

Proceedings of the CIB World Building Congress 2016

Volume I

Creating built environments of new opportunities

Edited by
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TAMPERE UNIVERSITY OF TECHNOLOGY



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Creating Built Environments of New Opportunities

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Preface

1. CIB World Building Congress 2016

CIB World Building Congresses (WBCs) are triennially arranged major research events for the built environment and construction sector. In 2016 this congress is organized in Finland (www.wbc16.com). This event is gathering together academic experts together with industry representatives from different parts of the world. The theme for CIB World Building Congress 2016 is "Intelligent built environment for life". It highlights the importance of build environment and its development to the society.

The WBC16 congress is a major event for all experts from industry, public sector and academia for advancing the development of built environments. The main theme of the WBC16 "Intelligent built environment for life" presents a cogent message that the built environment is a very important enabler for the well-being of its citizens, the success of its companies and the competitiveness of whole society, region or country. By defining the role of built environments in this way we can see the fundamental importance of our real estate and construction sector. In the WBC16 congress we turn our attention to the development of built environments in different conditions, countries and continents. Such developments can happen in different forms and scales, but always in a way where interplay between different stakeholders and experts play crucial role. These developments also need access to the latest knowledge and understanding which can be based both on industrial experiences and research-based findings.

Together, and by learning from each other we can be stronger and smarter for carrying out efforts where the main target is to deliver solutions that can be called Intelligent built environments for life. Our global umbrella organization CIB has three priority themes which are seen as focus areas for overall development and transformation of real estate and construction sector. These themes are Sustainable Construction, Integrated Design and Delivery, and, Resilient Urbanisation. The CIB priority themes present the overall framework for the content of this congress, supported and underpinned by specific congress sub-themes. In the WBC16 event a holistic viewpoint over this topic is presented that includes different dimensions from built environment as a system down to pragmatic end-user experiences and daily operations.

Seven sub-themes were developed to showcase the main areas where the majority of contributions was expected in the forms of presentations, workshops, special sessions and relating papers. Each sub-theme is presented using a simple but general challenge that expresses direction or need for different contributions. Each of these areas represents a broad totality. Thus, anyone whose work and expertise relates to the built environments can clearly place their work in one of these seven areas easily. The activities of CIB constitute work by a wide variety of different Working Commissions and Task Groups. The contributions from these bodies are linked to these sub-themes (Figure).

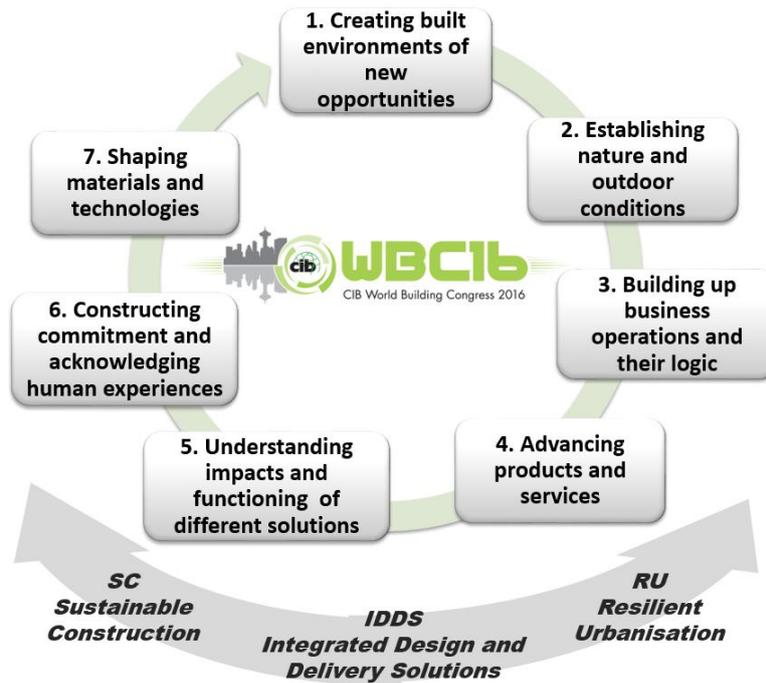


Figure. The sub-themes of the World Building Congress 2016.

