MICROBE

Co-funded by the Erasmus+ Programme of the European Union

Minimizing the influence of coronavirus in a built environment

MICROBE

O2/A4. Portrayal of the Big picture of the MICROBE

Project No: 2020-1-LT01-KA203-078100

CONTENT

1. Introduction 3
2. Planning practice by integrating an involved public 5
3. Affective method for analyzing emotions in public spaces for urban planning 7
4. Affective system for researching emotions in public spaces for urban planning 18
5. Case Studies 23
5.1. Practical Application of the Correlation Subsystem 23
5.2. Multiple Criteria Analysis of Heritage Buildings by Applying the Simulators Database 34
5.2.1. Applications of the INVAR Method for Establishing the Degrees of Priority and Utility of Cultural Heritage Buildings 34
5.2.2. Digital Recommendation Provision 37
5.2.3. Optimization of the Value 38
5.2.4. Hypothetical Calculation of Average Market Value for the Vilnius Basilian Monastery Building 39
6. Socio-political and cultural context 39
6.1. Vilnius, Lithuania 39
6.2. Sofia, Bulgaria 40
6.3 Tallin, Estonia 42
6.4. Biologna, Italy 44
6.5. Granada, Spain 48
References 52

1. Introduction

Academics have been expounding on the demand for knowledge regarding how the perception of urban areas by inhabitants could be applied in the urban planning process ever since the 1960s (Zeile et al., 2015). However, during the course of the Fourth and Fifth Industrial Revolution, technical and technological opportunities appeared for implementing contact and remote analyses of emotions in urban areas in actual time along with the use of the latest technologies for smart urban planning. Nonetheless, remote technologies are rarely used to date. These can assist in analyzing the emotions of people and their physiological states along with weather conditions and pollution in an integrated fashion. Such results can be used as supplemental information for city planning purposes. The Affective System for Researching Emotions in Public Spaces for Urban Planning (ASP System) was developed for this purpose.

Urban planning encompasses a technical and political process aiming to improve the welfare of inhabitants, control of the use of land, design of the city environment as well as of the communication and transportation networks, protection and improvement of the natural environment (McGill, 2015), also impacts on economic and social practices (Liang et al. 2020). According to Van Assche (2013), several urban planners deliver designs for parks, streets, buildings and other urban areas. Scholarly research studies (Gibbs, 2012; Rose, 2017; Levy, 2016; Berke and Godschalk, 2006) present the following typical responsibilities of urban planners: master planning (land, roads, parks, schools, public transport and such), land use planning, city design of urban areas, city regeneration, acquiring funds from governmental foundations, environmental planning (flora and fauna, land, water), conservation and restoration, collaboration and discussions with different stakeholders (specialists, community members, landowners, governmental agencies). Also, city planners analyze sustainability (Abubakar and Dano, 2019), land values (Aziz et al., 2020), pollution (Xing and Brimblecombe, 2020), safety and crime (Yang, 2019), social equity (Meerow et al., 2019), urban governance and planning trends and future trajectories (Das and Dahiya 2020), optimizing various planning alternatives (Natanian et al., 2019; Shu and Xiong, 2019, Yoon et al., 2019), etc.

The analysis conducted by the USA Healthy People 2020 initiative includes the following determinants:

- physical aspects like the natural environment including pollution, aesthetics and green spaces;
- housing and community design with its worksites, schools and recreational settings;
- built environments;
- social aspects like access to educational, economic and job opportunities;
- availability of resources to meet daily needs;
- quality of education and job training;
- access to health care services and cultural, recreational, sports and leisure-time activities;
- available transportation means;
- socioeconomic conditions, public safety and social support, social norms and attitudes.

All of the previously named determinants could relate in one form or another with residential and urban segregation. A description of the level of residential segregation with its various hues

can include the emotions felt by residents and experts. A brief analysis of segregation in European cities follows.

European cities are a widening gap between rich and poor, which leads to greater segregation. This means that both groups wind up living in homogenous, separate and impermeable areas. To go beyond the boundaries of a segregated area, the causes and solutions to segregation must be reviewed to come up with place-based policies that are inclusive, equitable and effective. Berlin with its implementation of the Future Initiative City District Program can serve as one example. The focus of this program consists of deprived neighborhoods and the means to regenerate their physical and socio-economic conditions, which would improve the environment. Disadvantaged residents must be provided with educational opportunities, both higher and lower levels of education, and actions must be taken to accomplish this. Further, these people need improved urban areas in their local area. The local people themselves must participate in renewing and vitalizing their neighborhoods. Social cohesiveness must gain strength. Additionally social and ethnic integration needs to be promoted (European Commission).

Lane (2005) deliberated several planning models (communicative, bargaining, advocacy, transactive) according to the level of public participation (citizen control, delegated power and partnership), the tradition of Societal transformation planning and the Pluralism planning school. Lane (2005) holds the opinion that advocacy, transactive, bargaining and communicative planning approaches characterize the contemporary era. Several procedural theories of planning (participatory, transactive, advocacy, bargaining and communicative) are further analyzed in brief. These theories differ among one another by their level of public participation.

According to Hacking and Flynn (2017), advocacy planning, transactive planning, collaborative planning and Deleuzian planning likewise declare uneven power relations among diverse individuals. In the opinion of Bojesen et al. (2015), the state of present planning requests a planning process (transactive planning and such), which can accommodate transparency and the expert viewpoints of numerous interested groups present.

Different researchers perform studies on urban planning in the area of participatory planning (Boukherroub et al., 2018; Hornsby et al., 2017; European Commission, 2014). These highlight interconnecting an entire community in strategic and management processes of urban planning in order to match opinions between all of its partakers and members of community development (European Commission, 2014).

According to (Lane, 2005), in advocacy planning, the function of a planner is basically that of a facilitator who either supports underrepresented groups directly or inspires them to become part of the process. Participatory mapping methods became more predominant in design and planning occupations with the rise of advocacy planning (Boone, 2015).

Various researchers have analyzed the bargaining model, where the community contributes to the decision-making process (Gao et al., 2018; Ghodsi et al., 2016a, b). Ghodsi et al. (2016a) deliberated the stochastic conflict resolution model for quality management of city runoff. Gao et al. (2018) analyzed spatial restructuring and the logic of industrial land redevelopment in urban China. Ghodsi et al. (2016b) suggested a multi-stakeholder framework for quality management of city runoff, paying special attention on the application of social choice and bargaining methods.

