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METROPOLITAN DIMENSION OF TRI-CITY: DEVELOPMENT OF THE NEW HARBOR STRUCTURES

1. INTRODUCTION

Economic and political transformation after 1989 brought entirely new situation to Polish cities, which include also the harbor ones. In specific, the existing Baltic Sea ports had to face significant changes. They were associated both with new development opportunities and threats, emerging – among others – from the new geography of logistics links. These were based on the fact that both north-south and east-west transportation corridors were made available, which brought new development conditions to our cities.

Among others, the large share of cargo was redirected from mainland Poland and other former socialistic countries to the German, Dutch, French and Mediterranean ports. This – to large extend – diminished the economic situation of the existing ports. At the same time connections to Scandinavian countries were re-opened, which effected in large increase of the cargo shipment in this direction. Besides these, the Polish seaports had to face rapid changes in the structure of cargo – which includes emergence of the new type of goods and vanishing traditional type of cargo – including coal i.e.

In order to secure the position and development of the Polish harbor cities, the massive capital improvements program was prepared, based on infrastructure development. It creates new investment opportunities for other partners, associated with maritime transportation and industries. In practice, the new terminals were developed or are under way, which will significantly change the position of the harbors in the regional and global market. These improvements have created also the new situation of the harbor cities.

In result, the next phase of the evolution of harbor structures emerged. This was accompanied with the relocation of cargo handling activities as well as launch of waterfront redevelopment projects of different size and nature. Both of these have become a starting point for reinventing the older part of harbor structures. This process has followed the path of evolution of port structures, as described previously for the west-European and north-American cities.

2. EVOLUTION OF THE PORT STRUCTURE – EMERGENCE AND TYPOLOGY OF THE WATERFRONT

As the evidence of the port cities undergoing massive transformation in last decades prove, the history of the development of port cities is inseparable from technological evolution of sea transport, including the methods for goods reloading and their processing. This evolution has had a great influence over the shape, development and, finally, the degradation of waterfronts in cities, including old and present port structures.[1] The changes in the interrelation between port and urban structures can be described in different ways; such a model study of the issue, widely accepted and quoted in literature, has been prepared by B. Hoyle. It illustrates the historical evolution of the city – port interrelation as is shown in table 1.

The above process can also be described in relation to the evolution of port structures, resulting in the appearance of various types of former-port areas, i.e. waterfronts. Using this method, one can indicate three stages of the development of city-port structure[3] (see table 2).

The above specification takes into account the two chief revolutionary changes in the mode of transport and storage of goods, resulting in the development of the 2nd and the 3rd generations of ports, and – as a side effect – the abandonment of former port areas, i.e. waterfronts.

For the first of these changes, i.e. the increase in the significance of maritime transport during the industrial revolution, appears to have been the most important because there appeared the need for the transport of significant quantities of goods. Water transport proved the most convenient and cheapest means for that, while railway was not developed sufficiently at that time. Moreover, port cities were also the most convenient location for industrial expansion and, also significantly, the acquisition of colonies by European countries and the need for en efficient transport system counts among development-fostering factors. At that time, the average size of a commercial ship was larger than that of the vessels from pre-industrial era, both in size and capacity, which was from 200% to 300% of the former quality; while the largest trans-Atlantic passenger ships reached even 600% larger dimensions, compared to those from the beginning of the 19th century.[4]

However, the 2nd generation of ports could no longer meet the requirements of developing maritime transport technologies. This especially relates to the development of container transport, ro-ro technology and new technologies of bulk cargo handling. These technologies required large storage areas, linked to relatively short quays, and feasible access for large-draught vessels. Therefore, structures suited to these requirements, called the 3rd generation ports, were located far from existing port areas, in the river deltas or on the open sea. Consequently, the ports of the 3rd generation have entirely lost their romantic ambience with picturesque canals and docks, instead, they are modern, specialized terminals, where large, self-propelled portal cranes reload containers, where general-cargo processing is almost non-existent, and bulk cargo is transported via pipelines and conveyor belts directly to processing plants or storage yards.

