Industrial space in Bydgoszcz

Piotr Brzeziński
Department of Architecture and Urban Planning, Faculty of Civil and Environmental Engineering and Architecture, UTP University of Science and Technology, Al. prof. S. Kaliskiego 7, 85-796 Bydgoszcz, Poland
p.brzezinski@utp.edu.pl

Abstract. Because of its specific, industrial space, a challenge from the planning stage to the design stage is constituted. Proper zoning of this space has positive effects on the industrial function, spatial exposure and environmental impact. Proper creation of industrial areas means the impact of these processes on a macro scale. Local government authorities have the most important influence on the formation of industrial areas, which are necessary for the functioning and economic development of a region. The right regional development policy is what places the industrial space in symbiosis with areas of a different purpose. The most important is the selection of an appropriate space - an enclave, where this specific function can exist and be developed without affecting the surroundings, which may be the adjacent urban space. Due to its specifics, locating of industrial areas has a fundamental role in these multifaceted processes. Bydgoszcz Industrial and Technological Park (BPPT) is the biggest industrial area in the district and one of the biggest industrial and technological parks in Poland. As city authorities say “According to the independent report of the World Bank “Doing Business in Poland 2015”, Bydgoszcz is the best city for investment. The potential of the Park and his rapid development are found disregarding not only amongst investors, but also amongst other operators receiving the BPPT infrastructure.” Referred to the above, there are several important questions. How do these assumptions relate to the industrial zone if an urban area is in the close neighbourhood? How should the development of industrial spaces look like, so that it does not adversely affect urban living space? How do the above assumptions refer to the Bydgoszcz Industrial and Technological Park (BPPT)? The matrix presented in the article compares the general assumptions of the interactions of industrial processes and their application for the Bydgoszcz Industrial and Technological Park.

1. Introduction
“According to the independent report of the World Bank “Doing Business in Poland 2015”, Bydgoszcz is the best city for investment. The potential of the Park and his rapid development are found disregarding not only amongst investors, but also amongst other operators receiving the BPPT infrastructure.”

Industrial objects most often represent simple architectural forms, focused on utilitarian and economic aspects, they are an exemplification of a figure, which in architectural theory is often considered as a reduction to a spatial "packaging", a coating that closes technology. Apparently, the design task, especially the architect's task, is focused on finding a pragmatic "package" that takes into account the

1 The Mayor of the City of Bydgoszcz – Rafał Bruski statement on the BPPT home website

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needs of technology. Industrial facilities rarely compete for space with public utilities. If they expose a face different from the ascetic architectural form, they usually do it one-dimensionally, transmitting the corporate image (often reduced only to the logo placed on the facade) in a blunt manner, without nuances.

In this study, four different scales of interactions of industrial processes were analysed there, i.e.:
- linking industrial space with the neighbourhood, with an urbanized habitat (city, district, zone),
- relations regarding land development (inside an industrial space),
- relations within the architectural complex (dependencies between buildings),
- the content of the architectural object (intra-object processes).

These four main scales, included in matrix interactions industrial processes, will be confronted with the Bydgoszcz Industrial and Technological Park (BPPT). The BPPT space, despite the common denominator, which is an industrial function, is largely diversified in both size and function.

2. Linking industrial space with the surroundings

For industrialized areas, the most important is to choose the right space - an enclave, where this specific function can exist and be developed without affecting the neighborhood, which may be close to the urban space. The placement of industrial facilities has a fundamental role due to its specificity. Zdzisław Arct described this, nearly forty years ago, in this way "Detailed location of the planned industrial plant should be consistent with the local possibilities and conditions for the implementation of the planned investment, as well as with the planned development directions and the needs of a specific industry. In the current national conditions, this corresponds to compliance with the local spatial development plan and the decision on determining the location of the investment undertaken by the economic planning authority" [1] 3. In the Kuyavian-Pomeranian region, the largest area for industrial use is the Bydgoszcz Industrial and Technological Park (Figure ). BPPT is one of the largest industrial and technological areas in Poland, and it is a part of the Pomeranian Special Economic Zone. The industrial park is an area of nearly 300 hectares with a good location in the central part of Poland and with proper communication. Between the industrial areas and the close vicinity of the city, there is a buffer zone - the forest.

The space inside the BPPT is served properly, the road system provides access to the investment areas located inside the industrial park. Parameters of internal roads are adapted to the movement of lorries and heavy-duty vehicles. The division of investment plots enables easy communication with the main road system of the park. Technical infrastructure is constantly being developed, but especially on the outskirts of the industrial park, the demand for media is still insufficient, which is troublesome for more demanding investments.