2. Introduction to the WBC16 proceedings

The WBC16 call for papers produced 550 paper proposals. All abstracts and full paper submissions were double blind reviewed by the members of WBC16 International Scientific Programme Committee. Finally, 360 paper contributions were accepted to be published in the WBC16 proceedings. We would like to take this opportunity to express our sincere appreciation to the WBC16 International Scientific Programme Committee and all editors of the WBC16 proceedings. All members of this committee can be found in the chapter four of this preface.

The WBC16 proceedings comprise five pdf-books (Volume I-V). The contents of different books are according to the sub-themes of WBC16 as presented on the following.

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I	<ul style="list-style-type: none"> Creating built environments of new opportunities 	Kalle Kähkönen kalle.e.kahkonen@tut.fi Marko Keinänen marko.keinanen@tut.fi
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3. Introduction to the Volume I of WBC16 Proceedings

Volume I includes 75 paper contributions linked to the congress sub-theme “Creating built environments of new opportunities”. This includes topics of three different levels. First the macro-level contributions cover aspects such as development policies and programmes on national or international levels for creating desirable systemic changes (sections: I, II). Second the meso-level aspects mean here certain topics relating to e.g. organizations and their operations, implementations or performance of new solutions or systems such as complete buildings (sections: III-VII). Third the micro-level topics are addressing particular contexts and their solutions, such as a specific building code, structure, material and analyses relating those (sections: VI-IX). The paper contributions included in Volume I are classified into the following nine book sections.

- I: Policies and programs for the development of built environment (11 papers)
- II: Lessons learned from regional challenges (9 papers)
- III: Meeting successfully different stakeholders and their interests (11 papers)
- IV: Towards advanced solutions for sustainability and resilience (10 papers)
- V: Reshaping processes for construction operations (9 papers)
- VI: Successful implementation of BIM technologies for the realisation of potential benefits (7 papers)
- VII: Innovative buildings and their performance (8 papers)
- VIII: Building regulations and control in the face of climate change (6 papers)
- IX: Moisture and mould Issues (4 papers)

4. Members of the WBC16 International Scientific Programme Committee

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Identification of vacant space; a prerequisite for industrial and societal development

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Abstract

In the real state community, vacant space is mostly regarded as a cost and a negative factor. However from a societal perspective, vacant space might function as a necessity for growth and creativity. Vacant space is not merely relevant for companies and organisations, but also for residential areas. In order to satisfy space flexibility, companies and organisations must have access to additional space during periods of expansion as well as additional residential areas and other facilities for e.g. employees. Conversely, vacant space must be managed during times of recession. In current practices, space flexibility can be enhanced through efficiencies, ownership, relocation, leasing, and in a larger scale, through governmental and public initiatives. This paper presents new methodologies derived from strategies from manufacturing industry; which are here applied to identify vacant space and potential market. It has been discussed a certain amount of concepts for an efficient allocation of resources by relating to Facilities Management, Total Quality Management and ICT as a significant approach for rendering efficiencies in land use, particularly in countries characterised by scarcity of green areas and abundant “brownfields” are rather a topic for development. In a conclusive discussion, this paper argues that the identification of vacant space, in multiple perspectives, is crucial for the future for urban and regional planning.

Keywords: vacant space, development area, manufacturing methodology, Kano model

1. Introduction

How can various kinds of vacant space best match the various needs of users and stakeholders? Vacant space is generally regarded as a negative factor among investors in particular. However vacant space could as well be regarded as a resource. At the Facilities Management Master Course 2000 to 2003 at Chalmers University of Technology and at the Real estate management Master course at Politecnico of Milan the value of spatial vacancy was widely discussed and emphasized among the participating professional facilities managers; indeed vacancy during the discussions was not merely regarded as a negative factor for owners in particular, but also a necessity. Refurbishment at a hospitality plant, for

example, must use vacant space by enabling continuous move of various sections of the hospital. Furthermore, in the ideas of dynamics of space use, growth firms for example have an advantage if they can expand to adjacent vacant spaces with permanent or temporarily leasehold contracts and maintaining a core of space for long term core activities. Studies in the industrial suburbs of Northern Italy, specifically in the Lombardy Region, render similar conclusions; the networks of entrepreneurial and manufacturing firms are dependent to access vacant space due to market fluctuations and demand for manufactured products. Having a close relation to business cycles, firms must as a consequence have a dynamic relation to space use and its facilities management. The management of space use can to a certain extent, become rendered more efficient and thus postpone decisions on expansion or full or partial relocation (Ciaramella and Dettwiler, 2012). Several consultancy firms measure frequently vacancy rates for benchmarking, forecasting and analysis of business cycle trends and real estate markets (often office space and retail space).