	Stage of development	Period	Description
I	Primitive urban and port structures	Until 19th century	Close functional inter-relation of the port and city
II	Developing port city	19th – early 20th c.	Rapid development of industrial and commercial functions separates the port from the city spatially, which permits the development of modern wharfs, along with industrial and storage area.
III	Modern port-city	Mid 20th c.	Industrial and commercial development, (including oil industry) along with the introduction of container and ro-ro technologies entirely separates the port from the urban area.
IV	The abandonment of waterfront	1960 – 1980	Technological changes in maritime transport compel the development of port-industrial structures independent of a city.
V	Revitalization of waterfronts	1970 – 1980	Large-sized maritime terminals have consumed vast areas of land; parallel to it the re-development of the waterfront for urban purposes has been done.
VI	Reconstruction of city-port interrelation	1980 – 2000+	Globalization requires changes in the modes of the functioning of the port and the re-establishment of its links with the city.

Table 1. Evolutionary stages of the city – port interrelation

Stage	Level of the city – port integration	Type of port structure	Type of waterfront
I	Full integration. Urban and port structures are strictly interrelated. **From ancient time to the early 20th century**	**1st generation of port structures** – located in natural sea or river quays, or on piers – adjusted to small vessels. Organic and spontaneous development of port structures.	Waterfront used as the re-loading area.
II	Separation of port and industrial from purely urban structures. **The early 19th to mid 20th century**	**2nd generation of port structures** – located in natural or artificial quays, suitable for various new types of vessels – steam ships. Port development planned by individual (rarely -co-operating) entreprises which build complex wharfs, warehouses, docks, etc.	**A-type waterfront.** The transfer of the main cargo to the ports of 2nd generation caused the abandonment of the 1st-generation ports, derived from the Middle-Ages, and opened possibilities for the adaptation of the area left by the 1st-generation ports for different purposes.
III	Complete separation of port and urban structures with an accompanying return of some port functions onto the waterfront of type A (marine tourism, passenger ships, yachting, etc.) **From the mid 20th c. on**	**3rd generation of port structures –** developed as specialized re-loading bases, bulk-cargo and container terminals, linked to distribution-logistics centers and specialized industry (e.g. refineries), economically linked with areas outside the city or region. The appearance of "harbor regions".	**B-type waterfront** The shift in cargo processing and the development of modern types of industry causes the abandonment of the ports of 2nd generation. The area freed by abandoned ports can be adapted to new functions.

Table 2. Stages of the development of city – port structures

The development of the 3rd-generation of ports has also caused a new phenomenon which has trespassed the boundaries of a single city, namely the appearance "harbor regions". This name denotes the area serviced by a given port. In the time of the 1st and the 2nd generation of ports, a civen city/ town with its direct background was its "harbor region"; only exceptionally, catchment areas sometimes including industrial centers located within them were related to a given sea port, thus becoming a form of the "harbor region". However, the appearance of the 3rd generation of ports has radically changed the situation. Now, the whole country and, even, a group of countries can form the background for a modern fuel terminal. This means that contrary to the 2nd generation of ports, which were prevalently built in existing port cities, the 3rd generation of ports have appeared only in a few of old ports. A classical example for this is the Gdańsk – Gdynia complex of ports where a modern 3rd-generation port Port Północny (Northern Port) serves both cities as much as its reloading capacity permits to do so. Thus, many cities can be located within a single "harbor region", embracing ports of the 1st and 2nd generations; usually, however, there is a single port of the 3rd generation while different cities have separate terminals of various specialization.

The appearance of the 2nd and the 3rd generations of ports, along with "harbor regions", fostered the abandonment of old structures, now useless for the new technologies of reloading and transport. These areas – the former port and related post-industrial areas, including former shipyards, – are now being restructured and revitalized.

Historically shaped waterfronts, despite similarities in their formation in various cities, have different characteristics which stem from many factors. First, one should mention their historical genesis, including "A" and "B" waterfronts, conditions of the location of a port city, such as the spatial layout of the waterfront area (the result of former technological soultions), and finally – the placement of a waterfront in relation to the original shore line. All these elements determine the possibility of the revitalization of a former port area, including the adapted functional and spatial solutions.