It is apparent that the responsibilities of typical urban planners encompass alliances and discussions with different stakeholders (specialists, community members, landowners, governmental agencies). Furthermore there are different levels of public participation in the mentioned planning models (inhabitant control, partnership and others). Recently it has become possible to learn the views and emotions of a community on city planning by applying the latest technologies, which are briefly described next.

Now advanced technologies and tools are applied in a more effective and inhabitant-centered way (Zeile et al., 2015). Related emotion data can be a novel kind of validation on the monitoring processes of urban areas (Resch et al., 2015). Li et al. (2016) assess the degree to which the emotional reactions of inhabitants are influenced by the city context (building shapes and textures, isovist parameters, visual entropy, visual fractals and such). Traditional, deductive planning methods can be supplemented with inductive and bottom techniques and strengthened with sensor technology (Streich, 2012). By applying sensor technology, it is possible to get straight feedback on urban planning from inhabitants and additional data for official planning processes using related emotion data (Zeile et al., 2015). According to Zeile et al. (2015), a rational planning process weighs all public and private issues to diminish conflicts and to get a worthy planning outcome.

2. Planning practice by integrating an involved public

Planners often have to deal with unprofessional behaviour, mixed loyalties, moral dilemmas, public frustration and other emotionally challenging situations. As they handle planning conflicts, planners can start questioning planning theory and be exposed to situations ripe with planning dilemmas, uncertainties, interpersonal difficulties and job-threatening conflicts; they might benefit from being mindful in such situations. Emotions are also important in organisational hierarchies. As a team of planners start a new project they might initially feel satisfaction and view the project as an endeavour close to their values and interests. They, then, feel the urge to be effective contributors to the project and master the necessary skills. Later, however, disappointment might set in when they see their managers handling the process in a way contrary to what they believe should be done, or they might feel wronged because of insufficient intellectual feedback and professional recognition from the decision-makers. Each person judges differently whether an action is acceptable or not: what one planner deems good, another one might think is unacceptable. Because of such uncertainties planners are likely to be exposed to stressful situations (Ferreira, 2013).

Inch et al. (2017) discuss the value of conflict and opposition in planning and how these concepts should be understood highlighting the fact that for anyone directly involved opposition may be helpful, valuable, heroic, harmful or disruptive and plays a role in determining the shape of urban change with important wider consequences for other stakeholder who may never be given a chance to voice their opinions.

Sweet (2018) looks at the philosophical origins of Western colonial thinking and its impact on planning. A transformation of planning practice may be possible by supplementing cultural competency with cultural humility in planning theory and education. Such a change could prevent a repetition of certain planning practices, often destructive, in communities of colour (Sweet,

2018). Trained and armed with cultural competency, professionals might be more likely to identify cultural, gender, social, and racial differences and take them into account. By learning about other, different cultures, practitioners will then be better prepared to understand the difference and be better at communicating with communities or providing them services in a respectful manner. More effective interactions will then be possible (Betancourt et al., 2003).

Wahlström et al. (2018) claim that multiple social, personal, and contextual factors determine city love. The elements that shape this multidimensional appreciation residents or visitors feel for the 'soul' and 'body' of a city may be very different among different cities, as well as within a single city. Loving attachment, according to Umemoto, is a combination of the emotional connection to a place (either symbolic or real), to close and dear people, and to past times (Porter et al., 2012). In the conceptual model proposed and empirically tested by Wahlström et al. (2020), the same kind of love, or the urban appreciation for a neighbourhood, as they also call it, is linked to the neighbourhood's material and immaterial amenities, or its 'body' and 'soul'. Residents 'love' their neighbourhood for its built and natural environment, public and commercial services (material amenities) and its cultural, lifestyle, emotional and rational elements (immaterial amenities) (Wahlström et al., 2020).

Lyles et al. (2018) examine the prospect of transforming our communities by applying compassion as an emotional state in planning. Compassion complements and extends prominent organizing concepts such as seeking equity and social justice, and can offer benefits in many areas of planning, including in advancing integrative conceptual frameworks such as sustainability and promoting the public interest, as well as in serving as facilitators, negotiators, mediators, and advocates (Lyles et al., 2018). Compassion and care complement and extend planners' efforts to seek social justice and offer a highly emotional, personal, relational and individually actionable orientation. Individual awareness, emphatic motivation and outlooks are in such case emphasised to achieve transformation. Our soul-searching often reveals undesirable patterns of bias, anger, ignorance, and other aspects that obstruct empathy, compassion, and, what concerns planners, service of the public interest. In public engagement, planners act as mediators, facilitators, conveners, conflict resolvers, and managers and, therefore, have many opportunities to create situations where participants will naturally come to feel compassion; it then can become an organizational culture. More focus on compassion for others, thus, can be beneficial to the core organizing concepts in planning such as sustainability, social justice, and serving the public interest (Lyles et al., 2018). There are many ways to cultivate compassion even in planning organizations that are practice oriented, such as private consultant firms, government agencies or non-profit entities. Elected officials, commissioners, staff, and stakeholders in some communities, for instance, may use compassion as a core framework (social justice or sustainability) and then organise goals, objectives, and policies around the framework. Compassion could also serve as a trust-building medium to shed light on different perspectives and interests, understanding of which may help solve unpleasant problems that may seem unyielding (Lyles et al., 2018).

A determination was made while conducting an analysis of pertinent literature that more attention is needed on emotional, social and cultural intelligence during the course of the city planning process.

A point of awareness that planners require is how to put emotions to work in their projects. Next, they need to be aware of how their approach inhibits or enables the effectiveness of those

emotions. More compassionate and inclusive communities constitute an aspirational goal of the real estate and construction field. There is considerable potential for fostering this goal requiring a more in-depth, emotional, social and cultural intelligence (Lyles and Swearingen White, 2019). At times planners might consider emotions as flaws, interferences or annoyances in the course of work. This gives rise to an emotional paradox as planners employ emotions for motivation in their public commitments and public engagements. The history of planning contains deep intellectual roots in just such a paradox. This applies to planners in different areas, such as engineering, architecture, public administration and other related fields. There are certain individuals and organizations that are now generating effective and authentic dialogues and community cooperation by engaging their emotional, social and cultural intelligence. Their stories along with their respective emotional dimensions deserve a front row seat in educational instructions, practical training and ongoing evolution as a unique field (Lyles and Swearingen White, 2019).

