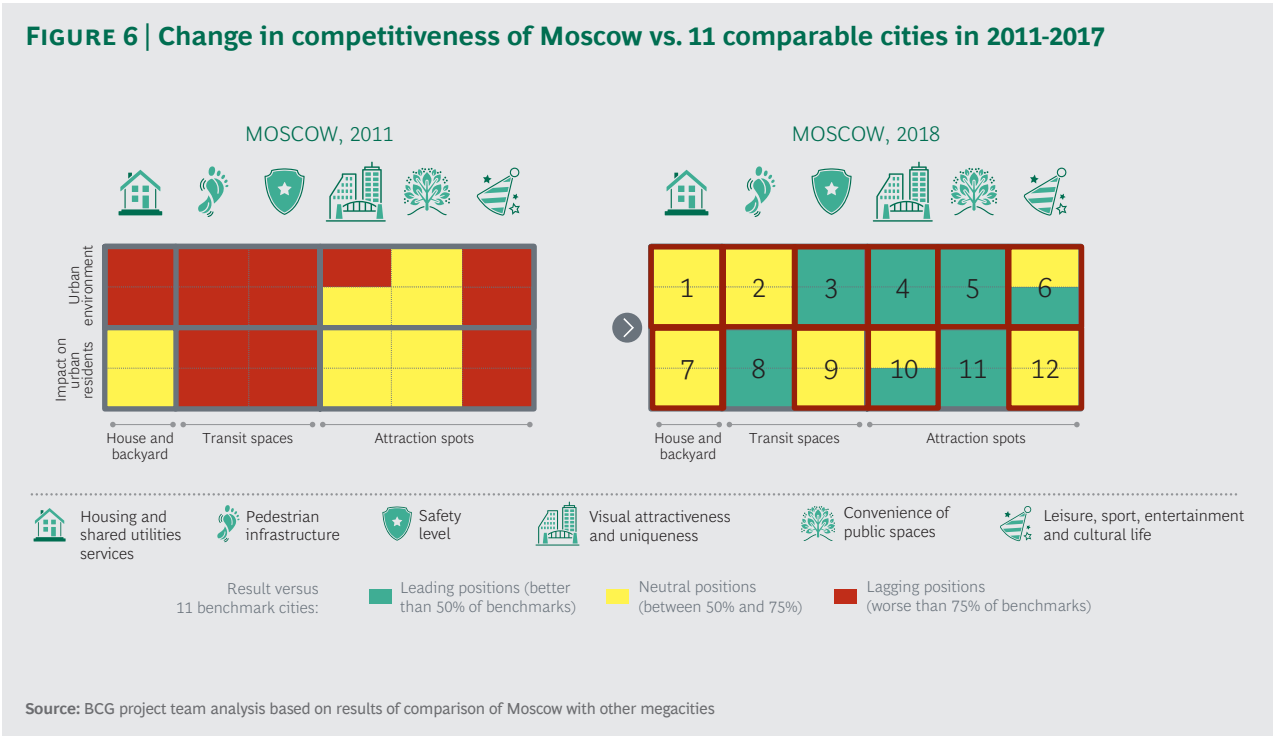


FIGURE 7 | Rozhdestvenka Street in 2015 before renovation (on the left), and in 2017 after renovation (on the right)



Pedestrian infrastructure (area 2 in fig. 6): the improvement of pedestrian infrastructure is significant, but insufficient

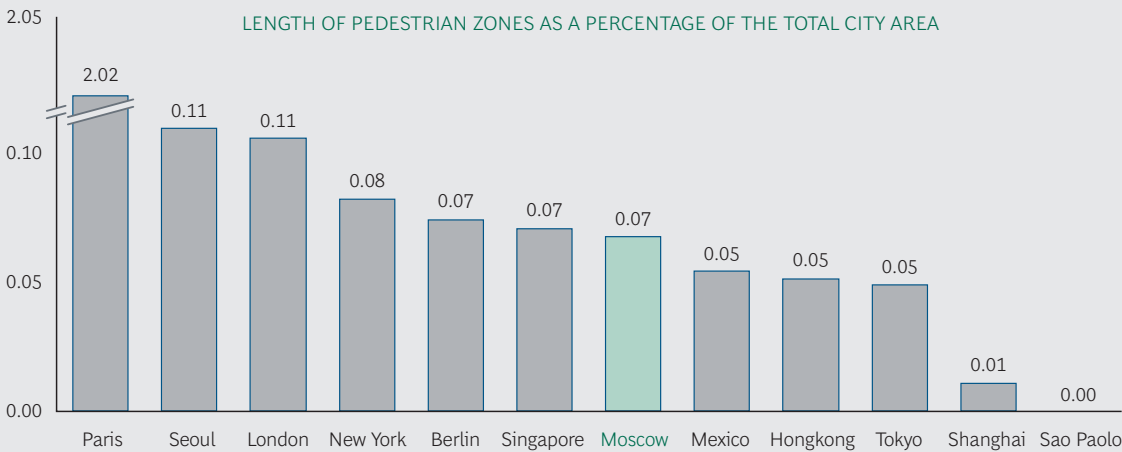
Moscow has shown significant progress in developing its pedestrian infrastructure: since 2011 the length of pedestrian streets in Moscow has increased more than five times². Comparing the position of Moscow and the leading global megacities in terms of the

