Architectural and Urban Image of Supermarkets in the Moskovskaya Oblast

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Abstract. Supermarkets are sales buildings characterised by complex technologies and construction and a distinct architectural and town-planning image. 20 supermarkets have researched and analysed using various criteria. Recommendations are given on the design of supermarkets: within a city they must be situated close to main motorways, in the industrial and storage zone or in close proximity; front walls must be attractive from the architectural point of view, its integration into the urban environment is important; parking lots must be designed separately for clients, lorries and personnel and must occupy not less than 30-50% of the land plot; building footprint must not exceed 30-35% of the land plot; green space area must be calculated depending on the number of visitors, but it must not be less than 5% of the land plot; recreation zones must be also incorporated into the supermarket space; fire safety rules, access to people with restricted mobility, environmental norms must be ensured at all times.

1. Introduction
Supermarkets as a new type of a commercial building appeared in Russian more than 10 years ago [1]. Familiar architectural image: spaces and front walls that remind of warehouses and production facilities with prominent entrance elements. They are usually situated on main motorways beyond the city. They are large with a wide range of goods, these are some of the distinctive features of supermarkets [2, 3].

Pertinence of the topic. Every commercial building in the Moskovskaya oblast at the initial design stages must get the Certificate of the architectural and town-planning image (ATPI).

A supermarket as a commercial building with the area of more than 1,500 square meters must complete the consideration procedure under "Basic procedure". The ATPI Certificate always includes colourful front walls approved by the Architectural and Town Planning Committee in the Moskovskaya oblast; floor-by-floor plans, layouts, technical and economic indicators, planning layouts for the land plot with urban development elements. The Law "On the urban development in the Moskovskaya oblast" determines the urban development elements (UDE). UDE include parking lots, recreation areas, lighting, fences, etc. Supermarkets have become an intrinsic part of the communities in the Moskovskaya oblast and have occupied an important place in the commercial sector as weekend stores [4, 6, 9]. Their architecture is different from other commercial objects [5, 7, 8]. The goal of the present publication is the following. To use cases to show what ATPI of a supermarket is. To identify the intrinsic features of the exterior of the building and urban development of a land plot as the main criteria of ATPI. To give practical recommendations on designing supermarkets.
Scientific pertinence is determined by the following objectives. To consider architectural solutions in existing supermarkets, to analyse and come to conclusions on the main criteria for this type of a commercial building in terms of its ATPI. To develop recommendations on including commercial buildings in the norms and regulations.

2. Theory
This article has commercial business facilities as its research object, namely supermarkets with the area of more than 5,000 square meters. The subject of the research concerns architectural and town-planning solutions for supermarkets in the Moskovskaya oblast (MO).

Research methodology. 20 supermarkets in the MO have been analysed for the purposes of the research in terms of their architectural and town planning solutions. This article reviews 10 of them (Figure 1). The author of the article actively participated as the head architect of the projects in the design of the two buildings, namely Big Box (Optoclub Ryady) and Ulmart. These buildings are shown in Figure 1 under numbers 5 and 7.

The location of supermarkets, urban development of supermarket land plots, their area and front walls were studied. The conducted research yielded the following results.

In terms of their location in the city all the buildings have only two options:

- on the outskirts of the city; in close proximity of the Federal or regional motorways (80%), or, quite often, in the industrial zone or close;
- within the city limits: in the retail and entertainment zone or the industrial zone, close to production and warehouse facilities (20%).

| 1.1. Leroi Merlin in Domodedovo. Construction and household goods. Total area of the building is more than 15,000 sq.m. | 1.1. Leroi Merlin in Domodedovo. Construction and household goods. Total area of the building is more than 15,000 sq.m. |
| -- situated beyond the city limits, on a Federal motorway |
| -- the height of the building is about 10 meters, the height of the retail zone up to the roof is about 7 meters; |
| -- building footprint – 30% of the land plot; |
| -- parking lot area – 50% of the land plot |
| -- number of parking spaces – 860 spaces |
| -- green zone – 2% |
| -- sidewalks, pedestrian zones on the parking lot – n/a |

| 2. "Lenta" in Domodedovo. Food and non-food goods. Total area about 10,000 sq.m. | 2. "Lenta" in Domodedovo. Food and non-food goods. Total area about 10,000 sq.m. |
| -- situated in the urban industrial zone, on the main district street |
| -- the height of the building is about 12 meters, the height of the retail zone up to the roof is about 8 meters; |
| -- building footprint – 37% of the land plot; |
| -- parking lot area – 40% of the land plot |
| -- number of parking spaces – 390 spaces |
| -- green zone – 4% |
| -- sidewalks, pedestrian zones on the parking lot – n/a |

| 3. Globus in Kotelniki. Food and non-food goods. Total area of the building is more than 30,000 sq.m. | 3. Globus in Kotelniki. Food and non-food goods. Total area of the building is more than 30,000 sq.m. |
| -- situated beyond the city limits, on a Federal motorway |
| -- the height of the building is about 10 meters, the height of the retail zone up to the roof is about 6 meters; |
| -- building footprint – 30% of the land plot; |
| -- parking lot area – 40% of the land plot |
4. METRO Cash and Carry, Leninsky municipal district. Food and non-food goods. Total area of the building is more than 10,000 sq.m.