In their interactions with colleagues and other stakeholders, planners need emotional intelligence to be able to read people's emotions from their body language, verbal cues, and other signals (Goleman, 2006). The concept of "constructed view" proposed by Feldman Barrett (2017) incorporates other insights and sees emotions as a fluid outcome of things happening in human brains and bodies, also influenced by social and cultural contexts.

3. Affective method for analyzing emotions in public spaces for urban planning

Global research indicates that a rationally performed, quantitative and qualitative, integrated data analysis and interpretation is more reliable, when a huge volume of data is under analysis. The Affective Method for Analyzing Emotions in Public Spaces for Urban Planning (ASP Method) was developed during the course of this research (see Figure 1). Section 3 contains a detailed description of the entire research Method. Meanwhile Figure 1 presents the overall diagram of the study. This Method is further described in brief.

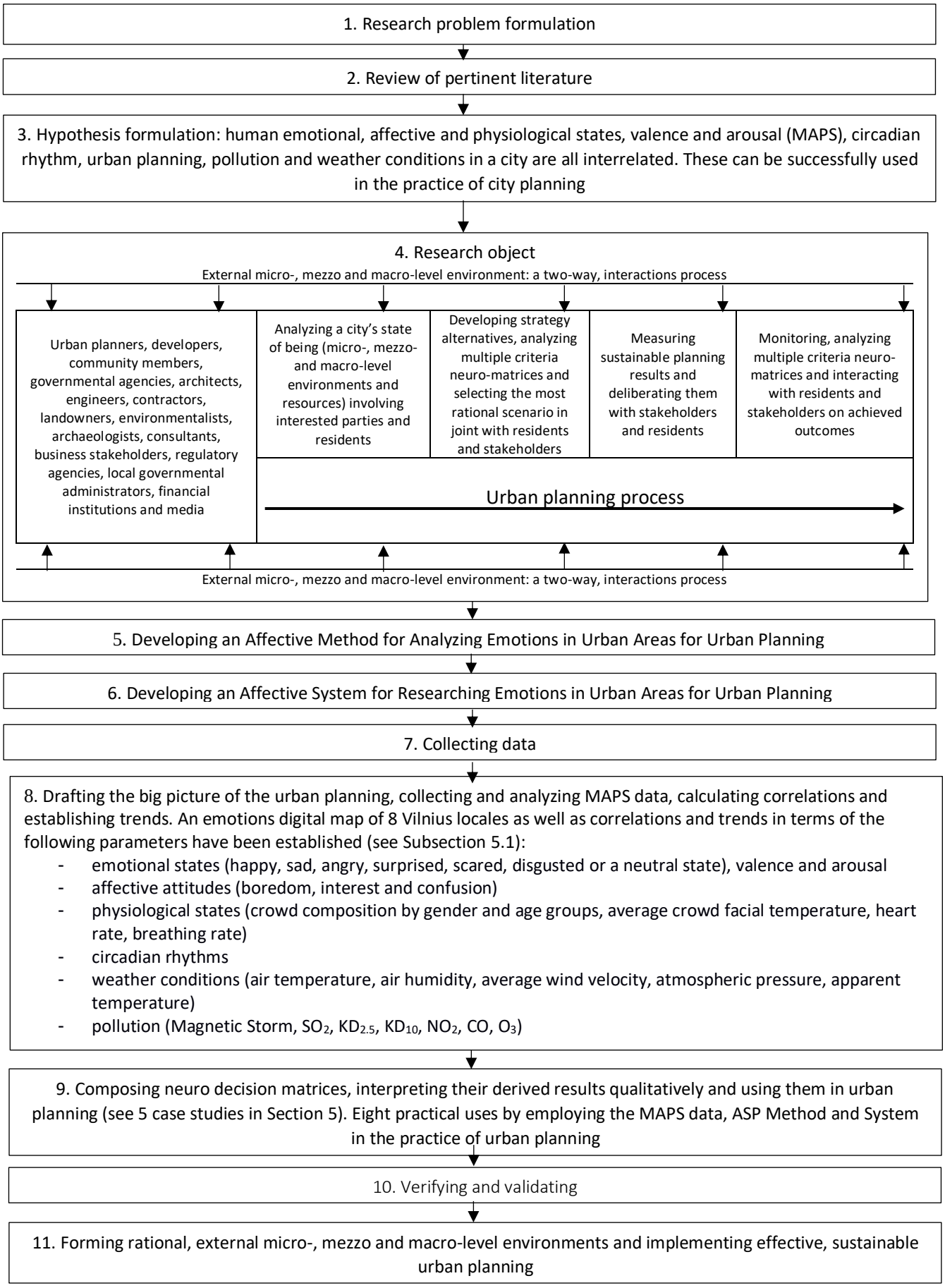


Figure 1. Affective Method for Analyzing Emotions in Public Spaces for Urban Planning

Stage 1 of the research involved formulating the problem under study. Remote means have not been applied to date for performing urban planning research that uses big data. In other words, multiple, non-contact biometrics have not been employed. The key to compiling over 80,000 average and strong correlations involves gathering data in an integrated manner. Here, the discussion involves MAPS data, circadian rhythm, pollution and weather conditions. A realistic picture of a situation in a city requires definition by the bigger picture. The requirements for a evaluation of urban planning involves use of multiple criteria neuro decision tables along with the establishment of several values - market, investment, customer-perceived, hedonic, emotional, synergistic and fair values. Additionally stakeholders require different recommendations devised especially for them. Thereby there has been a broadening and deepening of the scientific problem, when considering earlier researches conducted by other scientists. The analysis presented herein includes the application of the integrated ASP Method. Included in this Method are multimodal, non-contact biometrics; recommenders; statistics like Logit, KNN and MBP and four multiple-criteria, decision analysis methods, which have been developed by this paper's authors. The development of the ASP Method also involved use of the research by Kahneman pertinent to the results found in behavioral economics (Kahneman, 2003) and in the areas of psychology of judgment and decision-making (Kahneman, 2011) as well as the research results found by Simon (1997) in the areas of integration of emotions in decision-making and artificial intelligence. The key idea stated by Kahneman (2011) is noteworthy regarding the integration of two modes of thought – System 1 (emotional) and System 2 (more logical).