Depending on the time each former-port area appeared, these spaces can be divided into two main categories, resulting from the gradual split between development processes of spatial and port structures throughout centuries, as discussed in the chapter before. These categories are:

– A-type waterfronts, of ancient or (more often) Mediaeval origins, which are the remains of the port structures of the 1st generation. Their basic features are: small area strictly linked to a city (its historic centre), a small number of large-volume warehouses, and a small number of old re-loading devices. Due to their location, these areas are usually attractive as prospective marinas, commercial, service and accommodation program, along with recreational functions.
– B-type waterfronts, created in the 19th (or early 20th) century, which are the remains of port structures of the 2nd generation. Their basic features are: vast area, loosely linked with the historic centre of a city, the lack of the uniformity of the area (mixed port and industrial area, including shipyards), a relatively large number of remaining structures and objects, including technical devices, warehouses etc. Therefore, these areas are attractive as prospective housing and commercial areas (however, they rarely have the city-center character), as well as recreational or industrial zones.

Both types of waterfronts can be usually found within the structure of single harbor city.

3. POLISH HARBOR CITIES – THE POST-SOCIALIST TRANSFORMATIONS AND CONTEMPORARY TENDENCIES IN THE DEVELOPMENT OF CITY AND – RELATION.

The current spatial re-arrangement of port cities results from the decrease in significance of mass production based on the so called "fordist model". Therefore, the new types of industrial production are not necessarily linked to the close spatial vicinity to particular factories and are often carried-out in small and medium-size enterprises using the most advanced technologies.[5] As a result, we obtain a progressing phenomenon of competition between cities and regions, including fight for capital and work places. This competition reaches now even further – to the level of not only particular cities but "functional regions" which have now become a natural module of development.[6] Often, there is still some competition inside such a module, yet this is a deadly threat to the unity of the whole structure, including its position on the world market.

The processes of metropolitan spreading and differentiation of cities, from the international to regional scale, has certainly influenced the position of port cities and their "harbor regions". Many of them have been losing their significance, because of such reasons as:

- quality changes in the technology of sea transport,
- the decrease in capital turnover related to the turnover of goods and commodities,
- the reduction in the functions of ports to that of cargo re-loading.

Simultaneously, the chief role of the modern sea port has changed in comparison to the structures of the II generation. Now, it is to safeguard conditions for convenient, quick and safe reloading of goods. Consequently, the spatial and economic decisions related to it, inter alia: the building of new terminals, the development of existing structures, etc, are no longer the domain of urban planning but, often, economic calculation only.

Thus, the relations between a port city and the port itself, have gained new significance on the background of the spreading metropolitan character. This particularly pertains to those canters whose economic development previously relied on the sea transport of goods. Here, one can distinguish three groups of port cities:[7]

- **the city as a territorial port** – the centre of developed industry, using services and organically linked to port structures;
- **the port city as techno polis** – the centre hosting high technology industry, along with housing and service functions;
- **the "protective port city"** – the centre where the conversion of port-related economic system failed, hence it lost is previous economic significance.

Whether a given port city manages to adapt to its new role and conditions created by international competition depends on many factors. The so called "organizing capacity", is one of the most important, being defined as "... the ability to react to changes in external and internal conditions which influence the position of the entire metropolis..."[8] One of the manifestations of such ability is the level of being ready to accept and realize the projects for the revitalization of the urban structure, including the waterfront. In many cases, e.g. in Rotterdam, these projects are the new impulse for city development and enhance the city's attractiveness on the international market of cities and regions. Consequently, the relations between the port and its city, as well as between the city and its waterfont, have become an important factor, often decisive for the competitiveness of the whole structure, in the time of spreading metropolis.

Notwithstanding economic issues, including regional ones, there is another reason why waterfronts have become important for cities. The end of the 20th century, has noted a very strong tendency to heal the situation of cities with regard to the environment. The created concept for **sustainable development of cities**, assumes, among others, the limitation in the expansion of urban developments onto open spaces and a parallel re-use of already urbanized areas. At the same time, the necessity for the "recycled" use – the revitalization of former urban areas, now derelict. This category also embraces waterfronts. They are also an important element of the new models for the comprehensive coastal management, the main task of which is to ensure the conditions for economic development with the simultaneous protection of environmental values.

