AGH UNIVERSITY OF SCIENCE AND TECHNOLOGY

THE INDUSTRIAL REAL ESTATE MARKET IN KRAKOW AND APPRAISING THE MARKET VALUE OF INDUSTRIAL PROPERTIES

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Industrial real estate market in Krakow

Krakow as a cultural, scientific and sacred centre isn't on the top of the list of industrial properties in Poland. Although there are big investments located in different parts of the city.

Only few of these industrial properties occur near the city centre. Usually these are small production or built dozen years ago like: Tobacco Plant, currently "Philip Morris", the old historic brewery, situated on more than two hectares land, cracovian power station located on Kazimierz area, currently not exploited in electric energy and heat production.

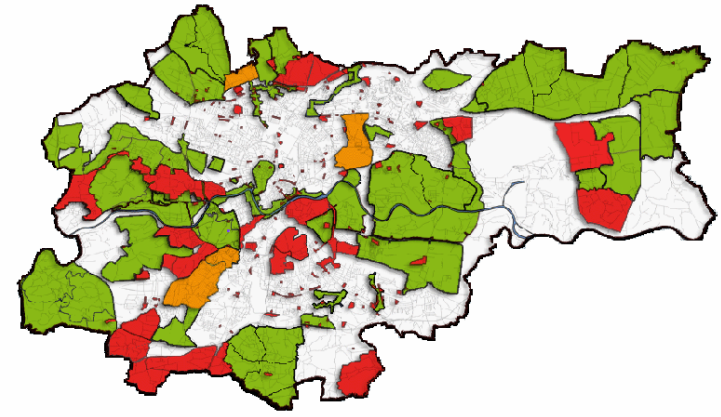
The rest of industrial properties are located in bigger distance from city centre. The most industrial developed areas are: Rybitwy, Czyzyny, Pychowice, land located along Zakopianska street and Balice.

One of the Krakow's industrial areas, which gather the most of industrial buildings, is Nowa Huta region, whose advantage is the largest amount of un-built and undeveloped land comparing to other city's districts, deficiency of ecological restrictions and good transport connection with cities from east and north site. Important in this matter is, that these areas, are located in greater distance from the city centre and in unattractive surroundings of steelworks so they are not interesting for residential properties purchasers.
The building was started in 1950, from residental buildings, tramtrack, hospital, schools and first elements of factory. In 1951 this big area was included to the city area.

The source: www.nowahuta.yoyo.pl www.mapy.pomocnik.com

One point of Krakow strategy concerns necessity the formation of proper condition for investors, which enable investments development and the growth of competitiveness in this range in relation to other polish regions. However there are some problems, which make difficult the realization planned investments. We can classify here most of all the lack of up-to-date site developments plans, insufficient technical infrastructure developed, specific nature of the city, employment costs, public help in relation to tax allowances and simplifications in obtaining permits and necessary documents for beginning investment.

THE LOCAL SITE DEVELOPMENT PLANS



The source: City Hall of Krakow, Spatial Development Office

Obstructions:

1. Insufficient number of valid site land development plans.
2. The decision of zoning regulations obtainment, in this situation, takes even one year in Krakow.
3. Insufficient amonut of large unbuilt areas in Krakow.

THE TECHNICAL INFRACTURE AND PUBLIC HELP

- transport network and its quality
- tax allowances
- technology parks

The source: www.sse.krakow.pl

The Cracovian Technology Park

- Is also a company which manage The Cracovian Special Economic Zone
- The actual area of the zone is over 400 hectares
- There are 14 sub-zones, where in 9 of them have available land for investment

The source: www.sse.krakow.pl

MARKET VALUE OF INDUSTRIAL PROPERTIES

The specific character of industrial properties:

- they are rarely the subject of sales transactions
- prices of sales contain all property's components, that's why their comparison to valuated property is difficult
- great variety of their components, which are discribed in various units

The algorithm of industrial properties appraisal

Within the framework of doctoral thesis there will be elaborated an algorithm which make possible the comparative analysis of particular components unit prices of sold properties and their transaction prices with valuated property's components, based on restrictive statistical models.
Each of transactions prices of industrial properties will be written as a sum of ratios of geometrical parameters and their price indicators and ratios of market attributes values and their importance coefficients.