length of pedestrian zones as a percentage of the total city area, it ranks 7th among the benchmark cities. Paris is an undisputable leader by this indicator, outscoring cities in the sample, including Moscow, by more than 20 times (see fig. 8). At the same time Moscow has average position by another indicator — walkability index³. Accordingly, Moscow ranks in the middle by the Pedestrian Infrastructure element.

2. From 1.3 km to 7 km: in 2011 - the Old Arbat Street; in 2017 – Nikolskaya Street, Tretyakovsky Lane, Rozhdestvenka, Kuznetsky Most, Kamergersky Lane, Tverskoy Lane, Stoleshnikov Lane, Klimmentovsky Lane, Pyatnitsky Lane, Bolshoy Tolmachevsky Lane, Ordynsky Tupik, Lavrushinsky Lane, Stary Arbat, Rybny Lane, Bogoyavlensky Lane.

3. Suitability of streets for walking is estimated using “walkability score” that is based on expert estimate of 2thinknow and incorporates elements such as comfort, safety and connectivity of pedestrian infrastructure

FIGURE 8 | The position of Moscow in terms of the length of its pedestrian zones as a % of the total city area, compared to 11 megacities



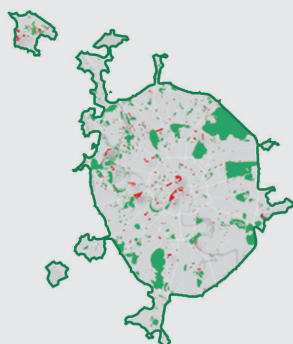
Source: Gamma geoanalytics; BCG project team analysis; openstreetmap.org

FIGURE 9 | The length and density of pedestrian zones in Moscow and Paris (the leading megacity)

MOSCOW

Length of pedestrian zones:
73 km

Length of pedestrian zones as a proportion of the total city area:
0.07



■ Parks

--- Pedestrian zones

□ City limits

PARIS

Length of pedestrian zones:
212 km

Length of pedestrian zones as a proportion of the total city area:
2.02



Source: Gamma geoanalytics; project team analysis; openstreetmap.org

Safety level (area 3 in fig. 6): leading positions in terms of street lighting and the number of CCTV cameras

One of the most important parameters of city safety is the level of its street lighting. So, in 2011-2017, more than 16 thousand facilities were lit by outdoor lighting, which made Moscow one of the top-5 best lit cities in the world⁴. The second key parameter is video surveillance. Today, there are 160 thousand CCTV-cameras in Moscow — more than in New York, Paris and Berlin, which allowed Moscow to rank fifth in terms of the number of cameras installed per square kilometer. Thanks to these measures, Moscow is the leader in the Safety Level element.

Visual attractiveness and uniqueness (area 4 in fig. 6): a significant breakthrough thanks to the implementation of a unified signage policy, renovation and lighting

Moscow ranks second among comparable megacities in terms of the number of significant places of interest, second only to Tokyo. In 2011-2017, a unified design code for advertising boards was introduced in the city, the number of buildings with architectural lighting grew by 4 times⁵ (see the example

on fig. 10), and about 1,000 cultural heritage sites were renovated⁶ (see the example in fig. 11). Thanks to the works implemented in the Visual Attractiveness and Uniqueness element, Moscow became one of the leaders alongside with London and Paris.

Convenience of public spaces (area 5 in fig. 6): Top 2 in terms of the number and area of parks

In the last years the total number of park areas in Moscow increased by two times⁷, in particular, several landmark parks were created (for example, the Zaryadye Park, fig. 12). This made Moscow one of the global leaders, both in terms of the area of parks to the total area of the city ratio (it became second among comparable megacities) and the area of places within walking distance from a park (fig. 13). As a result, Moscow has a leading position in the Convenience of Public Spaces element.

highlighting, in 2017 – 2143

6. More than 983 cultural heritage sites were renovated. Source: the municipal services complex, mos.ru

7. The number of parks increased from 126 in 2011 to 550 in 2017; Source: The municipal services complex, mos.ru Source: press release “Sergey Sobyanin: in the last years the number of parks in the capital city increase by two times”

4. Source: mos.ru

5. In 2011, 532 objects were equipped with architectural

FIGURE 10 | Triumphalnaya Square in 2015 before renovation (on the left) and in 2017 after renovation (on the right)



FIGURE 11 | Bole and Gutheil’s mansion in 2013 and in 2017 before and after renovation

