

CITY REPAIR: THE VIBRANT TRANSFORMATION OF PUBLIC OPEN SPACES – ANALYSIS AND DERIVATION OF DETAILED MEASURES

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ABSTRACT

Master students of the Resource Efficiency in Architecture and Planning (REAP) Program of related built environment disciplines considered public urban spaces and the question – for human needs, what makes the spaces vibrant? This paper reports main findings of the student group work. The first step of the investigation was for each student group to identify two spaces perceived as negative (non-vibrant) and two spaces perceived as positive (vibrant). The analysis of these spaces for all groups was consolidated into a list of negative criteria (aspects to be avoided) and positive criteria (aspects to be realised). The negative criteria for example included aspects about poor protection and accessibility. And the positive criteria included aspects that encouraged the use, enjoyment and comfort experienced in public spaces. Secondly, the groups identified spaces perceived as negative (non-vibrant) but with potential to become positive (vibrant) urban spaces. The potential identified was then substantiated for the spaces as specific criterion, which informed a framework to analyse the design of public open spaces. The criteria selection was guided by Jan Gehl's work in public space design, for investigation methods, perception satisfiers and physical design criteria. Thirdly, environmental interventions to improve the environmental performance of the public space were considered, such as integrating Photovoltaic (PV) panels into building façades. Finally, students designed detailed proposals to transform the chosen non-vibrant public spaces. Emphasis was placed on bottom-up strategies to facilitate local community involvement in space activation initiatives.

Keywords: vibrant urban spaces, human needs, protection, comfort, enjoyment, design of urban spaces, building integrated PV, bottom-up strategies.

1 INTRODUCTION

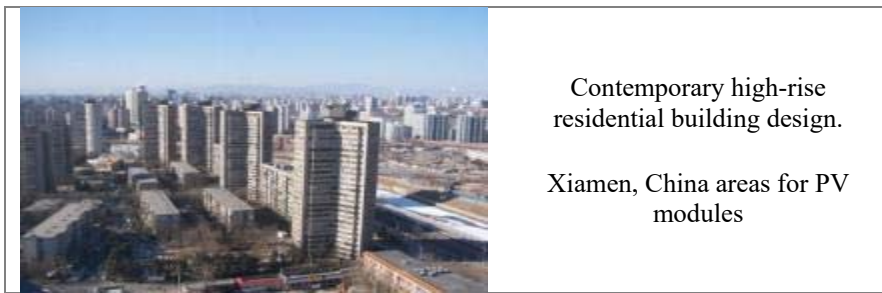
As architect's design at a building scale and urban planners work at a city scale; the design of public open spaces is often considered by both disciplines.

In apartments, social interaction is often limited to family and friends. Public spaces allow us to interact with a broader cross-section of society, where we can come together to socialise, share and exchange with others. But the space between the buildings is often designed for vehicular traffic. It is part of our nature that we enjoy the outdoors and to adapt to various changing conditions [1]. Public urban spaces that are inviting to people are essential in public open spaces to encourage human interaction.

Unfortunately, the reality is often different. The density and height of buildings in cities increases the distances between building blocks outside of a human scale, and the spaces between are often characteristically uninviting which can make social interaction unattractive, and thereby creating social isolation in communities by discouraging local residents to meet in public areas outside of their apartments (see Fig. 1).

This paper reports on the findings by master students within the disciplines of architecture and urban planning. Within the class Project II, students investigated public urban spaces and what aspects make the spaces vibrant. In total six public open spaces per group were chosen for investigation in the city of Hamburg.





Contemporary high-rise
residential building design.

Xiamen, China areas for PV
modules

Figure 1: Layout of apartment buildings in Xiamen, China. Public spaces in this context are inactive and function only as a thoroughfare to pass through the area [2].

The students chose two public open spaces they perceived as vibrant and analysed what makes them successful, drawing upon lessons learnt from two chosen negative examples. Two spaces were also selected that were perceived as negative with a potential for transformation into a vibrant space, using physical interventions. The design of these spaces was the main content of the course.

Finally, a list of criteria was derived that describes criteria for successful (vibrant) and unsuccessful spaces (Section 2).

As a next step, detailed input for the analysis of public spaces was undertaken. A foundation for the analysis was to consider human needs and their satisfiers, and how to design for the five senses of smell, touch, sight, hearing and taste. The analysis was based on the work of Gehl [3], [4], including physical criteria for the design of public spaces and investigation methods. Consideration was also given to how the spaces could include environmental interventions such as potential for renewable energy (e.g. PV modules in building façades) and how to create a building typology with a human scale (Section 3).