As a contribution on research and discussion on spatial occupancy, this paper aims to explore the nature of vacant space and the value of identifying various spatial categories that would more efficiently match the complexity of needs through means of ideas and methods from manufacturing industry.

2. Vacant space a significant parameter of our society

Who owns the vacant space? Suburban and urban space was a political issue after the Second World War when some philosophers and sociologists regarded new construction spaces as a common good and having primary purpose to satisfy human interaction (Lefebvre, 1968 and Bourdieu, 1984). Promotion of interaction in public areas gave 20th century influences on architecture and urban design (Gehl, 1987 and Hillier and Hanson, 1984 and other) which gave a balance of the physical artefacts (buildings and infrastructures) to the actual activities within urban spaces consisting of interaction and various services.

In recent years, conjoint with the debate on sustainability, houses and areas with development areas often become focus for new lifestyles, energy saving and even local food production. Still vacant areas needs financial means for development where public finance only covers the new constructions and refurbishment partially. Conjoint with the real estate crises in the beginning of 1990th, with a multitude of bankruptcies where the ownership was transferred to public entities, the idea of Private Public Partnership (PPP) become a solution; in order to develop abandoned buildings and areas; private interests were interweaved with public interests. Often a balance must be sought between private and public interest for development of vacant space. Vacant space has both negative and positive features; is a resource for governments to create so-called clusters and industrial development.

The occupancy oscillations due to business cycles with its dynamic forces between boom and recession are mirrored as well in the real estate market. Jong Lang Lasalle (<http://www.jll.com/>) illustrates the phenomenon as an “office property clock” by placing different cities around the world on upturn and downturn trends on office property market. Still, occupancy in these measurements are regarded ubiquitously a something positive, whereas the counterpart, vacant space is generalised as a negative factor.

The notion of natural vacancy has a significant role in Real Estate Economics as an intermediary factor between supply and demand. In fact, lag effects can be observed between cycles; demand and supply of office space (Pyhrr *et al.* (1999), Gabriel and Nothaft (1988), Whaeton (1990) and Sanderson *et al.* (2006)). Vacancy of office space is not only associated to acquisition or leasing but also to the

problematics of location and service like facilities management. Additionally to the mentioned lag effects in real estate occupancy can also be observed in a facilities management perspective, where the use of office space and connected services does not follow simultaneously the fluctuation of GDP (Growth Domestic Product/Capita) probably because firms are contractually bound to previous periods (Dettwiler, 2008).

Reasons for vacant space have multiple reasons. In Europe vacant spaces is related to industrial areas for primary and secondary industries that have ceased or relocated their activities, so-called “brownfield” (CABERNET, 2015) that additionally often have contaminated soil, which implies considerable decontamination costs for successive constructions (Ferber *et al.* 2006).

In global perspective, the reasons for spatial vacancy have numerous exogenous factors e.g.:

- **Obsolescence:** Building themselves might not meet the needs or the, abundant areas activities have become obsolescent; e.g. manufacturing plants, military buildings and hospitals
- **Competition:** Location in general might have lost the attractiveness. Other areas are more attractive in terms of price, image, infrastructure, nearness etc.
- **Destruction:** The remains of old construction and contamination of soil makes it difficult (often due to protection of cultural heritage) and expensive to incorporate new structure
- **Force majeure:** Political and global market forces e.g. former communist states, Detroit automotive industry etc.

The interrelationship between relationships of factors might favourably be illustrated in a figure than simple enumeration of separated factors (Figure 1). The production of idle or abandoned industrial areas can be regarded as a mix of exogenous factors such as the global crisis and the deindustrialization and architectonic factors; and additionally such as the obsolescence of industrial spaces in urban areas.

Two interdependent parallel processes influence the extent and use of idle or abandoned industrial areas namely; (1) addition or “production” of new space and (2) re-use of vacant space. The challenge is to manage the themes of performance, obsolescence, life cycle of industrial spaces and infrastructures thorough analysis of needs of the modern industry. Considering which type of manufacturing that can be hosted by modern cities, and in the same time to meet modern requirements, would be to establish a sustainable renewal process of idle and abandoned industrial areas for manufacturing and production (Figure 1). For planners and architects, the ultimate challenge is to provide appropriate spaces to modern industries with an understanding of the complex circumstance of present and future production.