- number of parking spaces – 1500 spaces
- green zone – 14%
- sidewalks, pedestrian zones on the parking lot – n/a

3. Globus in Kotelniki. Food and non-food goods. Total area of the building is more than 30,000 sq.m.

- situated beyond the city limits, on a Federal motorway
- the height of the building is about 10 meters, the height of the retail zone up to the roof is about 7 meters;
- building footprint – 49% of the land plot;
- parking lot area – 20% of the land plot
- number of parking spaces – 308 spaces 123 parking spaces in the open air parking lot + 185 spaces on a two-floor parking lot within the territory
- green zone – 15%
- sidewalks, pedestrian zones on the parking lot – almost none

6. Castorama in Odintsovo. Construction goods. Total area of the building is more than 20,000 sq.m.

- situated beyond the city limits, on a Federal motorway
- the height of the building is about 15 meters with 1 floor on pillars, the height of the retail zone up to the roof is about 8 meters;
- building footprint – 38% of the land plot;
- the parking lot under the land plot and partially under the building (1 floor) – 35% of the land plot
- number of parking spaces – 620 spaces
- green zone – 10%
- sidewalks, pedestrian zones on the parking lot – partially envisaged

7. Ulmart in Mytischi. Electronics, household appliances. Total area of the building is more than 20,000 sq.m.

- situated beyond the city limits, on a Federal motorway
- the height of the building is about 13 meters, the height of the retail zone up to the roof is about 10 meters;
- building footprint – 30% of the land plot;
8. OBI in Dmitrov (under construction). Garden goods, country house goods, construction goods. Total area of the building is more than 10,000 sq.m.

| Characteristics                                      |
|------------------------------------------------------|
| parking lot area – 30% of the land plot              |
| number of parking spaces – 880 spaces                |
| green zone – 1%                                       |
| sidewalks, pedestrian zones on the parking lot – partially envisaged |

9. Ashan in Domodedovo. Food and non-food goods. Total area of the building is more than 13500 sq.m.

| Characteristics                                      |
|------------------------------------------------------|
| parking lot area – 50% of the land plot              |
| number of parking spaces – 755 spaces                |
| green zone – 5%                                       |
| sidewalks, pedestrian zones on the parking lot – n/a |

10. Decathlon in Domodedovo (under construction). Sports goods, equipment. Total area is 4,000 sq.m.

| Characteristics                                      |
|------------------------------------------------------|
| parking lot area – 30% of the land plot              |
| number of parking spaces – 222 spaces                |
| green zone – 5%                                       |
| sidewalks, pedestrian zones on the parking lot – n/a |

**Figure 1.** Supermarkets with the main characteristics of their architectural and town planning image

It has been established that all the buildings form a part of chain stores. The total space of the supermarkets exceeds 4,000-5,000 square meters (sq.m.).

The style and colour solutions for front walls of the analysed supermarkets are based only on the corporate colours of the chain store. All the buildings are designed as wire-frames with suspended sandwich panels (100%). The wire frame is made from metal lad bearing framework: pillars, joints, roof trusses with cast reinforced concrete slab as the foundation. Sometimes reinforced concrete pillars are used. This assembly technology and the materials ensure fast and relatively easy construction of
the building that is virtually does not depend on weather conditions. Space and composition solutions for supermarkets are very similar. These are one-floor building 8-12 meters high (80%).

The height of the sales zone, or more precisely, the sales and storage zone from the floor to the prominent trusses is about 6.5-10 meters. These heights are determined by two factors:

- **Goods storage height.** All the supermarkets use high-shelf storage on storage racks more than 5.5 meters high.

- **Cutting the front walls made from sandwich panels.** Elements for the front wall with specific sizes. A sandwich panel is typically 1.0-1.2 meters high; its standard length is 3.0 meters; the maximum length that allows to prevent bending under its weight and takes into account the practical aspects of its usage for a sandwich panel is 9 m.

Today sandwich panel manufactures claim they can meet any requirements of their clients and designers and take any jobs, they offer various textures, surface finishes and even wood grain finishes. However, a unique architecture of the front wall cannot be ensured only by different surface finishes of a standard wall element that form the frame of the front wall. Space design arrangements and quick-mounting section construction in all the buildings of supermarkets are almost identical. As a result we get similar simple rectangular front walls with the central space that acts like a sales and storage area. The walls of supermarkets can be distinguished only by the colours of the specific chain brand. Chain commercial buildings can simultaneously harmonize and approve a front wall brand book in the Architectural and Town Planning Committee of the Moskovskaya oblast. This is an album with various surface finishes for wall in the corporate style and chain brand colours. Further design solutions for supermarkets are to be based on the wall solutions from the brand book.