Section 4 shows examples of the open space analysis undertaken by student groups. The analysis informed detailed design proposals for the vibrant transformation of the chosen negative public spaces. The interventions were focused on a bottom-up strategy with the aim to activate and include the local community in the design of simple and low budget solutions (Section 5).

Section 6 summarizes the class experience for the supervisor and students.

2 CHOICE AND INTUITIVE ANALYSIS OF VIBRANT AND NON-VIBRANT PUBLIC SPACES

2.1 Criteria for public spaces that are perceived as vibrant or non-vibrant

The first part of the student group work involved presentation of public urban spaces that students perceive as vibrant or non-vibrant, justifying their perspective. In their analysis, students were required to consider what infrastructure or services are present or absent in the public space.

On the basis of the analysis, criteria were established summarising qualities which vibrant and non-vibrant spaces comprise (see Table 1). The list of vibrant and non-vibrant spaces was established from student presentations and provides a summary of findings, demonstrating how positive aspects can be an inverse of negative aspects, and can draw upon lessons learned from non-vibrant spaces.

Table 1: List of criteria describing aspects of vibrant and non-vibrant public open spaces. The list summarises findings of student group presentations and does not claim to be complete.

Non-vibrant	Vibrant
<ul style="list-style-type: none"> • Unsafe (traffic – no clear separation / drugs, crime / unclear function) • Negative perceptions (noise / insufficient lighting during evening periods / overcrowded / poor maintenance / odour / dirt) • Density of surrounding buildings and the reduced comfort of feeling exposed • No offers for a longer stay • Missing infrastructure including: protection against rain, cycle lanes, bike racks, public transport services, signage, clear access and nearby food services • Sidewalks are too small • Lack of identity with no “natural” colour palette • Seating elements exist but in non-communicative arrangement 	<ul style="list-style-type: none"> • Good accessibility • Clear separation between places to stay and area for transport • Building’s distance and height in human scale • Trees and natural landscaping • Offers to stay longer (moveable) possibilities to sit / lay down • Gastronomy retail • Public toilet facilities • Something to observe (view / people / street artists, events / façades rich in detail) • Positive sensory impressions (sun / water, sea / natural materials (wood) / fragrance (flowers, sea water)) • Clear identity and function of the space • Special historic background • Places that have – in spite of negative aspects (traffic noise) a high identity and attractiveness for a limited target group and times of the day (night bars on a noisy street but under a bridge, skate parks etc.)

2.2 Public spaces that are perceived as non-vibrant but have a vibrant transformation potential

In the second stage of the student work, groups presented the public urban spaces that they perceived as non-vibrant but with vibrant transformation potential, supported by their justifications considering what aspects were present and absent in the spaces. Students then tabled their proposed design interventions to transform the spaces to vibrant places.

2.2.1 City wide distribution of investigated spaces

Student groups investigated 15 different public open spaces throughout the inner-city area of Hamburg, illustrated by Fig. 2. The spaces are often small and located in residential neighbourhoods. Students as inhabitants of Hamburg are familiar with their local neighbourhoods and were able to provide an informed local insight in their analysis.



Figure 2: Map of the inner city of Hamburg [5] with public open spaces that are perceived as non-vibrant but with a vibrant transformation potential.

2.2.2 General quantities of non-vibrant spaces with potential

In general terms, the majority of spaces investigated lacked a human scale, characterised by large unseparated distances with a missing point of interest (monotonous). It appears that in the process of designing buildings and their urban arrangement, open spaces in between buildings are designed as an afterthought, with less detailed planning and thought to their function and aesthetic. However, design should be flexible, as spaces that have a too specific design focus, with formal infrastructure, lack the ability to support informal and versatile uses. Exemplarily examples of non-vibrant spaces with potential are presented in Fig. 3.

2.2.3 Intuitive interventions for the improvement of spaces

Intuitive interventions proposed by students for the improvement of spaces included clear separations between car, bicycle traffic and pedestrians; seating; places to stand; varied pavement treatments; formal hedge landscaping for visual separation; sound protection through glass wall acoustic buffers around terraces; more public toilet facilities; opportunities for food and beverage retailing; improving the identity; and opportunity for flexible uses in the space.

2.2.4 Further analysis – methods to derive the optimal design interventions

In developing a strategy for optimal vibrant design interventions, the descriptive analyses by students detailed in this Section, were strengthened through the detailed input addressed in Section 3.