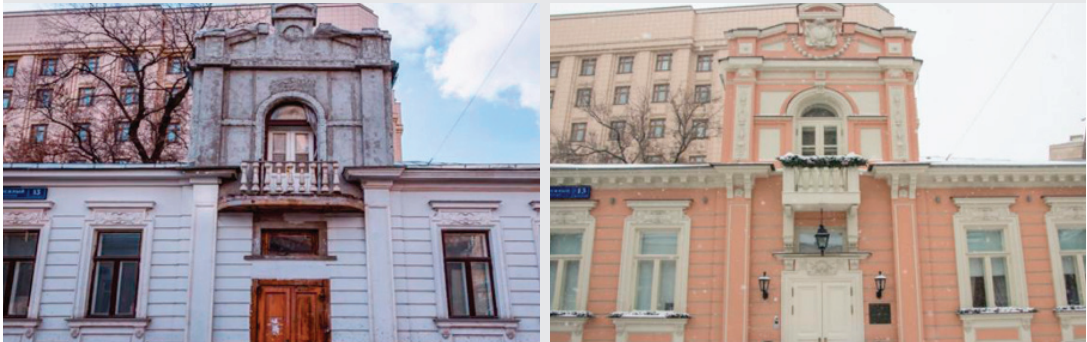
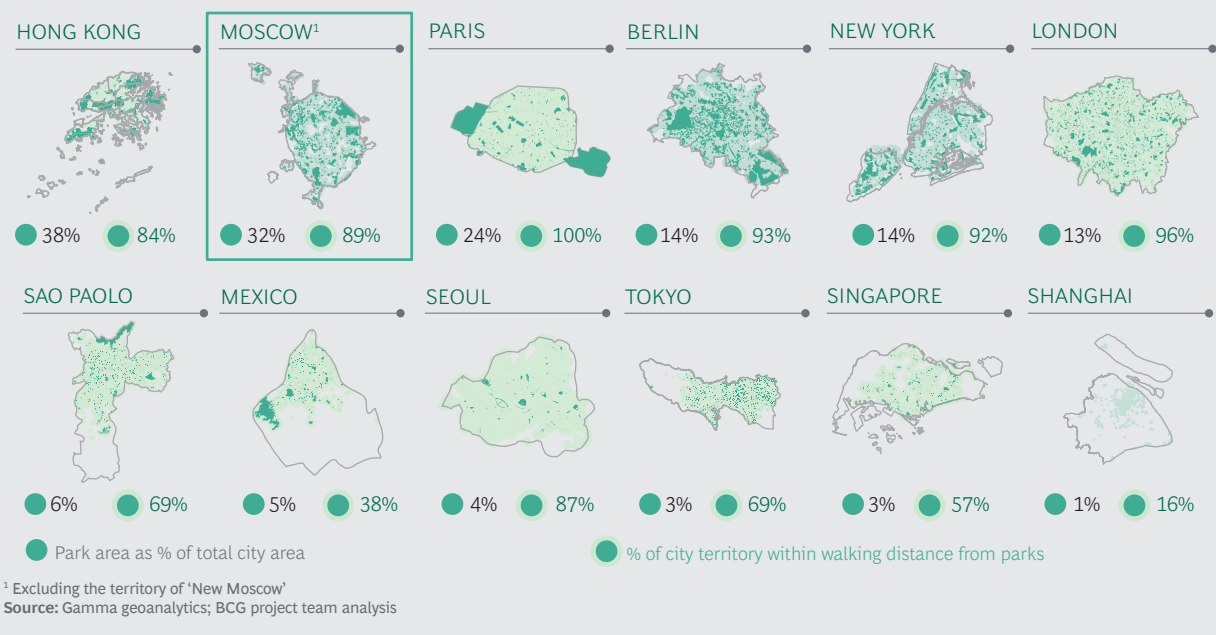


FIGURE 12 | The construction site in 2009 (on the left) and the Zaryadye Park in 2017 (on the right)



FIGURE 13 | % of the area of parks in the total area of the city territory and the area of places within walking distance from parks for 12 megacities, which are being compared



Leisure, sport, entertainment and cultural life (area 6 in fig. 6): a large number of festivals and a medium number of sport infrastructure facilities

In 2011-2017, free city festivals were held in Moscow on average every 2 days⁸, which is comparable to the festival frequency in Berlin, one of the global leaders in this figure (see the example in fig. 14). In addition, since 2013 the number of bike rental stations has increased 4 times . In terms of other sport infrastructure facilities (sport grounds, foot-ball fields, etc.) Moscow has a medium position, compared to the other cities.

IMPACT OF THE CHANGES TO MOSCOW’S INFRASTRUCTURE ON URBAN RESIDENTS

The renovation of Moscow brought about certain improvements in perception and changes in the behavior of the urban residents (diag. 15). According to our assessment, in terms of Pedestrian Infrastructure and Public Spaces Improvementelements, Moscow has successfully converted its investments in infrastructure into a change in the perception and behavior of its urban residents (fig. 6, areas 8 and 11).