Separated industrial spaces should be covered by local plans that are a guarantee of spatial order. The BPPT area is covered by the local spatial development plan, which largely facilitates and accelerates project activities. A few years ago, there were inadequate records of surface parameters. For example, in one part of the park, it was possible to build 60% of the cubic capacity of the plot there, including hardened areas (roads, parking, maneuvering space, etc.)! Fortunately, this has been changed and these

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2 The Bydgoszcz Industrial and Technology Park was established on December 21, 2004 for the purpose of investment areas for sale and for lease. The BPPT zone was located on the site of the former German explosive factory “DAG Fabrik Bromberg”. In its place, after the Second World War, the State Powder Factory was established. Since that time, chemical materials have been produced - mainly for the army. The name of the plants was changed many times, from 1971 it functioned as “Zakłady Chemiczne Zachem” in Bydgoszcz. In March 2014, the court announced the liquidation bankruptcy of “Infrastruktura Kapuściska S.A.”, which became the legal successor of “Zakłady Chemiczne Zachem”.

3 Arct (1974: 71)
relationships now (in the most unfavorable version) are 80% to 20%, and hardened areas are not included.

![Image of Industrial Park](image_url)

**Figure 1.** Bydgoszcz Industrial and Technological Park (BPPT), view from Bydgoskich Przemysłowców Street

When we decide on an enclave of a defined function, then it should be adapted and maximally used for its destination, where the area for development should be similar to the size of the plot. In order to introduce green areas, they should be proposed in an organized manner, apart from building plots, for example, land stripes separating plots or roads or areas that for various reasons are not suitable for industrial use.

### 3. Development of industrial areas

Due to the functional connections (communication system, technical infrastructure) concerning both the internal space of the industrial plant and the necessary technical infrastructure, this space should be separated and unified functionally creating an industrial park zone. Road communication is one of the characteristic elements of industrial space. In an industrial plant, we have a simultaneous connection of several different communication systems. Road service of delivery vehicles for the production and storage part is different and more restrictive than in the case of passenger cars in the administrative part. Appropriate use of the communication space, which includes various elements, such as appropriate zones of entry, deliveries, parking lots, require familiarization with the way they function and with the specificity of vehicles serving this space. The effect of understanding these relationships is space, with a different hierarchy of internal and external roads, adapted to serve different functional zones and proper relations between them. Moreover, the car communication system has a significant impact on the exhibition of the industrial plant itself, as in the case of Kilometro Rosso designed by Jean Nouvel, where the spatial determinant in the form of a red line - a kilometre long wall running along the...
motorway - separates the parking lot from the production area. This element is a recognizable sign in the landscape, giving the industrial space a strong identity, which also affects the brand recognition and strengthens its marketing importance.

In BPPT, insufficient identification of space is noticeable. Only small information boards about individual zones of the park inform us that we are in the BPPT area. The spatial determinant of industrial plants is most often limited to displaying the company's logo on the building or in its vicinity. When you are in an industrial park you have the impression that it consists of individual objects (plants) that do not have a common denominator - unification of the place. By introducing a spatial code, whether in the form of coherent information elements, which are not limited to a few tables with names of streets and sectors, elements of small architecture or other types of distinguishing marks, it would contribute to increasing the coherence of architecture and would also improve the economic impact of the industrial park. BPPT should be properly planned, create a harmonious whole, consistent both in general assumptions and in details that define and make it more attractive.

4. The connection between the components of the industrial complex

In an industrial plant, there are visible differences between particular parts, such as production, strictly subordinated to technological lines, administrative or distribution. This variety of functions has a direct impact on the "packaging" shaping the form of the object. The diversity of forms within one industrial complex is caused by the difficulties in combining function blocks with different parameters. With this diversity of forms, the construction of the building and external materials also has an impact on the nature of the object. „The large span, construction and protective materials, lightness, and at the same time, durability of materials and resistance to destruction and aging are among others features of a modern industrial plant”4. Proper – aesthetic – design of technological elements, such as tanks, silos, conveyor belts, chimneys, electrical poles or other elements necessary for the operation of industrial facilities, is a challenge for the designer.

In the case of large-size facilities, such as industrial plants, the diversity of individual components has strong technological connotations. This makes it difficult for the architect to express the aesthetic components, it requires a creative interpretation of elements much more strongly defined than in the case of other types of architecture buildings, which determines the aesthetics of the entire complex. These difficulties are manifested in the creation of large objects with the lack of ability to create distinguishing features, which would not be interpreted as unnecessary decoration at the same time. M. Brzezicki draws attention to the issue of individual features by writing that many industrial objects grouped into larger areas have an anonymous, generic form. These buildings unintentionally become similar to each other, creating vast, monotonous groups and substandard spaces [2]3. Despite the Louis Sullivan’s maxim “Form follows function” which is an important principle of the architecture of the twentieth century, its primitive implementation, in the case of modern industrial architecture is dictated by the priority of pragmatic components of decisions affecting the way of shaping architectural solutions.