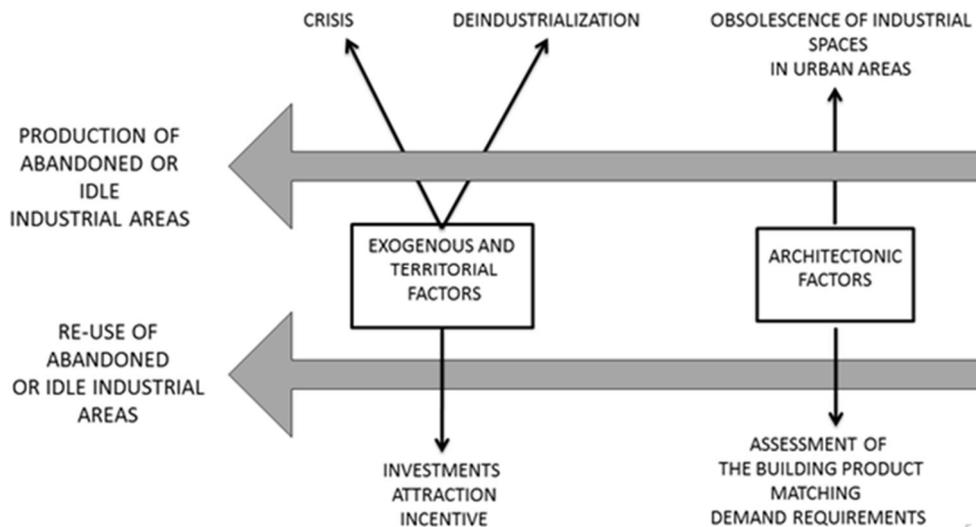


Figure 1: Key Factors and production of idle/abandoned industrial areas (Celani 2015, European Architects Network annual seminar, Milan, October, 17th 2015)

Furthermore, the challenge is to assess physical nearness standards to building categories of residential and tertiary sector areas. Most countries have zoning policies that prohibits residential planning in manufacturing zones. However with the emergence of manufacturing industry with “clean” production, many modern industries of today can be regarded as a part of tertiary sector. In urban planning the urge for attaining higher congestion, mixture of dwellings and workplace in the same area tend to be accepted. Interestingly, such mixture would be a comeback to the old European urban structure.

3. Inspiration from industry; methodologies

Considering that vacant spaces could be regarded as an opportunity for the development of a region is connected with the characteristics of a real estate product and with potential market analysis. A demand and supply analysis is defined through the supply of spaces in terms of viability. The definition of a Brownfield site is related to the notions of market failures and market constraints (Ferber *et al*, 2006) and (Groenendijk, 2006).

The lack of information about areas to be redeveloped is related to “layers of risk” to the structural specification of Brownfield and would be the main constraint is how it can be financially sustainable of redevelopment. At this point it must be specifically considered the category of benefit that splits in its turn the social and economic benefits (De Sousa, 2000) from the direct financial benefits for specific actors: in the first case the intangible factors affect the evaluation of viability of a site and in the second case the requirements of business plans are strictly connected to the time to come to fruition of the renewed asset.

Another layer of risk is featured by restrictions at the urban planning level, resulting in a set of constraints and limitation for the end use of the redeveloped area. The end usage of the area can be influenced by the typical features of the area of the building objects into the area, and of the characteristics of the neighborhood (Ferber *et al*, 2006). Accessibility, location, and physical condition are fundamental categories of the Brownfield areas to be redeveloped, additionally the different level of

possible contamination that renders it impossible to attain a standardization of reclamation and development costs for sites. Necessary information retrieval and data mining are to be considered as a cost burden due to activities connected to the project management of the renewal of the site. Preliminary studies incorporate costs, which in fact tend to increase in case of deficient information concerning the history of the site or connected deficient poor due diligence of the site. Here, ICT and Urban and Regional Public Databases would facilitate data processing and knowledge management.

3.1 Role of ICT and database information for reducing investment risk

Territorial data in Regione Lombardia are controlled and managed thru a GIS-based data-base. Analysis of the databases of Regione Lombardia reveals differences of needs and interests respectively among different categories of stakeholder (Celani, Ciaramella 2014); which is relevant to understand the interest function of different player into renewal of brownfield areas or regional planning. Table 1 represents stakeholders involved in the process of management of idle or abandoned areas.