A review of scholarly literature constituted Stage 2. The objective of the literary review was to disclose the state of art in this field (see Sections 1, 2).

The review conducted of literature pertinent to the field shows that the existing practice of city planning does not encourage considering analyses of the emotions and affective attitudes of its residents. Planning Advisory Service (PAS) reports include descriptions of current planning research and best practices. The American Planning Association website is presenting these reports. Although information, advice, and tools for advancing legal, policy, and technical dimensions in planning practices abound within PAS resources, unfortunately, these resources contain little or no information on emotional aspects (Lyles and Swearingen White, 2019). Planning departments are usually subdivisions that belong to faculties of architecture, design and engineering. This fact may explain the lack of people trained in psychology among planning teachers and students (Aftab Erfan, 2017). Planning researchers often treat emotions as a problem planners face, an approach that might be explained by the fact that this discipline has a strong technical–rational tradition (Ferreira, 2013).

This literature review also revealed that planning needs to pay greater attention to emotional dimension. Emotional expression happens to be basic when endeavouring to bring about progressive change, as the discipline of urban planning purports (Fischer, 2010). Therefore Sandercock (2003) and Hoch (2006) have been urging planners to begin recognizing this perspective in their work. Especially for the larger projects, like parks or housing projects, emotional and symbolic issues generally remain more hidden although, all the while, they tend to be far more important than the physical structures actually defining them (Fischer, 2010). Fischer (2010) holds the opinion that, although there has typically been an overemphasis on the physical dimensions of planning, planners truly need to reflect on the more emotional side of the planning process in their practice, even when handling buildings, property protection, safe parks

and other major projects. A Ladder of Citizen Participation by Arnstein (1969) work reveals that planners might enter into public engagements feeling eagerness or, possibly, fear or even contempt, and how this happens. Barrett (2017) presents a “constructed view” containing more insights. A worldview recognizing the inherent worth of all beings is fundamental to planning with compassion. This calls for a mature awareness of thoughts and emotions along with their interplay in the self and in others. Awareness can thus extend into an empathy for all people. This is what nurtures motivation to lessen suffering, both for oneself and for others (Lyles and Swearingen White, 2019). Emotions generate wisdom, which planners can embrace, comprehend and employ. Relationships are inherently emotional, and, once planners are able to grasp this, they can become more intelligent and effective in their work. There are very difficult emotions involved in planning due to social interactions in planning. Deeply entrenched suffering exists caused by inequality, racism, sexism and other systematic failures, and there does not appear to be any cessation of such in society. Effective engagement with the full spectrum of diversity and difference in society provides the means for planners to work with emotions with greater skill. This is especially true for planners who endeavour for social advancements in equity and justice (Lyles and Swearingen White, 2019).

Worldwide research is also recommending the performance of text and perceptions analyzes on the emotional, affective and physiological conditions of residents by employing biometric and social network technologies. Spatial planning, geoinformatics and all the way to computer linguistics provide combinations of methods for detecting emotions/perceptions. These lead to a firmer grasp of people’s perceptions and responses to static and dynamic urban contexts, in time and in geographical space (Zeile et al., 2015). Zeile et al. (2015) extract contextual emotion information by employing technical and human sensors along with georeferenced social media posts to collect and analyse data on emotional perceptions to urban space. Thereby urban planners gain a different, citizen-centric perspective, which has resulted from this unique, information layer.

Stage 3 raises the Hypothesis. In brief, a description of this hypothesis is that there is an interrelationship between human emotional, affective and physiological states, arousal and valence (MAPS), circadian rhythm, urban planning, pollution and a city’s weather conditions; furthermore these interrelationships are applicable in city planning. Additionally a multiple-criteria analysis pertinent to some city can incorporate these and other data, which are also useful for issuing recommendations for city stakeholders by utilizing neuro decision tables as aides.

City spaces become very attractive to all stakeholders and residents when they contain a positive emotional charge. Such affected stakeholders include developers, community leaders, architects, businesspeople, contractors, environmentalists, consultants and landowners. Meanwhile positively charged locations are especially popular among residents, because such locales develop into well-visited recreational sites. Businesses are attracted to areas that attract visitors with high valence levels, causing them to compete in opening retail outlets, which offer an entire array of products and services.

Stage 4 describes the object of the research. An effective city planning process must be implemented with the participation of the entire community. The purposes and capabilities of the interest groups participating in this process must be considered. Furthermore attention must be paid to the micro-, mezzo- and macro-level environments. This two-way process of

interactions between the environment of the city under planning and city's stakeholders are highly related. Special focus turns on how the planned city's environment will affect the wellbeing of its residents, and how the residents will affect the city's environment.

Successful planning processes require healthy foundations, such as those offered by public engagements. The benefits of such should be understood by all planners. Naturally some of the most meaningful works of planners, their favourites, which fill them with hope and inspiration, come about by their public involvements. The planners who foster strong desires to have everyone in a community flourishing rather than suffering are often driven by their emotions, which motivate their endeavours (Lyles and Swearingen White, 2019). An intentional reinforcement of experiences tends to support the capabilities of planners in working with other people who are also in a continual state of change. Conversely, there might be an inadvertent reinforcement of patterns involving thoughts and feelings, which act to inhibit the capabilities of planners (Lyles and Swearingen White, 2019). An element critical to skilful planning involves grasping how the inner and outer lives of people take shape; how it requires an interplay of thoughts and emotions. Arnstein's writing carries a sense of pervading threat. Once planners experience this pervasive feeling, they frequently and naturally respond with a sense of flight, fight or freeze. Yet, this greatly reduces any further opportunity for engaging in productive discussions and ultimate collaboration. Emotions relate to what is named the mammalian brain, or the human limbic system. Affection, anger, sadness and other feelings operate in people's efforts to bring up their offspring and to enable basic cooperation (Lyles and Swearingen White, 2019). One of the research object's components is collective interest, objectives, and e-democracy, which we analyze in Chapter 4.