It is only when paying attention to the extraction of distinctive features, such as in the case of Martin Kohlbauer’s district heating plant south in Vienna, that the desired effect can be obtained - the facility begins to enrich the surroundings. The search for distinguishing features is noticeable in the local industrial space of BPPT (table 1). An interesting case is the Metal-Bark Company office built at the turn of the last years or, due to the scale of the building, a garbage incineration plant (Figure 2). The façade materials used, as well as the various forms of individual zones of the plant, distinguish them and make them characteristic in a space, recognizable for the people working here and for the visitors.

4 Szparkowski (1999: 55)
3 Baborowska-Narożyń, Brzezicki (2008: 9)
Figure 2. Metal Bark Office building in BPPT

Table 1. Quality assessment matrix of industrial impacts processes in BPPT

| The scale of industrial processes influence | General assumptions | BPPT |
|--------------------------------------------|---------------------|------|
| **The connection of industrial space with the surrounding** | Location arrangements – the industrial enclave | + |
| | Communication service (road parameters, entries and departures) | + |
| | infrastructural service (location of devices in the field – e.g. fire water tanks, reduction nodes, high voltage station) | +/- |
| | Local plan arrangements | +/- |
| | Spatial context | +/- |
| **Processes in space development** | Assurance of technical support zones (deliveries, receipts, fire protection) | +/- |
| | Service area (entry zone, car parks) | +/- |
| | Exposition of industrial buildings | +/- |
| | Marketing impact | +/- |
| | Relations between elements (buildings, other structures) | +/-* |
5. Conclusions

As R. Barełkowski claims, architecture is always socially engaged, always sensitive to the environment and affecting them. Without this intellectual layer, without experiencing architecture in parallel with its designing, one cannot talk about architecture at all - then the soulless cubits are created, purely utilitarian, with a beauty that is exclusively superficial [3]⁶. Despite the industrial facilities, their function defines the form, attention should also be paid to the connection of its technology with the architectural image of the object. The connection of various technological zones (with specific requirements) with each other has a significant impact on the architecture of industrial facilities, regardless of their location. Assuming that the responsibility for the interconnection of technological lines is a task for a project team that recognizes the optimal technological requirements and realizes them, at the same time, shaping the humanistic aspect of space with the expression of industrial architecture. Mutual functional connections of internal zones are possible when defining the proper application program, which includes both guidelines regarding the technological process and functional dependencies of the other components of the project. It should be added that the industrial facilities should additionally be "flexible", that is, if necessary, e.g. changing the production line or expanding the plant, have adaptation possibilities. The range of possible transformations should be taken into account already during the design phase. Selection of the right solutions for each stage becomes an integral part of the author's work. As Z. Szparkowski writes, current tendencies in the design of factories indicate the need to make many design choices. Usually, they should not limit the invention in industrial architecture [4]⁷.

The matrix, which compares general assumptions from the impacts of industrial processes and their application to the BPPT zone, is a subjective assessment of the possibilities, potentials and needs of the selected area. Proper shaping of the habitat for industrial areas is largely dependent on local government activities. Land-use processes depend on both design activities and are linked to activities shaping the common space of an industrial park. The last two components of the scale of industrial processes impact depend largely on the activities of project teams.

The proposed matrix for assessing the quality of interactions of industrial processes is a method of orderly analysis of the environment, which is considered to be burdensome, cannot be discounted, but still must provide the maximum possible spatial comfort. The introduction of even simple but focused on the humanities and technological aspects, evaluation of industrial areas, on the one hand, gives information about zone deficiencies, the need to repair or correct, but on the other hand, gives

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⁶ Barełkowski (2012: 11)
⁷ Op. cit., Szparkowski (1999: 55)
accentuates non-economic factors having a significant impact on the economic sphere of industrial zones operation, their attractiveness and durability.

Industrial buildings are specific challenges for both designers and local authorities, whose task is to create a space adapted to this function. The BPPT meets these expectations with some reservations. By introducing the correction of the local plan's provisions and paying more attention to the identification of the internal space of the industrial park, it is possible to obtain an area of greater investment attractiveness, so much needed for this region.

While fulfilling the assumptions of finding the right solutions of the technological process, functional connections for individual user groups, defining and also designing characteristic, as for this type of objects, proper land development becomes easier when designing the industrial facilities.

Acknowledgment
"This article/material has been supported by the Polish National Agency for Academic Exchange under Grant No. PPI/APM/2019/1/00003”.

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