Since the 1980s the “Kano Model” has been used in the manufacturing industry in order to enhance product development and customer satisfaction (Kano *et al.*, 1984). The Kano Model is further developed to three levels of requirements, which influence customer satisfaction; (1) “Must-be requirements”, (2) “One-dimensional requirements”, and (3) “Attractive requirements” (Suerwein *et al.* (1996). The categories of requirements can be considered as a scale from very basic level (1), just above dissatisfaction up to the highest degree of satisfaction, “the delight customers” (3).

Table 1. Basic Structure of Financial Interests and Needs among Stakeholders and Governments of Different Levels. (elaboration by authors)

	<i>Private stakeholder</i>	<i>National Government and national agencies</i>	<i>Regional Government</i>	<i>Local (municipality)</i>
<i>Financial Interest</i>	<i>Assessment and valorization of the areas (cash-flow)</i>	<i>Attraction of Investments</i>	<i>Management and control Polluted areas</i>	<i>Taxation of the underutilized areas</i>
<i>Information needs</i>	<i>Urbanistic development index, distance from infrastructures (transport, energy, IT), availability of resources</i>	<i>Societal development: Demography Industry, Political Targets, Infrastructure (connection larger networks)</i>	<i>Start-up investment, Growth firms and networks of growth firms,</i>	<i>Square meters of an area, ownership, energy, water supply</i>
<i>Database Information needs</i>	<i>Capability to support new actors on market, Creation of supply and demand</i>	<i>Regional databases are not interconnected under a National one</i>	<i>Regional database georeferenced (available)</i>	<i>Non-fully integrated databases, different for any municipality</i>

Using the Kano model for assessing the needs of the potential customer of a product and a service has widely been considered to be an attractive solution to identify attributes as key drivers to success for

customers' satisfaction (Mikulic, 2007). In Mikulic's review it cannot be found any application in the field of Urban Renewal and attractiveness of the vacancies in terms of quality elements. However identification of quality elements for the potential investor would probably reduce the risk of vacancy, reducing the market failures risk. Considering Territorial marketing as a branch of marketing discipline (Bagautdinova *et al.* 2012) with specific features due to various location externalities, conclude us to regard the potential customer of a regional areas as a potential customer of a common good. Bagautdinova *et al.* (2012) regard the localization decisions of firms relates to the effect of globalization, which in its turn is related to (1) market challenges of international sales, (2) the changed space-time relationship in modern economy and (3) the distribution of migrants flows.

The specific needs of Companies; Regional and Urban strategies can be identified and ultimately coordinated when equilibrium between demand and supply is met; e.g. issues of the demand of spaces (not only physical) and offer of spaces (areas in the urban and regional areas), the general interest etc.

In order to create high quality urban structures that would match complexity of needs, of the "delight customers", tools from Total Quality Management (TQM) such as the House of Quality (Hauser and Clausing, 1988) would be worth applying in urban planning because such tools are developed to optimise multiple variables.

By aspiring to satisfy the customers' needs, an effect would be more competitive regional and urban areas as well as more competitive company that is located with business in the area. A potential use of the Kano Model for territorial and urban development and more in detail, in order to mitigate market failures in idle and abandoned areas re-use and allocation is connected with the idea of functionalization. Kano model represents a sophisticated tool to assess customer's needs, to draw functional requirements, to develop new concepts as a part of forecasting procedures and continuous strategy work. Total Quality Management tools in general have its origin and used in manufacturing sector, which is historically more dynamic and positive to undertake change and innovation than the construction industry. The Kano model is a primarily customer-oriented tool where market failures in the brownfield areas are often connected with a lack of development of a strategy to assess the needs of the market. The needs of innovative industries are often hidden or difficult to be standardized because of their complexity. The identification of customer requirements is a part of the theory development and it is proposed a construction guide for a Kano-based questionnaire in order to develop a tool useful to meet Kano's theory of classification of needs with survey techniques. The use of the method Suerwein *et al.* (1996), according to Kano's theory, and the following implementation for mitigating market failures in abandoned and idle industrial areas re-use is the possible way to understand and assess potential market needs and requirements for vacant space.

4. Vacant space; conceptualisation

The walls of buildings and physical boundaries are rarely coherent with the organisational activities and the multitude of current spatial needs of urban features like living and working. For example, the needs the organisational dynamics of activities growth firms could ideally expand its activities if vacant space is adjacent to the core activities (Ciaramella and Dettwiler, 2011). Areas with vacant space offer thereby a support to the dynamics of firms that have to expand their surfaces.