8. 1,172 free city festivals were held in Moscow from 2011 to 2017.

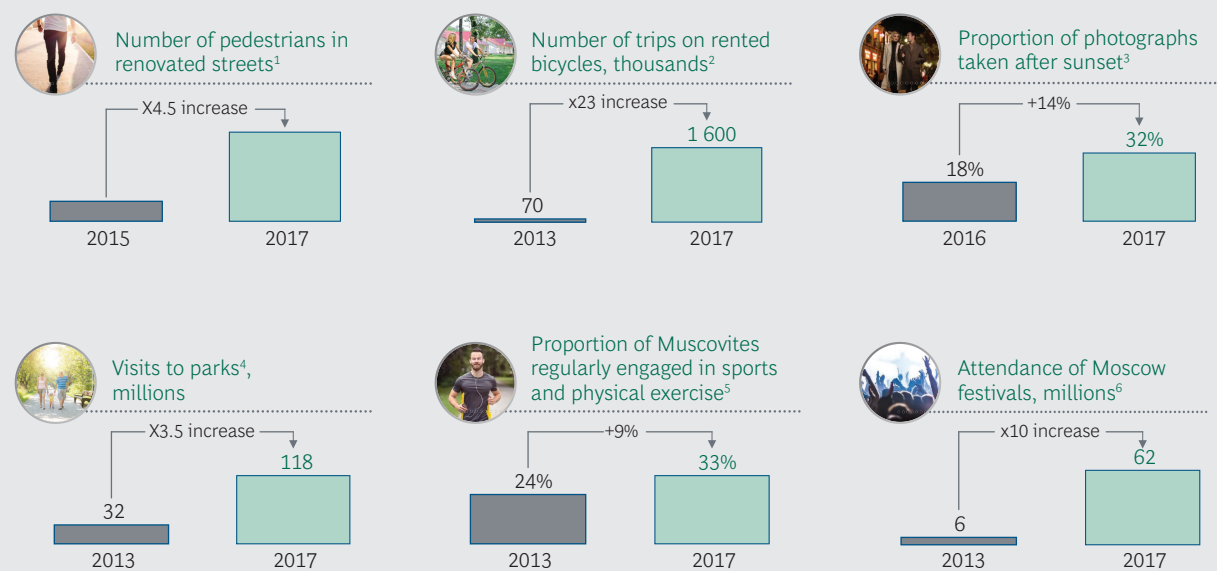
FIGURE 14 | The Bolshoi Theater during the Circle of Light Festival



- The number of pedestrians in the renovated streets has increased by 4.5 times, on average⁹.
- Muscovites have begun to use bike rental services 23 times more often¹⁰.
- Now every third photo in the renovated streets is made after dark¹¹.

9. Source: The Department of Transport of Moscow.
10. Source: mos.ru.
11. Source: Strelka KB - the mean values for streets and squares: New Arbat, Tverskaya, Novinsky Boulevard, Sadovaya Kudrinskaya, Bolshaya Sadovaya, Sadovaya Triumfalnaya, Petrovskie Linii, Bolshoi Kislovsky, Malaya Dmitrovka, Taganskaya.

FIGURE 15 | Changes in the behavior of Muscovites in 2013-2017



¹ mos.ru;

² The Department of Transport of Moscow;

³ Strelka KB - the mean values for streets and squares: New Arbat, Tverskaya, Novinsky Boulevard, Sadovaya Kudrinskaya, Bolshaya Sadovaya, Sadovaya Triumfalnaya, Petrovskie Lini, Bolshoi Kislovsky, Malaya Dmitrovka, Taganskaya;

⁴ The Department of Culture of the City of Moscow;

⁵ The Department of Sport and Tourism of the City of Moscow;

⁶ The Department of Economic Policy and Development of the City of Moscow

Source: results of focus groups;

- Every third Muscovite has begun to pursue exercise and sports activities¹².
- Muscovites have begun to attend festivals 10 times more often¹³.

The main objective of investments into urban improvement is to increase the level of comfort for citizens, but also to produce economic benefits such as additional budget revenues from:

- Additional proceeds of retailers and food service providers because of increased tourist appeal and free-entry city festivals. For example, in 2017, Moscow's budget received 97.9B rubles in revenues from tourism and various events¹⁴.
- Revenues of new businesses in renovated pedestrian streets and iconic parks

However, despite these notable changes in the behavior of Muscovites and significant economic impact from investments in urban improvement, the city still has significant room for enhancement. Moscow still has a long way to go in terms of translating the investments in infrastructure development into citizens' positive attitude and behavior changes, which, in turn, would help to further reinforce the city's budget revenues and fund even more changes.