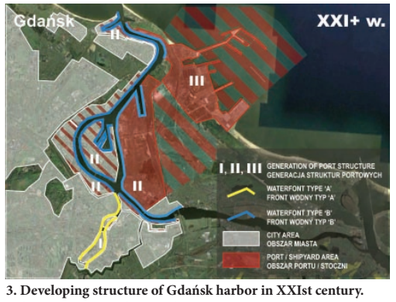
In result, shaping of contemporary relations between a port city and its port is not a simple task. Numerous conditions of this process make the scale of possible solutions large; moreover, specific groups of issues can be variously emphasized. Yet, whatever model is adapted, the problem of shaping (or rather – revitalization) of the waterfront in a port city remains one of the chief tasks, instigated by both economic and environmental urges.

4. GDAŃSK AND GDYNIA AS KEY CASE STUDIES

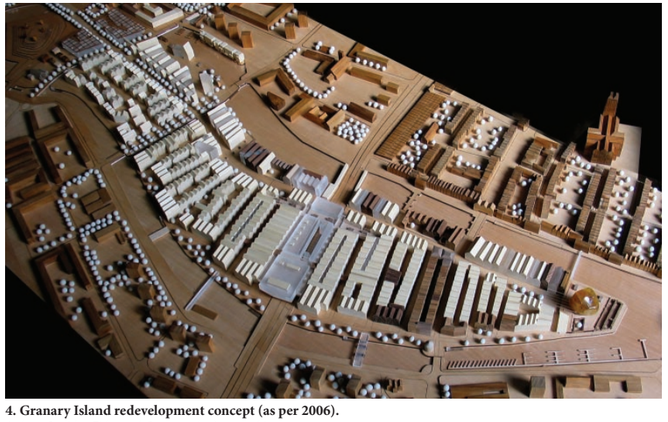
The most interesting of these is the case of the Tri-City Metropolitan Area, including two major seaports (Gdańsk and Gdynia) as well as a number of other municipalities. Development of the new infrastructure and logistics connections in this area allows further deliberations on the strategies of urban development. These are associated with substantial urban regeneration opportunities as well as with further expansion of the port and transportation structures.

1. Structure of Gdańsk harbor in XVIII century.
Authors: Piotr Lorens, Barbara Zgórska
satellite picture source: www.googlemaps.com

2. Structure of Gdańsk harbor in the mid of XXth century.
Authors: Piotr Lorens, Barbara Zgórska
satellite picture source: www.googlemaps.com



3. Developing structure of Gdańsk harbor in XXIst century.
Authors: Piotr Lorens, Barbara Zgórska
satellite picture source: www.googlemaps.com



4. Granary Island redevelopment concept (as per 2006).
Authors: Stanisław Fisher et al. Source: author's own archives

5. Aura Park complex (2015).
Picture credit: Piotr Lorens

First projects are already completed, which allows speculation on the potential future of the other transformation areas. These speculations include possible reversal of the entire urban development policy, as substantial urban regeneration areas may become available in close future.[9] In result, the port structures may become reconnected to the proper city, and its maritime identity may become reinforced.

The specifics of both cities was presented on the sequences of following graphics, which present the historic and present evolution of both cities.

In case of Gdańsk, one can discuss the full sequence of evolving port structures, as well as appearance of both possible types of waterfronts. Present transformation of the port and its proposed expansion towards deeper parts of the Gdańsk Bay allow speculation on further advancement of the transformation process. The evolution of Gdansk port structures was presented on the diagrams (fig. 1-3).

In result, numerous projects within the various parts of the waterfront are planned and executed. These include redevelopment of the Granary Island along with banks of the Motława River (waterfront of the medieval origin – type A) as well as regeneration of the area of Gdansk Shipyard – the so-called Young City (waterfront of the XIX-th century origin – tybe B). The pland and first developments taking place within these areas were presented on fig. 4-7.