Price indicators will be estimated on the base of market research in the range of unit rental rates. In the result there will be calculated the most probable price indicators of particular property's components and importance coefficients.

Function condition for each of transaction price will have a form:

$$S_1c_{S1}+...+V_1c_{V1}+...+L_1c_{L1}+...+a_1k_1+...a_jk_j=C_T$$

With reference to properties components, for which there's no possibility of price indicators establishing, based on rental rates analysis, these indicators will be set using the reconstructions costs.

The system of conditional equations can be written in the following form:

$$S_1 \cdot (\tilde{c}_{s1} + \delta_{s1}) + ...V_1 \cdot (\tilde{c}_{v1} + \delta_{v1}) + ... + L_1 \cdot (\tilde{c}_{L1} + \delta_{L1}) + ...a_1 \cdot k_1 + ... + a_j \cdot k_j = C_T$$

Using the following matrix symbols:

$$[S]=\begin{bmatrix} S_{11} & \dots & V_{11} & \dots & L_{11} & \dots \\ S_{12} & \dots & V_{12} & \dots & L_{12} & \dots \\ \dots & \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots & \dots \\ S_{1u} & \dots & V_{1u} & \dots & L_{1u} & \dots \end{bmatrix} \quad [\delta]=\begin{bmatrix} \delta_{S1} \\ \vdots \\ \delta_{V1} \\ \vdots \\ \delta_{L1} \\ \vdots \end{bmatrix}$$

$$[a]=\begin{bmatrix} a_{11} & a_{21} & \cdots & a_{j1} \\ a_{12} & a_{22} & \cdots & a_{j2} \\ \dots & \dots & \dots & \dots \\ a_{1u} & a_{2u} & \cdots & a_{ju} \end{bmatrix} \quad [k]=\begin{bmatrix} k_1 \\ k_2 \\ \vdots \\ k_j \end{bmatrix}$$

$$[\Delta C]=\begin{bmatrix} C_1-(S_{11}\tilde{c}_{S1}+\dots+V_{11}\tilde{c}_{V1}+\dots L_{11}\tilde{c}_{L1}+\dots) \\ C_2-(S_{12}\tilde{c}_{S1}+\dots+V_{12}\tilde{c}_{V1}+\dots L_{12}\tilde{c}_{L1}+\dots) \\ \vdots \\ C_u-(S_{1u}\tilde{c}_{S1}+\dots+V_{1u}\tilde{c}_{V1}+\dots L_{1u}\tilde{c}_{L1}+\dots) \end{bmatrix}$$

The system of conditional equations can be written in the following matrix's form:

$$[S]\,[\delta]+[a]\,[k]=[\Delta C]$$

For analysis for random deviations variation and importance coefficients should be formulated the Lagrange's function in the following form:

$$\Psi=[\delta]^T[\delta]+[k]^T[k]+\lambda([S][\delta]+[a][k]-[\Delta C])$$

The approximated random deviations values (δi) and importance coefficients (kj) can be calculated using the formulas:

$$[\delta]=[S]^T([S][S]^T+[a][a]^T)^{-1}[\Delta C]$$

$$[k]=[a]^T([S][S]^T+[a][a]^T)^{-1}[\Delta C]$$

The estimated price indicators values equal the sum of their approximated values and calculated random deviations:

$$c_i=\tilde{c}_i+\delta_i$$

Appraising market value of industrial properties

If for appraising industrial property there are set geometrical parameters related to usable area, cubature or length of its components, then matrix of parameters can be written in the following form:

$$[\overline{S}] = [\overline{S}_1\ \overline{S}_2 \ldots \overline{V}_1 \ldots \overline{L}_1 \ldots]$$

Values of appraising property can be written in the following matrix of attributes:

$$[\overline{a}] = [\overline{a}_1\ \overline{a}_2 \ldots \overline{a}_j]$$

The market value of appraising property will be estimated using the formula :

$$WR = \left\{[\overline{S}][\overline{a}]\right\} \times \begin{Bmatrix}[c]\\[k]\end{Bmatrix}$$

THANK YOU