12. Source: Department of Sport and Tourism of the City of Moscow; mos.ru

13. Source: Department of Sport and Tourism of the City of Moscow; mos.ru

14. Source: Tourist and Excursion Flows and Economic Impact from Tourism, report by the Department of Economic Policy and Development of Moscow, January 2018

MOSCOW 2025: AN URBAN ENVIRONMENT FOR THE FUTURE

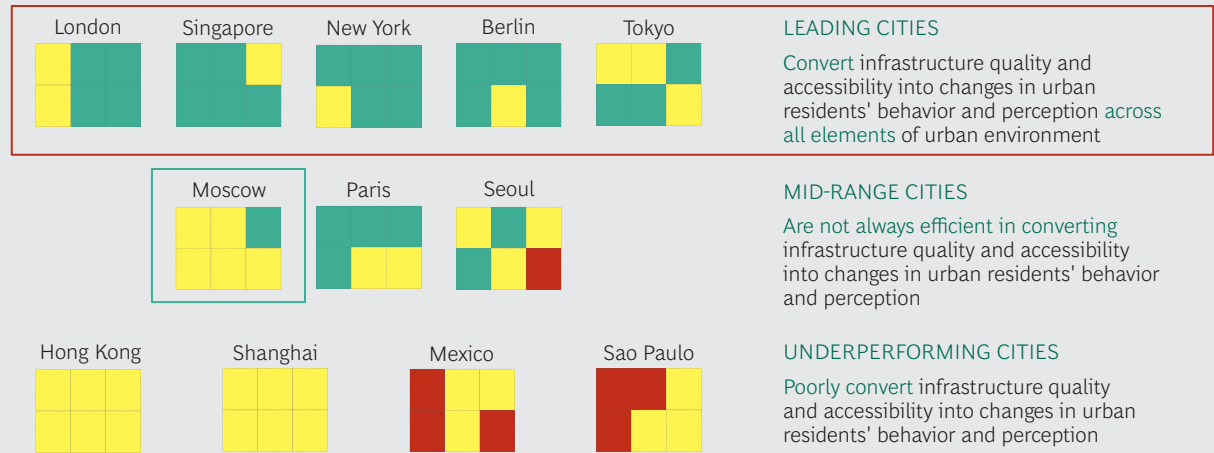
Selecting a course of action

After comparing competitiveness heat maps, we divided the cities into three groups, in terms of their success in converting investments in infrastructure into positive perceptions by, and behavior of, their residents (Fig. 16):

- 1. Leading cities — high conversion rate.
- 2. Mid-range cities — average conversion rate.
- 3. Underperforming cities — low conversion rate.

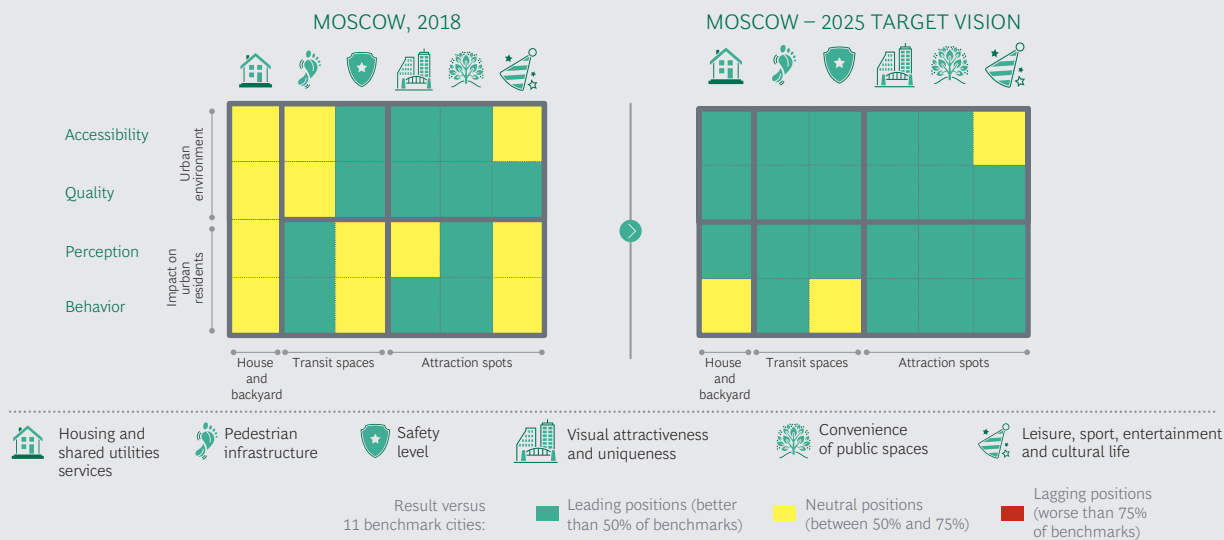
The achievements that Moscow has made over the last seven years has meant that the city is able to take a firm position among the mid-range cities, equal to Paris and Seoul, and to outperform a group of cities that lag behind, including Hong Kong, Shanghai, Mexico City and São Paulo.