Vacant space of buildings has their roots in new constructions due to speculation and forecasted occupancy, as well as vacant space of older building that of various reasons have been abandoned. Some

urban and suburban areas are (1) entirely vacant whereas (2) other areas are characterised by scattered occupancy (Table 2). The former situation (1) gives higher freedom for developers and stakeholders to refurbish and plan new areas; existing building of e.g. historical value can be refurbished and other building are demolished to give place for new infrastructure and construction.

The latter situation (2) seems however to be more complicated: the users of scattered occupancy can consist of dwelling as well of private or public activity; such complexity can be described in multiple interrelated dimensions: economics, sociology, governance and more. Users and inhabitants within scattered areas often have lower occupancy costs compared to dense urban areas. Process and discussion for revitalisation, refurbishment and changes implies an increase of costs, which implies among others a threat of being able to stay due to economic reasons. Social structures are as well subject to change and risk to disappear due to new changes. Experiments with methodologies of local democracy and collective design with work groups as an influencing factor in the planning process has been made since four decades however standardised to a minor extent.

Table 2. Differences between high spatial vacancy and partially vacant areas. (elaboration by authors)

<i>Characteristics</i>	<i>Area/District Low Spatial Vacancy, partially vacant areas</i>	<i>Area/District High Spatial Vacancy, entirely vacant areas</i>
<i>New concepts/design</i>	<i>Low freedom</i>	<i>High freedom, e.g. new sustainable design</i>
<i>Image</i>	<i>Influence both positive and negative from existing building stock</i>	<i>Freedom to create wanted image</i>
<i>Function</i>	<i>Existing infrastructure and service; applicability and adaption issues</i>	<i>Freedom to create new concepts of infrastructure and services</i>
<i>Public investment on infrastructure</i>	<i>Dependence on current status; re-investment</i>	<i>Entire new infrastructure, Governmental involvement</i>
<i>Social structure</i>	<i>Mixture of current and new users</i>	<i>New users</i>
<i>Buildings</i>	<i>Existing: refurbishment, friction to refurbish, new construction (e.g. in-fill projects). Mixed use of buildings</i>	<i>Demolition, New construction Refurbishment, Cultural Heritage (Degree of permission to refurbish)</i>
<i>Services (FM)</i>	<i>Divided with current occupiers, Economies of scope</i>	<i>Larger contracts, Economies of scale</i>
<i>TQM</i>	<i>Economies of scope</i>	<i>Economies of scale</i>
<i>ICT</i>	<i>Economies of scope</i>	<i>Economies of scale</i>

The strategic methodologies within manufacturing industry seem to be more advanced than within construction sector; the recent decades most products of manufacturing industries (e.g. textile, furniture, IT-hardware) has succeeded to lower the price for their products due to outsourcing, economies of scale,

free competitive market etc..., the construction sector production has contrarily increased. Reducing building cost has become a governmental topic for promotion where construction industry is encouraged to learn from manufacturing industry in order to attain efficiencies. In the research of Facilities and corporate real estate management, a main issue is in fact the identification of needs among end-users and stakeholders. Therefore it would be appropriate to connect specific needs to specific space and land (Figure 2).

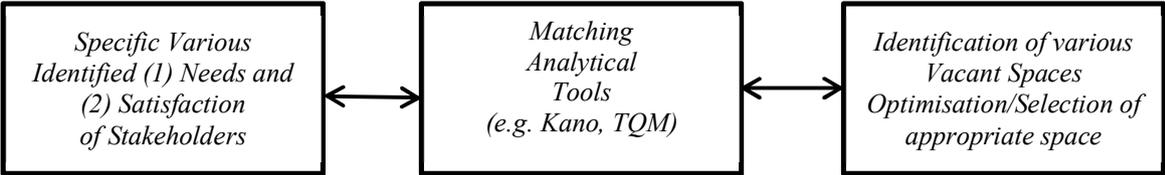


Figure 2: Matching of tools as means that connect identified spaces with identified needs.

Areas with vacant space that have nearness to city cores can be regarded as a reserve for expansion and urban development with first class image and profitability. Example of this are abandoned Wharfs plants or airports of large cities where substantial areas have been successfully transformed into residential areas and activity for the tertiary sector. The European Union conjoint with CABERNET (www.cabernet.org.uk) has categorized idle land into three categories (CABERNET ‘ABC Model’ of Brownfield Land Commercial Viability). A first approach to classify vacant space is would be the application of these categories and the concepts of Table 2 incorporates the idea of degree of vacancy. Table 3 renders a structure of basic nine categories based on the Kano Model and the ABC-Model subdivided into three main building categories.