The external, micro-, mezzo- and macro-level environments affect its residents, whereas the residents affect these same environments. Urban stress is a condition either of bodily or of mental tension arising from city life, as per the General Multilingual Environmental Thesaurus. Such tension grows due to physical, chemical or emotional factors. The physical and social environment of a city usually identify the "urban stress" idea. This is often the major channel between an emotional or mental experience (Pykett et al., 2020). Neuroscientists have employed laboratory research to derive their findings. Their discoveries show interconnections between upbringing endemic to city life, urban life itself and personal mechanisms for responding to stress among people (Lederbogen et al., 2011). Europe has experienced fluctuations in the quality of its city environments over the past several decades, which have proven important. The worrisome aspects that the urban areas in Europe face include air and acoustic quality along with traffic congestion. Land resources have become limited causing tremendous competition for its use, which generally threatens expansions of open and green spaces. Meanwhile deteriorating buildings and infrastructures negatively affect the quality of life in cities while, at the same time, degrading the urban landscape. An investigation into the effects of different environmental components and the levels of their quality on the health conditions of the people living in a city and their quality of life is bound to unearth symptoms of environmental stress. Numerous interdependent variables interact along with the manner in which different urban activities interact with a city's structure determine the quality of an urban environment. A local environment must withstand the tremendous pressures caused by a high concentration of people and their ongoing activities within cities. One way or another, there is an effect on the health of an exposed population by local environmental conditions. Nevertheless, regional and

global problems have causes in common resulting in interdependent effects, which, in turn, closely relate to environmental problems that affect urban areas (European Environment Agency, 2016). Also laboratory-based mental stress tasks have been used to ascertain the mediating effects of city environments on stress (Steinheuser et al., 201; Olafsdottir et al., 2017).

Meanwhile emotional expressions vary considerably among people. Thus planners can never assume anyone, much less themselves personally, are capable of consistent and accurate interpretations of emotions expressed by others. There are inherent limitations to personal perceptions including cognitive biases that are further coloured by innumerable emotions. Here the conception of emotion shows it to be an endlessly evolving manifestation originating in people's brains and bodies as well as in social and cultural contexts (Lyles and Swearingen White, 2019). Then there is "moral environmentalism", as named by Corburn, which is the conviction that some types of built environments can generate behaviours that have greater wholesomeness and productivity along with other behaviours deemed as positive. Such a concept punctuates the histories of city planning and urbanism, both the practical and the theoretical (Corburn, 2004). Thus far, high crime rates along with noise and air pollution in environments containing inferior and unstable housing conditions continue to plague neighbourhoods and cause chronic stress. Such areas extend far and wide, well beyond communities planned along strict, moral environmentalist paradigms (Śliwińska and Zaborowski, 2017; Pykett et al., 2020; Gong et al., 2016).

Writing about the planning of multicultural cities with diverse populations, Sandercock (1998) states that desire, loathing, fear, and hope are constant companions of interactions in such cities. She believes that only when the traumas and conflicts of such populations are taken into account a humanistic approach to planning is possible. Therapeutic approaches are discussed in psychology literature including minimally assisted or self-initiated processes based on semi-structured activities such as therapeutic community-based music, therapeutic photography, and therapeutic play. An emerging orientation, therapeutic planning is a natural result of the need to handle the range of emotions that play out in modern life (Aftab Erfan, 2017). Offering an expanded definition of therapeutic planning, Aftab Erfan (2017) argues that the challenges facing today's communities demand an emotionally engaged planning approach with therapeutic orientation. In a different research project related to therapeutic landscape design, Schulte (2019) city sustainability literature on existing therapeutic outdoor spaces and on the way nature affects minds and emotions, and works with input from experts in trauma therapy and treatment, political conflict, and therapeutic landscape design to propose design strategies with a therapeutic effect for a busy urban area in urban Cairo, Egypt, as a form of relief for victims of trauma and traumatic stress. As more and more people around the world move to cities, one way to improve the health of populations is by making the cities healthy and vibrant. Urban green spaces and parks offer many health benefits, with the wild aspects of parks reported as a highly significant factor. But the therapeutic value of the park as a green space stems from a combination of all its features rather than from any single component. People with access to wilderness have more chances to relax, feel deep connection, and reflect (Cheesbrough et al., 2019).

Rupprecht (2019) believes that the planning stage should not be the point where any engagement and communication with local people ends. In a sustainable urban planning process, local people need to be involved at all of its stages with the public informed about the progress

at each step of the implementation. Citizens need to hear which points of the agreed vision and objectives have been achieved. They should be encouraged to give feedback on ways to make measures better, as well as provided with opportunities to share their views, because they are the people with the immediate experience of how the measures actually perform in real life. To achieve the best results possible and use resources effectively, urban planners should seek as much contribution from citizens to the monitoring and implementation process as possible. This way they can make use of both the first-hand knowledge of citizens and the expertise of professionals (Rupprecht, 2019).

Use was made of the Affective Method for Analyzing Emotions in Public Spaces for Urban Planning (ASP Method) (see Stage 5). This Method involves different MAPS data gathering and analyses methods including non-contact biometrics, statistical and recommenders techniques and data mining. There is the additional inclusion of four multiple-criteria, decision analysis methods (INVAR, etc.) that the researchers of this study developed as well as the biometric methods and research results found by Kahneman (2011) and Simon (1997). The research results of Nobel Prize winners Kahneman (2011) and Simon (1997), who integrated the rational thought processes and emotions of interest groups, can be put to practical use for planning cities and their surrounding regions. Two categories (or systems) of thought processes are defined by Kahneman (2011), a founder of behavioral economics. Fast thinking constitutes the first system, whereas slow thinking constitutes the second system. The first system includes impulses, emotions and exaggerated optimism. Since everything occurs nearly involuntarily, the first system requires little effort. However, the second system of slow thinking involves analytical skills, which generate control over behavior and thoughts. Clearly the first system of slow thinking pertains to advertising promoting rational concepts. Meanwhile the second system of fast thinking pertains to emotional advertising. There is no intrinsic conflict between rationality and emotions, as purported by Simon (1997), an analyst of factors in decision-making of which emotions constitute one factor. This researcher concludes that emotions can and do foster appropriate decision-making.

A popularly accepted fact involves purchasing decisions known as the 80%/20% rule. Simply put, the basis for making a decision to buy something is 80% emotions and only 20% logical analysis or facts.

The use for a multiple criteria assessment of sustainable alternatives involves the INVAR (Kaklauskas 2016) Method for a multiple criteria analysis (Degree of Project Utility and Investment Value Assessments along with Recommendation Provisions). The hedonic, customer-perceived, integrated, hedonic-market and hedonic-investment values of a project under deliberation can also be determined with the assistance of the INVAR Method. Furthermore it can submit digital recommendations for improving projects. Another use of the INVAR Method involves optimizing select criteria that would lead to making the project under deliberation equally competitive on the market as other projects under comparison. The INVAR Method is capable of additionally calculating a projected value for the project under deliberation for making it the leader among other projects under deliberation.