The detailed input is based on the assumption that everything that people do in their daily lives is related to human needs (Section 3.1) and how they are satisfied through human



Figure 3: Examples of non-vibrant public spaces with vibrant transformation potential. a) A street in a neighbourhood (Glashüttenstrasse) [12]; *Potential*: A quiet, established residential street in an attractive quarter, with well-maintained apartment buildings serviced and activated at ground floor by convenience stores, cafes and restaurants; *Problems*: Inadequate sidewalk width and congestion of car parking on narrow streets. b) An open space between high-rise apartment buildings (Grindelhochhäuser) [13]; *Potential*: High density of residential neighbourhood with residential apartment building heights between 10–15 storeys. High number of local inhabitants with opportunities for recreation in an attractive local residential quarter; *Problems*: The distance between buildings is too large, with a low provision of open spaces (gardens and landscaping) to provide a sense of comfort or options for outdoor seating. There is no focal point of interest or identity for the space. c) A public open space in the city centre (Domplatz) [14]; *Potential*: This space is centrally located near to Hamburg’s main retailing street. The space is characterised by a large number of pedestrians, public transport commuters passing-by, retailing, restaurants, and historic buildings such as an old Hamburg castle and cathedral. White cubes now mark the place where earlier columns of the church once stood, which are now used as public seats; *Problems*: The space does not invite visitors to stay. The white cubes were built as a historical monument and do not function as formal seating. Traffic noise along one side of the space makes acoustics uninviting and the overall design is perceived as artificial.

perception (Section 3.2). We feel invited to stay in a public space if we have the feeling that nothing threatens us, some physical elements allow our extended stay and there is something to experience that makes us enjoy our time there (Section 3.3). Methods for investigation of the present situation (Section 3.4) and an overview to PV modules (Section 3.5) further detail the space analysis inputs.

3 INPUT

3.1 Fundamentals of human behaviour

All human activities are related to the desire to satisfy our needs. A helpful matrix of human needs and their satisfiers was developed by Max-Neef [6]. Public open spaces can contribute to the fulfilment of human needs through providing an opportunity to communicate with people outside of our family unit, as a meeting place with friends, observing daily life or by simply enjoying the atmosphere. And importantly, we are “outdoor animals” [1]; the outdoor natural environment provides us with an important opportunity to refresh from artificial human-made surroundings

3.2 Human perception of living in the city

It is routine that most people on average have three to five travel routes per day, involving going to work, buying foods and other convenience items on a daily basis [8]. If we perceive there are too many activities in a day, it can be experienced as stress. The travel route is often determined by its perceived convenience, which can be measured by time required to travel. By rule of thumb [7], duration of travel by walking (the walkability) should usually not exceed five to ten minutes (with an exception made for routes to work and special occasions). Translated in pedestrian or bicycle distance, this corresponds to about 3 metres to 500 metres or a few kilometres respectably. Within this threshold, this open public space investigation seeks to find a target distance for convenient needs. As a city needs a social density so that basic institutions can exist in corresponding distances, a threshold 100 inch/ha was used [7].

When spending time outdoors we experience different kinds of territories [9]. Primary territories are spaces related only to a single user in an apartment where there is internal social interaction with family and friends (e.g. balcony). Secondary territories are related to a limited and defined group of people that know each other such as neighbourhood friends (e.g. shared communal terrace). Public territories include spaces accessible to everyone (e.g. public parks).

Secondary territories have an important social function where the human need for communication can be satisfied. Often spaces between neighbouring buildings are forgotten in architecture design, with limited consideration given to social interaction within those spaces.

Humans naturally orient themselves in their physical activities explicitly horizontally and forward [3], [4]. Our perception is optimized when we communicate in a horizontal direction. Different critical thresholds can be derived for the distances where we can determine communication signals, by reading a person’s face expression and mood and hear spoken communication. The distance required for effective communication can be used to guide the design of public furniture to further promote interaction. As an example, the width and distance between two benches will have a significant influence on the communication between the bench users.

As we perceive with our five senses, the contact with other people and within spaces delivers an impression. For example, faces and façades provide visual messages; ears receive an acoustic impression, and odours or textures influence the comfort of a space.

3.3 Avoid threatening and realize enabling and invigorating aspects: Social and physical criteria

To successfully respond to our human needs and their satisfaction in urban spaces, it is important to reduce negative feelings like undesired injury, sensory impressions or persons. To feel safe while visiting a place, the space should be clear with physical separation between areas for traffic and areas to linger, with appropriate illumination and egress opportunities.