FIGURE 16 | Enlarged heat maps of 12 cities



Source: BCG project team analysis

FIGURE 17 | Competitiveness heat maps of Moscow’s current status and the target vision for 2025



Source: BCG project team analysis

However, we believe that one of the priority targets that Moscow should set itself is to raise the level of comfort of the urban environment to those of leading cities (London, Singapore, New York, Berlin, and Tokyo). To achieve this target, a plan was proposed for the next 7 years that will address this issue and ensure that the city’s initiatives and activities are effective.

In preparing this plan, we also compiled a target heat map for Moscow 2025 (Fig. 17).

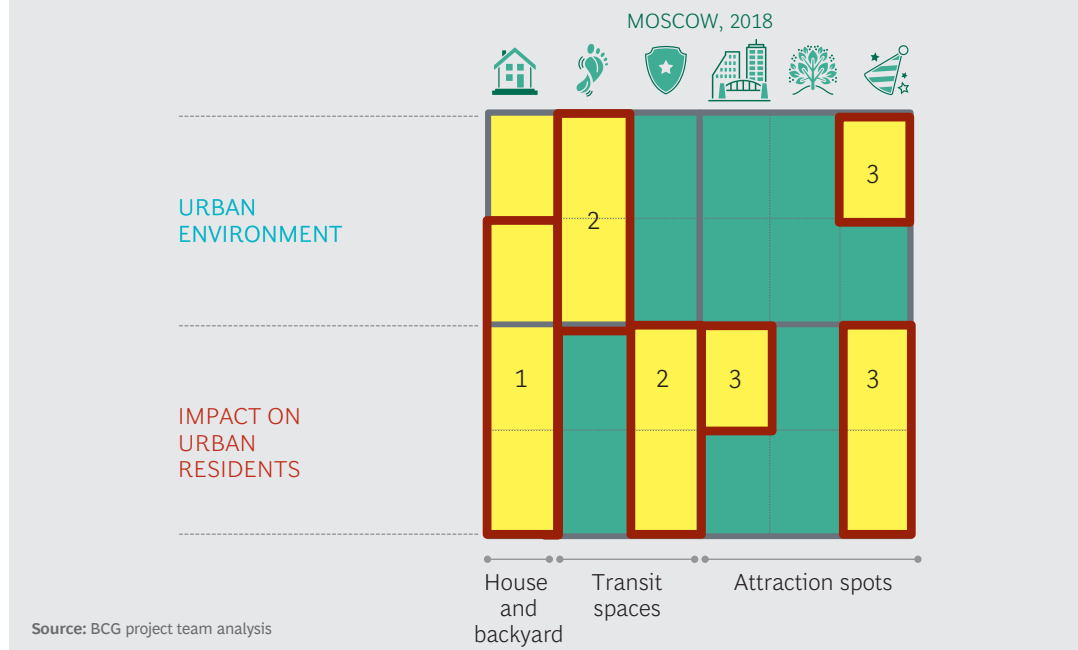
Moscow 2025: a city to live in

Based on the comparison of Moscow’s current heat map and the target heat map, we defined what we believe are priority areas for the city’s development over the next seven years (Fig. 18). Analysis of best practices revealed specific solutions that other megacities used in these areas, and that could be implemented in Moscow. A survey of leading Russian and international experts in urban studies helped to assess whether the experience of such best practices would be applicable, and to develop recommendations tailored to the local conditions in Moscow. In determining the priority of the target areas for development, we also took into account the results of surveys conducted among Moscow residents.

As a result, we identified three main areas for the city to focus on until 2025:

- **Home and backyard** (Area 1 on Fig. 18): the quality of living conditions needs to be improved, as well as the level of services provided. Information campaigns are also needed to promote a culture of using entranceways and yards, and a culture of decision-making at the level of mini communities (dweller committees).
- **Transit spaces** (Area 2 on Fig. 18): the quality of pedestrian infrastructure needs to be improved, and modern security technologies need to be introduced. Information campaigns are also needed in order to improve the perception of the safety level and quality of transit spaces.
- **Attraction spots** (Area 3 on Fig. 18): the external appeal of public spaces needs to be improved, as well as the diversity and quality of leisure activities. In addition, the efficiency and ease of communication needs to be improved, in order to change the perception and behaviour of urban residents.

FIGURE 18 | Priority of changes for Moscow



Based on the three areas mentioned, a program was drawn up for the development of a comfortable urban environment in Moscow, which consists of 14 key initiatives (Fig. 19):

1. **Cozy car-free backyard** — a well-maintained, clean yard with no cars and with varied infrastructure (tables, benches, children’s playgrounds and sports grounds, bicycle racks, etc.)¹.
2. **Safe, functional, and beautiful entrance space** — entrance spaces that are renovated to a high standard, with modern equipment for the maximum convenience (parcel lockers, secure storage for bicycles and pushchairs, and individual lockers for long-term storage for each apartment) and safety of residents (cameras instead of concierges).
3. **Affordable, reliable and convenient utilities** — providing homes with modern equipment and technology to improve the quality of utility services and to create conditions to develop

competitive business for managing residential properties.