Once identified areas enable preparation of strategic facilities management, e.g. bundling of service contracts. Circumstances of entirely vacant areas or scattered occupancy as we have seen in Table 2 give certainly implications on the notion of Table 3, like the extent of service deliveries, economics of scale etc.

Table 3. Basic structure that combines Building categories with ABC Model and areas requirements reading through Kano Model.

<i>Building category /Vacant space category</i>	<i>Manufacturing</i>	<i>Tertiary sector</i>	<i>Residential</i>
<i>A. Commercially viable Sites (Self developing sites) “Attractive requirements”</i>	<i>1.Minor surfaces/workshops in dense urban areas. Efficient and sophisticated services and infrastructure</i>	<i>2. Price Competitiveness, Affordable areas, High price office, established firms. New concepts of FM</i>	<i>3. Competitive flats, sustainable solutions, nearness to work and lifestyle facilities like shops, services, gym etc.</i>
<i>B. Marginal Viable sites (Potential development sites) “One-dimensional requirements”,</i>	<i>4. Affordable areas. Basic needs met and contractual guaranteed. Efficient and safe service delivery</i>	<i>5. Start-up areas. Consultancy, offices, incubators, new high tech firms NTBFs (New technology based firms)</i>	<i>6. New lifestyle image, lower price. Young generation with new lifestyle, connection to entrepreneurship</i>

C. Non Viable Sites (Reserve sites) “Must-be requirements”,	7. Expansion areas, connected to 4. Basic service	8. Expansion area. Low tech service firms (cleaning, repair shops etc.)	9. Separated from 7. But not 8. Basic cheap living for e.g. temporary staff
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The identification of specific vacant space that would match specific needs is primarily dependent on current methodologies like ICT, BIM (Building Information Modelling), POE (Post Occupancy Evaluation), Forecasting methodology (e.g. scenario planning) and DSS (Decision Support System). The proposed inclusion of manufacturing strategic tools, like Kano model, should be regarded a contribution to the present complexity of planning tools. We mean that it would be worth to evaluate and further undertake research how manufacturing tools that can be implemented in existing system like BIM.

The logic and mathematical understanding of the problem can be expressed as follows:

$$S_{TOT} = S_{OCC} + \sum S_{VAC} = F(N_{FIN}, N_{ECO}, N_{SOC}, N_{RES}) \quad (1)$$

- S_{TOT} = Total space of limited area (Buildings, Lands, Infrastructure) of e.g. an industrial plant.
- S_{OCC} = Present occupied space of an area, to be remained or relocated, or incorporated in future changes. $S_{OCC} = 0$ in total abandoned areas as often is the case with brownfield areas for example.
- N_{FIN} , N_{ECO} , N_{SOC} , N_{RES} are the various identified needs among users and stakeholders in basic parameters that also defines the notion of sustainability of today, namely a balance of financial, ecological and social perspectives. N_{RES} represents factors that cannot directly be categorised in the three mentioned perspectives.

Continuing the reasoning of Table 3 above, the factor $\sum S_{VAC}$ of formula (1) would thus be a composition of the various identified vacant spaces consisting of land, infrastructure and buildings. The Kano model expects to connect the vacant spaces to various levels of services and facilities management concepts. The space dynamics between the different categories incorporates as well service activities, which would have a significant role unifying the entire area in order to attain efficiencies and goals. By that reason the mentioned spaces in formula (1) could as well be replaced by a composition of services, which we here name D, thus

$$D_{TOT} = D_{OCC} + \sum D_{VAC} = F(N_{FIN}, N_{ECO}, N_{SOC}, N_{RES}) \quad (2)$$

The idea of formula (2) is as well similar to the thinking within facilities management to regard spaces also as a service *per se*, thus

$$D_{TOT} = S_{TOT} \quad (3)$$

Formula (3) has no operative value but should rather be considered as the idea of supporting space dynamics and incorporate flexibility to future change within the planned area.