On the contrary, the city of Gdynia – constructed mainly during the interwar period – does not possess the traditional medieval-type of harbor structures. But its structure includes the so-called "city premiere zone", which plays the role of elegant seaside boulevard and

6. Young City redevelopment concept (as per year 2000).
Authors: Sasaki Associates. Source: Synergia 99 sp. z o.o. archives

7. Mixing historic and contemporary structures. New architecture on the waterfront (2015).
Picture credit: Piotr Lorens

1. Hall, 1993, p. 12
2. After: Hoyle, 1998, p. 32
3. Kochanowski, 1999, p. 285 – 287
4. Richie – Noakes, 1984, p. 11
5. Jałowiecki, 1999, p. 27
6. The issue of shaping the „functional areas" was recognized on the state level in 2015 along with the special parliamentary act on shaping and developing these.
7. Jałowiecki, 1999, p. 58
8. van den Berg, Braun, van der Meer, 1997, p.1
9. In fact, this proces was already reflected in the on-going discussions and most probably in close future will be formally recognized in the planning policy for cities, which at the moment (meaning: end of 2015) is subject of revision.

REFERENCES

van den Berg L., Braun E., van der Meer J.: Metropolitan Organizing Capacity, Ashgate, Aldershot, 1997

Hall P. : Waterfronts: A New Urban Frontier, [w]: Bruttomesso R. (red.) Waterfronts. A New Frontier for Cities on Water, Centro Internazionale „Citta D'Acqua", Venice, 1993

Hoyle B. : Cities and Ports: Development Dynamics at the Port – City Interface, [w]: Bruttomesso R. (red.) Land-Water Intermodal Terminals, Marsilio, Venice, 1998

Jałowiecki B. : Współczesne przekształcenia struktury osadniczej I przestrzeni miejskiej, [w]: Kołodziejski J., Parteka T. (red.) Cywilizacja informacyjna a przekształcenia przestrzeni. Zmiany strukturalne metropolii polskich, Biuletyn KPZK PAN, Zeszyt 186, Warszawa, 1999

Kochanowski M. : Miasto I port. Relacje historyczne i współczesne jako problem strategii rozwoju miasta, [w]: Kołodziejski J., Parteka T. (red.) Cywilizacja informacyjna a przekształcenia przestrzeni. Zmiany strukturalne metropolii polskich, Biuletyn KPZK PAN, Zeszyt 186, Warszawa, 1999

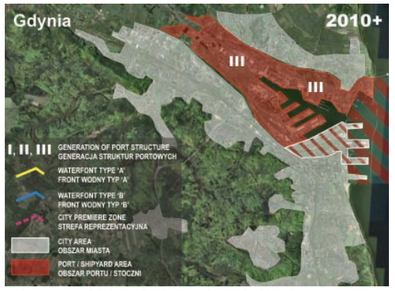
Richie-Noakes N. : Liverpool's Historic Waterfront, Her Majesty's Stationery Office, London, 1984

5. CONCLUSIONS

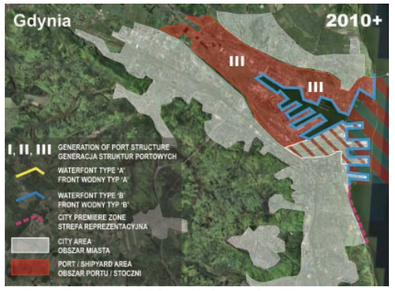
As it can be derived from the discussed cases, the evolution of the city-port structure – based on both natural development process of the harbor and influenced by the socio-economic transformation of the post-socialist cities – can lead to major transformation of the development opportunities of these agglomerations. Recent changes in this matter, made within the structure of Gdańsk and Gdynia, allowed further discussion on the expansion of the port structures as well as on complex regeneration of urban waterfronts.

was originally planned as major "waterfront forum". At the beginning of XXIst century the idea to use the waterfront of the city as key part of its structure and major public spaces was renewed and new plans regarding these sites were drawn. These already effected in creation of first major housing and commercial buildings, but in store is much bigger concept of the so-called "Sea-City". The general schemes presenting these tendencies were presented on fig. 8-10.

8. Structure of Gdynia harbor in the end of the interwar period.
Authors: Piotr Lorens, Barbara Zgórska;
satellite picture source: www.googlemaps.com



9. Structure of Gdynia harbor in the end of XXth century.
Authors: Piotr Lorens, Barbara Zgórska;
satellite picture source: www.googlemaps.com



10. Future structure of Gdynia harbor in the XXIst century.
Authors: Piotr Lorens, Barbara Zgórska;
satellite picture source: www.googlemaps.com