The development of Affective System for Researching Emotions in Public Spaces for Urban Planning (ASP System) occurred during the implementation of Stage 6. The basis for this development consisted of the results from Stages 1 through 5. Section 4 presents these results in greater detail.

Stage 7 involves collecting MAPS data upon conducting the scanning of human-centered urban areas.

Stage 8 involves developing the big picture of the urban planning, calculating correlations, analyzing the data and establishing the trends. The definition of a city's reality appears on the stage of the big picture.

Fresh layers of information about urban processes are needed for greater insight into the "city as an organism". An entire array of researchers, including Chaudhuri (2002), Osborne and Grant-Smith (2015), Hedström (2019) and Trejo 2019, assert that, since emotions comprise knowledge, then emotions are knowledge. That emotions are knowledge-making was an assertion made by Aristotle back in the Classical era (Nussbaum, 2001). That emotions are data is the opinion held by many scholars, such as Svalgaard (2016), Goya-Martinez (2016), Hansen and Trank (2016), Fritz and Vandermause (2018). That emotions are information constitutes the opinion of other scholars, such as Goya-Martinez (2016), Brackett (2019), Copenhaver and Odenbaugh (2020), Ching and Chan (2020). As one person emotes, another person receives information by the expression of those emotions. Actually, the intentions of some transfer to others via emotions. The information that someone does not want to do something can be expressed as fear. When a person experiences anger, the information conveyed is that the person does not want to be treated in the way he/she had been treated. In brief, persons in the immediate surroundings have learned what has happened by the emotions expressed (Ching and Chan, 2020). Then, there is an appraisal process stemming from another person's reaction, which becomes information taken into account (Butler, 2015). What is happening in a group, according to the opinion of Svalgaard (2016), can be surmised by thoughts and emotions, which become the data regarding the situation. An explanation of why positive emotions are not easily separable from cognition is offered by Kiken and Fredrickson (2017).

Every particular emotion has its physiological, psychological and behavioral characteristics. Their analyses can relate them to becoming design features, necessary for dealing with the threats and opportunities appearing in the current situation. Emotions consist of evolutionary functions that can be understood by the relationship between three factors: (1) fear with its subtypes pertinent to varying levels of threat; (2) happiness and sadness traits and their possible variances that could prove advantageous under encouraging and under discouraging conditions; (3) emotions under social situations along with needed adaptations for mutual interrelationships. Every distinct emotion has an adaptive meaning to the sort of situation that gives rise to it. Thus an understanding of such a situation is needed to define any specific emotion. There is a complicated relationship between the elements making up an emotion and the condition that forms it (Nesse, 1990, 2019).

External demonstrations of feelings in an environment of war exhibit the emotions of soldiers in battle. An evaluation of a battle and even a forecast of the tendency inherent to the war itself requires an accumulation of the emotions soldiers are feeling for a greater understanding of the situation (Lin et al., 2019). For example, visual, emotional evidence exhibiting a high positive valence and low arousal, as Surakka et al. (1998) propose, signals a nonthreatening and nonappetitive environment. A good source of information consists of the emotions people are feeling. Tiredness, e.g., indicates information about a person's energy level or sense of fatigue, coldness – the temperature of the surroundings and feelings of warmth and trust between more than one person – their friendship or their attraction to one another (Frijda,

1988). There are consequential emotions relevant to actions such as, e.g., selecting words carefully to avoid hurting the feelings of another or when emoting personal feelings in instances of frustration involved with a difficult task. Emotions become a form of reasoning, assisting people in understanding their own positions and interactions with others, and providing means to respond in an adaptive manner (Mayer et al., 1999).

Emotions can represent desirable goals in addition to being a means for encouraging appropriate activities. Nearly everything humans endeavor to think or do intend to prompt positive emotions and evade negative ones. Thereby there is an inducement of Darwinian fitness, which is a result of factors that are vague in the awareness of most people. Synergistic efforts by cognitive and evolutionary psychology constitute people's attempts to improve their grasp of the link between emotions and adaptive behavior (Cosmides and Tooby, 1989). The engineering perspective regarding emotions is an adaptationist approach. This perspective sees every emotion as designed by selection to resolve certain problems coming up in some certain realm. Emotions can be seen as goal-directed by a certain level of abstraction, meaning their evolution ad been in response to resolving certain adaptive problems (Sznycer et al., 2017).

Since information that is more emotional is likely to affect attitudes more strongly than neutral information does, information that is highly positive or highly negative could prompt citizens to rely more on EU media evaluations (Soroka and McAdams, 2015). There is a greater frequency of negative news. The guess regarding this situation is that people tend to have a stronger reaction to negative information. The clear pervasiveness of negativity biases on average seemingly account for the tendency of news anywhere around the world to be primarily negative, since all media are seeking to expand their audiences (Soroka et al., 2019).

Additional insights into the complex human-city relationship can be provided for urban planners by correlating extracted and measured human emotions (Zeile et al., 2015). An understanding regarding the perceptions and judgements people make regarding some large-scale urban region at a high resolution proves to have great significance for researchers, urban planners and decision makers (Zhang et al., 2018). Zhang et al. (2018) present a method for identifying the visual elements of a site. This method identifies the visual elements possibly causing a safe, lively, depressing or some other description of a locale. This perception has a strong correlation with human perceptions. A variety of objects were first identified as having a positive or negative correlation with every one of six perceptual indicators out of 150 object categories that had been segmented from street view images. These results increase the understanding researchers and urban planners may have regarding the interactions of place sentiments and semantics. Dependence between multiple variables can be established by using multivariate regression analyses for an investigation (Zhang et al., 2018). Some pairs of indicators correlated strongly, as Zhang et al. (2018) discovered. Concepts like "beautiful – wealthy" and "depressing - safe" correlated with one another; however, some pairs like "beautiful - boring" were really quite independent. Nonetheless, the specific connections between these indicators would differ between Beijing and Shanghai. The correlation of "wealth - depressing" was found to be strong in Beijing, for one example; however, it proved quite low in comparison with results found in Shanghai (Zhang et al., 2018). The remote, biometric tests conducted for this research derived quite many dependencies and trends (see Figures 6-14). These are next described in brief.