5. Discussion

There are multiple ways to generate space, underutilized or abandoned; in the industrial and manufacturing sector respectively, the disappearance or relocation of heavy industry; aggressive policies attracts investments from countries, where the cost of labour and where the energy consumption is very

low and which in its turn allows companies to increase their competitiveness. Functional obsolescence of some buildings, which take advantage of phenomena of re-location; but also in the service sector, according to the phenomenon that sociology calls "despatialization of labour" (Beck, 2000). In essence, for different reasons, the use of the space occupied by production activities and tertiary sectors gradually decreases; this implies the need to understand if and how this space can be used for a new lifecycle or whether it is necessary to think about a radical change of the original use. To understand the possible application of space, an appropriate interpretation of data like the qualitative characteristics and data mining of spaces or areas is necessary for further processing to the mentioned Kano model and DSS (Decision Support Systems).

The intrinsic problematics in Facilities Management methodology is the measurement of satisfaction (in order to identify needs) which one can suspect has various ground for biases. For example when users are regularly involved in surveys, workshops, interviews, post-occupancy evaluation (POEs) etc. an habitude to express and define needs, satisfaction and desires has uneven weight and proportions among different categories of users and stakeholders. This is not only a managerial problem but also a democratic and sociological problem. The boundary between "need" and "desire" is furthermore a not explored area and of considerable significance in the briefing process. A layering and categorisation of service concepts based to the Kano Model would favourably contribute to an appropriate identification of needs.

Vacant space might represent a problem but, in some cases, also be regarded as an opportunity: at the urban scale, at the scale of single plot and in the case of individual buildings. At urban scale, vacant space would encourage expansions and developments, giving rise to new functions; at the scale of a single plot, unused space can be a solution for congested areas: the most frequent concerns central or semi-central areas, where productive activities have been developed and after years they see turn their original vocation, the surrounding areas are transformed in residential areas and because of that any expansion of business set up is allowed (in Italy, the city of Milan has many cases of this type). The presence of areas throughout the city, with different sizes, becomes a problem that cannot be managed in an urban perspective, but requires as well the ability to analyse regularly local needs; which enable a retardation of the process of regeneration. At the scale of individual buildings, the free space may constitute a reserve to support any need to grow their business for end users or the possibility of entering new strategic functions.

Another significant theme is the importance to avoid the distortion of the vocation of the territories and to leave traces that make up a real cultural heritage. The physical nature of the land to its original state, but especially the artificial environment transformed and conditioned as it appears, where virtually nothing is excluded and potentially unrelated to technological environment, have become the object of study and conservation projects, transformation, but also of real 'restoration' of objects and places. Objects and places where for decades has operated a transformation of productive type, which has involved technological and human resources, where the traces of the past chase and overlap, creating synergies and contiguity that form the backdrop of our lives must be organized and this should engage the stakeholders in an integrated and comprehensive approach towards the future use of the land. Slow or sudden changes of entire territories, birth and death of small and large urban concentrations, productive areas, factories, industries, deserve systematic analysis to properly address any future project.

The fundamental problem of planning areas vacant space is the multitude of data, different interests and number of persons involved in the process. The ICT technology of today enables data processing and

extracting appropriate information for planning, briefing and decision. The challenge to interweave complex factors is a part of managing processes and changes in manufacturing industry. It is to assume that the skill is more advanced in manufacturing industry because it is applied in daily continuous and standardised process, whereas the development an area of vacant space or brownfield area is a unique project where specific solutions must be tailor-made for the particular area. Planning experience from a developed area can only partially be transferred to another area.

Finally, since we argue that vacant space should be regarded as a valuable expansion resource and as reserve space *per se*, it would be motivated that new planned and refurbished areas of e.g brownfield never should be to 100 % occupied; some parts vacant space should be maintained as support for core activities of present companies, dwellings and organisations. Unsolved is still the partition of financing the vacant space.

6. Conclusions

In this paper we have argued to incorporate methods, learnings and ideas from the manufacturing industry into the planning process of idle and vacant areas. By means of primarily the Kano Model a higher accurateness is expected in order to identify various categories of vacant space, that would match varies needs. We argue that a better matching of spaces to various needs must as well be related to future urban structures with new values and attitudes, not only regarding finance and entrepreneurship, but also concerning sustainability, sociology and culture. New constructed or refurbished areas are not only “bricks and mortars” but also a physical space for activities and performance of complex services like FM and social interaction. Such progress within planning process would in fact be harmonized with the ideas of United Nations, where the notion of sustainability is defined through multiple perspectives.

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