4. **High-tech and efficient digital home** — promoting a universal web portal and application for managing home and utility services, and switching to smart meters.
5. **It’s my home — and I do care** — actively cultivating mini communities (dweller committees) for blocks, buildings and districts, to carry out information campaigns and organize communal events.
6. **Pedestrian-oriented city** — ensuring the comfort of pedestrian traffic by increasing the number of pedestrian zones and developing pedestrian infrastructure.
7. **Cleanliness underfoot and beyond** — measures to prevent pollution of streets, including conducting information campaigns, introducing appropriate fines, etc.
8. **Safety around the clock** — switchover to smart lights, providing public spaces with equipment for emergencies; conducting information campaigns to improve perceived safety; installing emergency buttons and developing security start-ups in the city.

1. The concept of “car-free backyard” involves moving all parking spaces from backyards around residential buildings to specially allocated areas (multi-level or underground car parks, car parks on the other side of the residential building, car parks at ground level with a second level built above for the backyard)

9. **Green city** — increasing the amount of green space in the city and developing park infrastructure.
10. **Modern city image** — positioning Moscow as one of the world’s architectural capitals, attracting talented and well-known architects, artists and designers, participating in international competitions and conducting large-scale communications campaigns.
11. **River as culture and leisure hub** — increasing the number of pedestrian waterfronts and developing their infrastructure; developing summer beaches; and providing entertainment programs.
12. **City of sports** — installing mixed-use sports grounds and special grounds for alternative types of sport in backyards and parks; holding international sports festivals and events.
13. **City of festivals** — increasing the quality and scale of festivals in the city and organizing major cultural events.
14. **Your digital city guide (Moscow @ Your Fingertips app)** — developing and promoting a universal digital app

with detailed information about all the infrastructure and events in the city, with the option to purchase tickets and book and pay for rental services.

The 14 initiatives described above cover the entire spectrum of a comfortable urban environment, but it is not possible to monitor the simultaneous implementation of so many initiatives effectively. We therefore used two criteria to select the highest priority areas:

1. Gap to target state — how much work needs to be done in order to reach the target.
2. Public opinion — how relevant the issue is for the urban residents and how high their level of dissatisfaction with the current state of affairs is.

The results of this evaluation are shown in Fig. 20.

Implementing these priority areas will significantly change Moscow and the comfort of living in the city. Muscovites and their children will start spending more time in well-maintained yards outside their homes, with no cars and with infrastructure for

FIGURE 19 | 14 areas for development in Moscow



FIGURE 20 | Prioritizing areas for development in Moscow



Source: focus groups, interviews with experts, analysis of best practices, BCG project team analysis

people of all ages. Entrance spaces will become safer and cleaner, and special areas for storing bicycles and pushchairs will free up corridors and stairwells. Modernizing the utilities will reduce the number of breakdowns and the cost for residents, and developing a competitive business to manage residential properties will increase the speed, efficiency, and quality of cleaning and renovating the premises and yards. Urban residents will start to travel less in their own cars and will instead start to use alternative forms of private and public transport, and they will spend more time walking in the growing network of pedestrian zones, sitting in cafés, and socializing with friends and family.

In order to make progress, you must control the course of motion

The competitiveness heat map compiled has proven to be an effective tool in assessing the current level of comfort in the urban environment and establishing a target vision for the city. However, it can also be used later on to manage the changes:

- As a tool to measure progress in the development of the urban environment — to quantitatively assess a wide range of indicators and to compare Moscow with other cities.
- As a tool to measure the effectiveness of converting investments into improving the perception (and changing the behaviour) of urban residents — to assess the demand for infrastructure in the city.
- As a tool to adjust the course of development — to determine the priorities for future changes and improvements.


FIGURE 21 | A comprehensive list of quantitative indicators used for preparing competitiveness heat maps

	 HOUSING AND SHARED UTILITY SERVICES	 PEDESTRIAN INFRASTRUCTURE	 SAFETY LEVEL	 VISUAL ATTRACTIVENESS AND UNIQUENESS	 CONVENIENCE OF PUBLIC SPACES	 LEISURE, SPORT, ENTERTAINMENT AND CULTURAL LIFE
Accessibility	Availability of quality housing Cost of utilities vs. income Mortgage repayment terms when buying a standard size apartment	Length of pedestrian areas	Number of CCTV cameras Share of illuminated streets Number of street lights	Number of lighting events Standardized signage policy Number of significant attractions	Availability of parks in the city Availability of parks within walking distance Availability of public toilets	Number of free city festivals Number of sports grounds Availability of sports infrastructure Availability of cultural infrastructure
Quality	Hazardous dwelling rates Quality of water supply Quality of power supply Water quality assessment Quality of city cleaning	Walkability of streets	Use of smart lights, face recognition technology, availability of alarm buttons, defibrillators	UNESCO sights	Diversity of infrastructure of the largest parks Diversity of infrastructure of the largest pedestrian waterfronts	Number of large (international) festivals Diversity of entertainment within the city (theaters, cinemas, musical performances)
Perception	Perceived quality of drinking water Perceived urban cleanliness	Positive/negative semantics (analysis of Instagram posts)	Safety Index Nightlife safety and nighttime lighting quality perception	Positive/negative semantics (analysis of Instagram posts)	Perception of the quality of parks Positive/negative semantics (analysis of Instagram posts)	Positive/negative semantics (analysis of Instagram posts)
Behavior	Types of activities residents engage in outside (analysis of Instagram images)	Popularity of pedestrian infrastructure (analysis of Instagram images)	Crime rates Popularity of nightlife (analysis of Instagram images)	Popularity of the main attractions (analysis of Instagram images)	Popularity of parks (analysis of Instagram images)	Popularity of parks (analysis of Instagram images) Number of visitors to cultural events – theater, exhibitions