Once threatening aspects to a space have been mitigated, it is important to address how the space caters for different user groups, for single visitors and groups. This is to address how a person feels comfortable in a space to talk, to move around freely and to watch something without the feeling of being watched. The physical aspects of a space should include good accessibility for all persons, areas to linger, benches, areas, sanitation, opportunities to purchase food or drinks, and protection against inclement weather. Once the user of a space feels secure, the space can then include invigorating aspects that bring vibrancy and focus to a space for enjoyment. Invigorating aspects can include physical play infrastructure, water sculpture, human theatre, gardens of flowers and views to 'just feel at one with the world' [3], [4], [10].

3.4 Investigation methods

In the investigation of the open spaces, it was possible to count the number of persons visiting and to create a map illustrating the preferred paths of travel through the space. The investigation recorded whether people only use the space as a thoroughfare, and how long and where they spent their time. Informal walking paths indicated preferred ways to travel and photographs assisted in documenting this behaviour [3], [4].

The ratio width of the space to height of the surrounding buildings provides information about how the space is perceived. As a general rule of thumb, we feel secured if the ratio is between 1:1 and 2:1. Unfavourable ratios can cause the feeling of being constricted or lost.

The façades of the surrounding buildings are also influential in encouraging and dissuading visitors to stay. Human perception of space is a very active process, occurring every 5 to 10 seconds when the brain processes new impressions [3], [4]. When designing for pedestrian networks, this means that every seven to ten metres new information should occur to maintain interest. Therefore, to maintain an interesting human experience for our senses, façades at ground floor should be vertically separated from the surrounding buildings using this range. On this basis a space can be analysed through identifying its problematic façades that are perceived as too passive and dis-interesting. A gentle transition between buildings and sidewalks also creates an important intermediate space, which should be considered in the design of spaces to encourage social interaction and interest in built form.

3.5 Opportunities for environmental sustainability

To create visual interest and assist environmental sustainability objectives, PV panels can be incorporated in space design. A long, dis-interesting façade could be re-modelled with a



(vertical) arrangement of PV modules into an active, interesting layout. Existing cloud computing web-tools [11] can also be used to assess the possible power harvest of renewable energy generation, contributing to the function of the modification.

4 DETAILED ANALYSIS OF NON-VIBRANT PUBLIC SPACES WITH VIBRANT TRANSFORMATION POTENTIAL

Equipped with tools and methods described in Section 3 student groups continued to analyse the non-vibrant spaces selected for potential. The analysis included a description of recognised problems and an active character statement to assist the design of physical interventions.

4.1 Present use of the space

The investigation methods described in Section 3.4 delivered first insights to the use of the space, including the duration of visits and patterns of movement.

An optimal precondition for a space is a high number of visitors and a marker of success is whether the visitors stay for a long duration. Inversely, in a space with a low visitation rate, it is more difficult to attract visitors to stay longer. Fig. 4 illustrates movement of visitors within a space and their interactions with surrounding land uses.