Correlations and trends were established for ten locales in Vilnius as well as for the entire city with assistance from the ASP Subsystem of correlations. The calculations of these correlations were according to the emotional, affective and physiological states of passersby along with their valence and arousal levels while including, as well, weather conditions, pollution and circadian rhythm (see Figures 9-14). This Correlations Subsystem helped in calculating more than 80,000 average and strong correlations. The metrics and correlations indicating high, medium or low importance for residents constitute a field to be defined by future research. The measurements taken in Vilnius require a more detailed analysis relevant to parameters with strong correlations and substantial impact on residents. Upon successful accomplishment of this, concrete decisions can be made quickly. This is needed to avoid further problems as well as to gain a level of benefit from the matters, as they currently exist.

Stage 9 involves application of the multiple criteria decision analysis (MCDA) to study the effectiveness levels of urban areas and buildings (see Subsection 5.2).

An involvement of people from some specific area into various planning processes constitute the main idea presented here. People have different expectations about specific areas, and these are urban emotions. This reveals what additional features can be added to an area for greater desirability. Linked to one another, a resident's perception and urban space spark emotional reactions, thereby generating a unique atmosphere for the resident viewing it. Green places, rivers, lakes, pollutions, industry areas, street conditions and further geographical aspects affect the feeling of residents within their current environment. How this happens is what urban emotion endeavours to understand. The accessibility of infrastructures can be rated by methods such as barrier free planning. The identification of a planning deficiency can be eased either by a temporal barrier or by merely a negative impression of some resident. The conceptualisation of city feelings was not as simply some comprehensive instrument of explaining various sorts of planning responsibilities. Instead, this concept can generate a different view for a better understanding of a city's formation. Extracted contextual emotion information can constitute the direct feedback needed for urban planning, decision support and evaluating ongoing processes involved in planning and designing (Choudhury et al., 2016).

The comprehensive study of analyze specific tasks employed five case studies, presented in Stage 9. The evaluation of certain parts of the integrated ASP Method required such a study. The proposed, integrated ASP Method was substantiated by these five case studies.

A qualitatively interpretation of the results from the study presented here can be used in urban planning. The objective of urban emotion is to grasp the effect on people's feelings caused by the surrounding environment. Informed decisions in city planning are made by specified target-groups. A better understanding can be achieved among different stakeholders concerning how individuals react to dynamic and static city environments. A unique layer of information results, which offers urban planners an additional, citizen-centric perspective.

Users can compile neuro decision matrices based on the derived MAPS data. Thereby, planners applying the INVAR Method and neuro decision matrices can establish the most effective alternatives for urban planning and calculate the hedonic, customer-perceived, integrated, hedonic-market, and hedonic-investment values. This is the reason that a multicriteria analysis truly corresponds with urban planning issues concerning the analysis of emotions. Urban planners are able to employ the ASP Method and System according to eight

different directions. The endeavor of this study was to demonstrate the innovativeness and practical usefulness of the ASP System on a global level.

Stage 9 involves a quantitative interpretation of the derived results for their further use in urban planning. A provision of automated recommendations appears in this case (see Subsection 5.2.2). These are pertinent to market, investment, customer-perceived, hedonic, emotional, synergistic and fair value calculations (see Subsection 5.2.4) for urban planners. Those who formulate city planning policies also need to focus attention on the micro-, meso- and macro-factors that have the least significance for improving their city or its regions. The reason for this is because, in the opinion of Tofallis (2020), these will provide a greater conditional benefit for subjective well-being. Tofallis (2020) believes it is important to improve conditions at an individual level for those who feel the lowest level of wellbeing.

Stage 10 regards the verification and validation processes necessary to assess ASP Method and System precision. The accuracy of the ASP was assessed by the verification process, assuring that the results from the system reflected the actual situation. The ASP Method was first confirmed to measure its accuracy and verify that the ASP Method's outcomes showed the real condition by adapting correlations (see Subsection 5.1). The steps relevant to the proposed ASP Method are accurate, as shown by the calculated correlations. The validation and verification of the ASP Method, which appears in the next step, was expert-assisted. This assessment was conducted by twelve urban planning and real estate development experts. Opinions were submitted by those experts who validated the analysis of the urban areas. The validation provided was in terms of the affective, emotional and biometrical conditions of passersby, their valence and arousal levels and by cultural heritage objects. Furthermore experts have tested all the possible states of the ASP Method to double check the results to see if the desired features of the method had made them satisfactorily. The hypothesis must coincide with the ASP Method, which the verification identifies. Four cases of cultural heritage sustainability (see Subsection 5.2) were verified and validated by the proposed hypothesis, which also validated the accuracy of the ASP Method and System.

Stage 11 involves performance of the rational formation of the external, micro-, mezzo- and macro-levels of a city environment as well as of the implementation of effective, sustainable urban planning. A graphic illustration of the interactions among optimal, rational and negative urban environments appears in Figure 2. The constructive influence of specific urban environmental dimensions on the efficiency of city sustainability is featured by the zone within the ellipse. Meanwhile the adverse effect that urban environmental dimensions have on the sustainability of the city appears in the zone outside the ellipse. Wherever the urban environmental dimensions overlap, the result is a better sustainable city. When all three ellipse areas cross over one another, such as, in this case, the social, environmental and economic areas, the sustainable city has reached an optimal state. The larger the crossover area is, in consideration of the weight of the dimensions, the more sustainable the city is. There are urban environmental variables that affect city sustainability. Such variables have been investigated to identify them and to establish the differences between the most sustainable cities in the world and in Vilnius City. Once such differences were determined, key proposals for Vilnius were established. Boundaries on the city sustainability are forced directly by the presence of variable dimensions of some specific urban environment. Thus the efforts to implement urban planning by appropriate stakeholders are more rational once such objective boundaries are known.