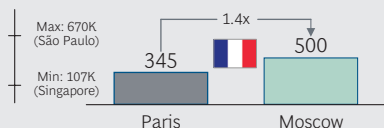
Source: BCG project team analysis


APPENDIX 2 | Comparison of accessibility, quality, perception and behavior indicators of comfortable urban environment in Moscow and benchmark megacities

ACCESSIBILITY AND QUALITY INDICATORS

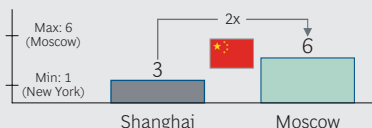
 Moscow scored 2nd among benchmark megacities in terms of number of street lights


Number of street lights, thousands



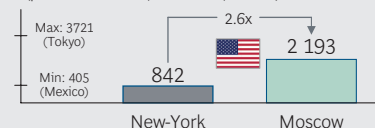
 Moscow scored 1st among benchmark megacities in terms of number of light shows


Number of light shows, annually



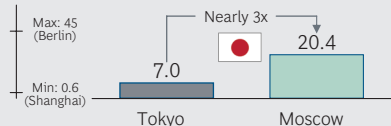
 Moscow scored 2nd in number of significant sights and attractions (places of interest, museums, nature)


Number of significant sights and attractions (places of interest, museums, nature)



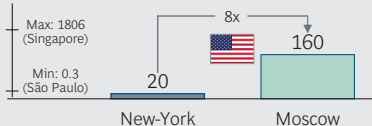
 Moscow became 3rd in number of city festivals per 1M inhabitants, slotting between Paris and London

Annual number of city festivals per 1M inhabitants



 Moscow is one of the five cities with the highest number of surveillance cameras per square kilometer

Number of surveillance cameras per square kilometer¹



¹ For this indicator the area of Moscow is assumed to be the area before the 2012 expansion.

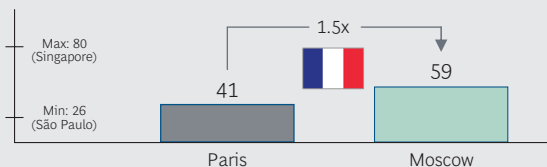
Source: BCG project team analysis, open source data

PERCEPTION AND BEHAVIOR INDICATORS



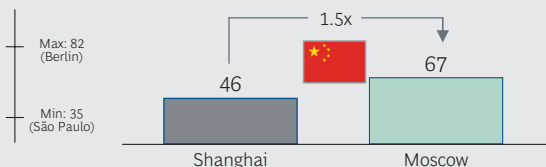
Average score of Muscovites' satisfaction with urban cleanliness is 1.5x higher than for the inhabitants of Paris

Index of perceived urban cleanliness¹



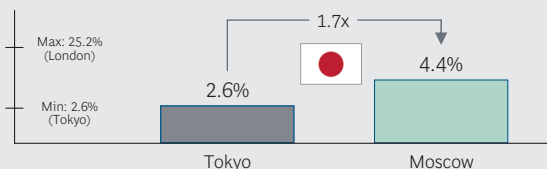
Average score of Muscovites' satisfaction with the quality of parks is 1.5x higher than for the inhabitants of Shanghai

Index of perception of the quality of parks¹



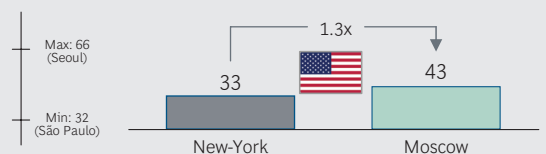
Share of cyclists in Moscow is almost 2x higher than in Tokyo

% of cyclists in total population



Average score of Muscovites' satisfaction with nighttime lighting is 1.3x higher than for the inhabitants of New-York

Index of nightlife safety and nighttime lighting quality perception¹



¹ Perception index with values from 0 to 100, with 0 being bad perception and 100, good perception.

Source: BCG project team analysis, open source data



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