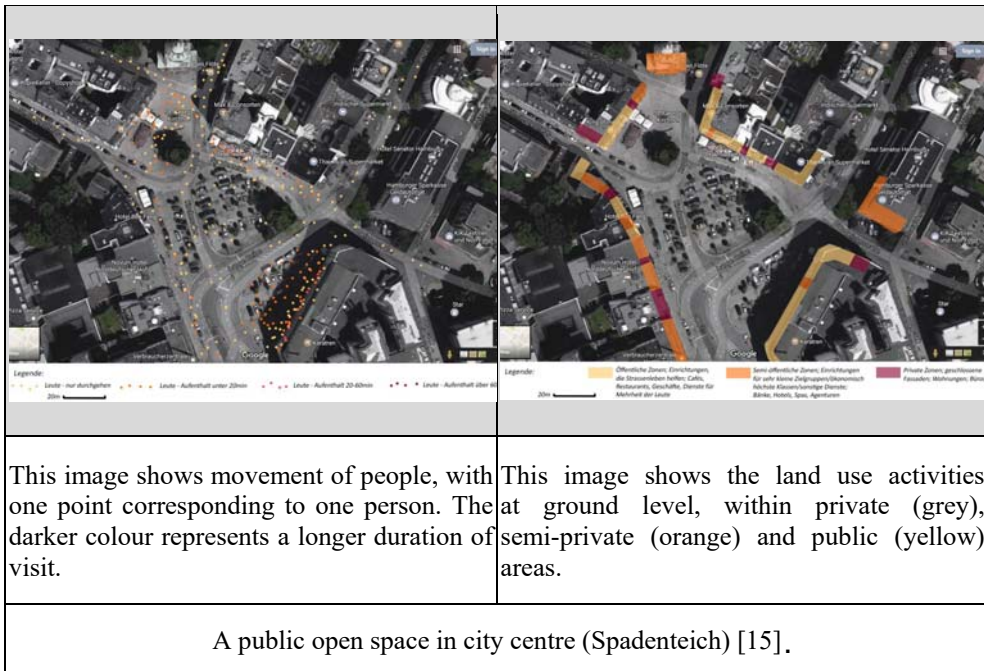


Figure 4: An example for the analysis in how space is used, the high amount of visitors and available services at this location demonstrates the high potential of the space.

4.2 Threatening, enabling and invigorating aspects

The criteria in Section 3.3 are applied to understand why the majority of visitations to open public spaces do not have a long duration.

If there were negative and threatening impressions in space, different aspects could be modified to improve the situation. Proposals for improvement could include clearer separation to moving objects like cars and to improve illumination.

It is also important to consider whether there are enough elements to encourage visitors to stay. To improve duration of visits, the space could be upgraded with more clearly identifiable public furniture.

Finally, the space should be analysed as to whether there is an interesting offer, such as a nice view or interactive activities. Possible proposals for improvement could be modification of the space to allow flexible uses such as markets.

4.3 Analysis of the surrounding buildings, façades and ground floors

As identified in Section 3.4, the width and height of the space should be carefully considered, so that the built form ratio creates a positive and secure personal perception within a space. If the building scale needs to be reduced, interventions could include subdivisions of the space created by formal gardens, trees and public furniture.

For optimal design, surrounding façades should comprise active uses with a well perceptible vertical separation of 10 metres to 15 metres. To better activate façades, interventions such as colour, texture and PV-modules could be incorporated to create interest.

When designing public open space at ground level, active uses should be provided to generate visitation and interaction, with a good mix of offers. Further it is important to consider whether ground floor zones are private or publicly owned and the comfort level of slope transition between adjoining buildings and the sidewalk. If positive design elements are absent, interventions could include the promotion of initiatives and activities at the interface of the space with the buildings, such as alfresco dining.



Figure 5: Proposals for the installation of PV modules in existing sunlit façades. Modules are visible from the ground level by pedestrians to improve the interest and identity of the urban space.

4.4 Areas for PV modules

Fig. 5 shows examples of how PV modules can be incorporated in the design of façades to create interest. The technology can be multi-functional, not only providing renewable energy but also providing weather protection.

5 DERIVATION OF DETAILED DESIGN PROPOSALS

The detailed analysis of the investigated public open spaces resulted in a list of self-derived measures for their improvement, including top-down and bottom-up strategies (preferred). The measures were weighed according to their ability to transform the spaces to become vibrant. The weighting was categorised as badly needed, preferable and additional.

Three related measures were chosen from the list to improve the spaces and were digitally created using 3D perspectives from the viewpoint of a pedestrian (see Fig. 6).

6 CONCLUSION

The analysis has highlighted the range of public open spaces which are too large for the typical work of an architect and too small for an urban planner, and therefore are often forgotten and unplanned. Urban spaces have very complex conditions of private and public ownership forming a significant obstacle for the realisation of detailed design interventions. As a consequence, the spaces are also often poorly designed due to their complexity.

On the other hand, public open spaces have a very important role in the daily life of citizens looking for opportunities for social interaction. Fortunately, a tendency can be observed that cities have begun to transform their open spaces from car oriented to more pedestrian and bicycle oriented. In general, these measures are implemented by top-down strategies with varying levels of success. Bottom-up strategies are a valuable supplement for this development, which sometimes only need a limited top-down starting initiative to become a self-running process. Local inhabitants are included directly in this approach, as their power and knowledge is valuable towards informing the design and there is a greater sense of ownership in the final outcome. Such initiatives should be supported by local administrations.

The university class that is described in this paper is a voluntary elective. A survey at the end of the class showed that students as future architects are really interested in that field and perceive it as part of their professional work. By comparing their proposals after the first presentations (see Section 2.2) with their proposals after input (Section 3) and detailed analysis (Section 4), they noted that the delivered input was helpful and necessary for the success in the final design solution. Therefore, there is a valuable opportunity for architectural programs to consider the design of urban spaces as it would increase their field of professional work and at the same time close a gap in the development of our cities to a more human and sustainable scale.