The building footprint in the analysed supermarkets takes 20-49% of the total area of the land plot (LP). 70% of the analysed supermarkets have building footprints that account for 30-35% of the total area of the LP.

Supermarket parking lots are an important element in the urban development of an area and in ensuring the well-being of the client. The area of parking lots accounts for 30-50% of the LP. In other words, the designed supermarket takes up about the same area on the land plot as the designed parking lot does.

The green space area varies from 1 to 15%. In 80% of the cases, this green space is simply a green zone along the motorway that separates the parking lot and the supermarket from the motorway. Green zones of 10-15% are rare, with the most common share being 1-5% of the land plot.

Crosswalks (pedestrian traffic markings) should be marked as there are too many cars and constant traffic on the territory.

Anti-parking poles dividing pedestrian paths from the carriageway must be 1.5 meters apart under the ruling of the Government of the Moskovskaya oblast. Unfortunately, they have not been used in all the projects, and they are absent in 20% of the cases, or they used but partially.

Recreation zones on the territory of supermarkets are not envisaged. On the part of the contractor, that would be unnecessary luxury, as the regulations do not require recreation zones to be organized on the territory of the supermarket. It is quite strange, as even production sites and storage facilities must have recreation zones in their territories. Clients tired of shopping do not have an opportunity to have rest in the area around a supermarket. The same applies to the personnel of the supermarket who are deprived of that possibility. The regulations also do not envisage any minimum percentage for green zones in the land plot of the supermarket.

Such objects as "Isolated shopping malls, supermarkets, shopping centers and retail centers, public catering enterprises, outdoor wholesale markets, food and industrial markets, multifunctional complexes" are marked as Class V, which means that these facilities should have a sanitary and protection zone (C53) of 50 m as a protective barrier that ensures the safety of the population when the facility is operated under normal conditions.

Noise barriers for the area are constructed in 40% of the cases, which means that 40% of the supermarkets violate the requirements for minimum distance from residential buildings. These barriers
are the last measure when sanitary norms are violated, first of all, when sanitary and protective zones of the supermarket are reduced.

3. The practical value

Is determined by the fact that propositions and recommendations are developed that can be used in designing supermarkets. These conclusions should be incorporated as recommendations into norms and regulations for commercial buildings for the purposes of supermarket design.

Building footprint must not exceed 30-35% of the total area of the land plot.

The parking lots do not occupy less than 30-50% of the land plot, which should be taken into consideration in the very beginning of the design, when calculations are impossible. Standards for calculating the number of parking spaces must be introduced for clients, cargo transport and for the personnel.

Green space area must be calculated depending on the number of visitors, but it must not be less than 5% of the land plot.

Such elements of urban development as crosswalks, anti-parking poles must be made compulsory elements and must also be regulated by the relevant norms and regulations.

Recreation zones on the territory of supermarkets must be calculated depending on the number of clients and personnel, they must be made compulsory.

Propositions on noise barriers must be developed for the territory, and reference documents for the design of supermarkets must be presented. Barriers with various soundproof qualities must presented as general solutions in the form of brand books.

Supermarkets are crowded buildings with great areas. It is a priority to ensure that fire safety requirements are met.

When a supermarket is designed (retail buildings, functional fire safety class F3.1), the norms of fire safety are taken into account even at the sketching stage. Because of large areas and long front walls, there is a need for fire escapes to be designed in the front walls all round the building. Outside fire escape staircases across the walls of the building are compulsory, if its length is more than 150 meters. Buildings with building footprint of more than 10,000 square meters and with the length of more than 100 meters must ensure an all around access for fire fighting vehicles.

When the front walls of supermarkets are designed, it is essential to take into account the environment, including such factors as fast moving cars on the motorway next to the supermarket and the length of the walls, as well as the location of unloading facilities with regard to the main view points, etc. Chain supermarkets must develop brand books, e.g. albums with entry group options, variants of the front walls in the corporate colours of the corresponding brand.

Its location in the urban environment must be analysed more carefully in terms of its environmental impact, convenience and safety for clients and staff. Standard sizes for sanitary and protection zones in supermarkets must be developed depending on their total area and the number of parking spaces.

These conclusions should be incorporated as recommendations into norms and regulations for commercial buildings for the purposes of supermarket design.

4. Conclusions

Supermarkets are sales buildings characterised by complex technologies and construction. Stricter fire safety rules, norms on ensuring convenience, access must be introduced, but at the same time simple spaces, walls and minimalistic urban development should be preserved. The architecture must take into account all the specific aspects of supermarket design and try to diversify and improve their architectural and town-planning image.

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