Finally, it must be noted that architects could act as valuable part in a team of professionals to design public open spaces, but they often feel under qualified. There is a significant opportunity to up-skill architects and other built environment disciplines in university programs to plan for these forgotten public spaces, so that lively neighbourhoods with positive social interaction can flourish in our cities.



Figure 6: Examples of student design proposals for the improvement of existing non-vibrant public spaces. a) Ohlsdorf [18], Space in front of a city-railway station the unstructured space does not invite visitors to stay; people use it only as a transport transfer area. *Design intervention:* structuring the space with seat elements to clearly separate areas for staying and moving. b) Park Fiction [19], A public space overlooking the Elbe port. *Design intervention:* Existing zones are to be connected with the use of coloured pavers to establish a connection and appeal to the space. This connection would be enhanced with the introduction of lighting during night periods which is powered by PV panels fixed on the perimeter. To activate usage during the winter months, vertical irregular canopies provide weather protection whilst also being artistically sculptural. c) Domplatz [14], A public open space in city centre, (see Fig. 2 for the present situation). *Design intervention:* Historical columns of the cathedral would be marked with vertical green elements; seat would be located between the columns, to make the space inviting for communication. Columns are low in proximity to the video screen, but tall on the noisy side of the street to assist with acoustic separation.

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REFERENCES

- [1] Baker, N., *We are all outdoor animals. Proceedings of the PLEA Conference*, pp. 553–555, James & James: London, 2000.
- [2] https://commons.wikimedia.org/wiki/File:Beijing_northeast.jpg. Accessed on: 26 Dec. 2017.
- [3] Gehl, J., *Life Between Buildings: Using Public Space*, Van Nostrand Reinhold: New York, 1987.
- [4] Gehl, J. & Svarre, B., *How to Study Public Life*, Island Press, pp. 106–107, 2013.
- [5] <https://www.google.de/maps/@53.5543808,10.0777984,12z>. Accessed on: 15 Dec. 2017.
- [6] <http://www.rainforestinfo.org.au/background/maxneef.htm>. Accessed on: 19 Jan. 2017.
- [7] Cordis, E., *Wohnen in der Dichte – Bauliche Bedingungen der Privatheitsregulation im Außenraum verdichteter Wohnformen*. PhD thesis, Carl von Ossietzky Universität Oldenburg, 2007.
- [8] <https://www.baufachinformation.de/Wohnen-in-der-Dichte/dis/2012029006732>. Accessed on: 26 Dec. 2017.
- [9] <http://www.mobilitaet-in-deutschland.de/index.html>. Accessed on: 26 Dec. 2017.
- [10] <https://psychologydictionary.org/secondary-territory/>. Accessed on: 26 Dec. 2017.
- [11] Dietrich, U. & Kirchberg Erto, G., *Livable public urban Spaces: Criteria for assessment and design. Proceedings of the Sustainable City Conference*, WIT press, pp. 386–397, Sevilla, 2017.
- [12] <http://re.jrc.ec.europa.eu/pvgis/apps4/pvest.php#>. Accessed on: 26 Dec. 2017.
- [13] Peters, S., Nusair, S. & Abdul, W., *Design of vibrant public spaces*, MA course, HafenCity University, 2017.
- [14] Salimbeni, A. & Jordan, M.A., *Design of vibrant public spaces*, MA course, HafenCity University, 2017.
- [15] Franceschetti, E., Lebedev, A. & Miclea, I., *Design of vibrant public spaces*, MA course, HafenCity University, 2018.
- [16] Ahmadi, C., Kacenova, M. & Comajeva, M., *Design of vibrant public spaces*, MA course, HafenCity University, 2017.
- [17] Abu Eladas, A. & Amoruso, F., *Design of vibrant public spaces*, MA course, HafenCity University, 2017.
- [18] Skjerdingsstad, M. & Ronneberg, E., *Design of vibrant public spaces*, MA course, HafenCity University, 2018.
- [19] Rohde, A., Wagner, L. & Sawitzki, E., *Design of vibrant public spaces*, MA course, HafenCity University, 2017.
- [20] Ahmed, A., Mosha, C. & Garcia Rios, L., *Design of vibrant public spaces*, MA course, HafenCity University, 2018.