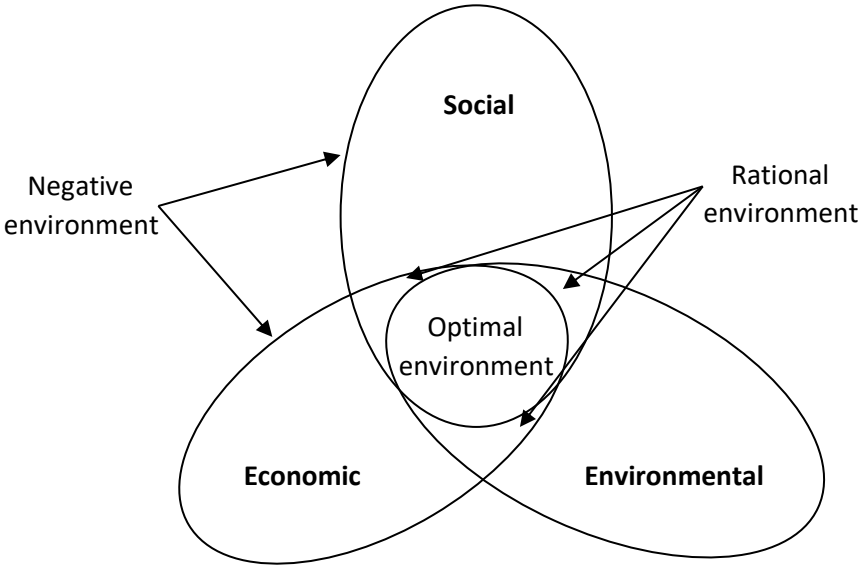


Figure 2. Fluctuation of efficient boundaries of social, economic and environmental dimensions influencing sustainable city efficiency and determination of optimal, rational and negative urban environments

4. Affective system for researching emotions in public spaces for urban planning

A Smart Database Management System, a Smart Database, an Equipment Subsystem, A Model Database Management System and an Intelligent Model Database and User Interface constitute the framework of the Affective System for Researching Emotions in Public Spaces for Urban Planning (ASP System). We developed the ASP System based on the ASP Method.

Developed emotional, affective and physiological states, arousal and valence (MAPS) along with the Historical, Recommendations and Simulators Databases and a Smart Database engine constitute the framework of the Smart Database. Collections of MAPS data are accomplished by the Video Neuroanalytics Database. Historical data accumulates in the Historical Database after being collected by the video neuroanalytics, recommendations. Experts in the field assist with the compilations for the Simulators Database. These named subsystems store data for urban planners on sustainability and quality.

The subsystems that constitute the Intelligent Model Database are the Text Mining Subsystem (see Section 4), Recommendations Subsystem, Simulators Database (see Subsection 5.2) and Correlation Subsystem. Different stakeholders are able to receive recommendations from the Recommendations Subsystem on air and noise pollution and other issues regarding ways to improve sustainability. Urban planning alternatives can be modelled by the Simulators Database, which offers a System for such modelling. The Simulators Database, which the authors of this article developed, are presented in Subsection 5.2. An analysis of different correlations pertinent to human-centered, urban planning metrics and their influence on people can be performed by the Correlation Subsystem. Applications of the integrated ASP Method for

revealing information and patterns in MAPS data layers are assisted by the data Correlation Subsystem (see Subsection 5.1).

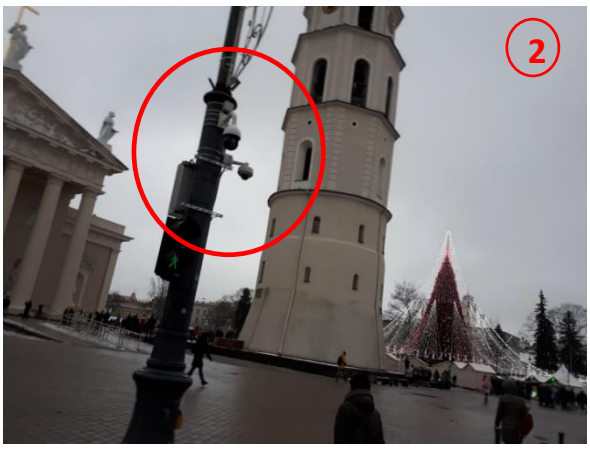
As an example of ASP, we will briefly analyze the Equipment Subsystem and Text Mining Subsystem below.

Section 4 presents the description of the Equipment Subsystem regarding data measurements of human emotional, affective and physiological states, arousal and valence (MAPS). Currently the measurements of MAPS data take place in the Vilnius Municipality building, the Business Center on Narbuto Street 5 and at six Vilnius City intersections: 1) Kareiviu¸, Kalvarijų and Ozo Sts. intersection; 2) Žygimantu and T. Vrublevskio Sts. intersection; 3) Santariškių¸ and Baublio Sts. intersection; 4) Šventaragio and Pilies Sts. intersection; 5) Šventaragio St. and Gedimino Pr. intersection and 6) Pamenkalnio, Jogailos, Islandijos and Pylimo Sts. intersection). Furthermore MAPS data was also being gathered at three Vilnius beaches during the summer. The sensors of the Equipment Subsystem are also intended to be attached to four inner-city buses with ever-changing routes. There is an expectation, in this case, to additionally gather data at 400-500 bus stops. Currently there are over 0.5 billion pieces of MAPS data accumulated.

The Equipment Subsystem comprises face emotions (FaceReader 8), temperature (infrared camera FLIR A35SC), Respiration sensor X4M200, people flow counter (H.264 Indoor Mini Dome IP Camera), voice emotions analysis (QA5 SDK), eye pupil (Mirametrix S2 Eye-Tracker), brain signals (Enobio Helmet), heart rate (iHealth Wireless Blood Pressure Monitor) biometric analysis devices. The Equipment Subsystem was used to collect biometrical and physiological data. The User Interface provides convenient conditions for a user to manage the ASP. Anonymous passersby had emotional, affective and physiological states, arousal and valence (MAPS) tests conducted on them at eight distinct locales in Vilnius City (see Figure 4). Different formats of remote data were gathered in three layers, in real-time, with the aid of the Affective System for Researching Emotions in Public Spaces for Urban Planning (ASP System). This MAPS data required processing, integration and analysis.

a)

b)



c)

d)

Figure 4. Examples of Equipment Subsystem hardware at the beginning of Pilies Street (a, c) and at Gediminas Prospect (b, d)

Over 490 million of such MAPS data have been accumulated at this time. These provide a rather accurate definition of "how people feel in a city". The only data established without the use of video streams are the breathing rates of passersby, which are taken with the Respiration sensor X4M200. Instead, a radio-frequency electromagnetic signal is applied to reflect information about a target.

Two publicly available and objective datasets on basic human emotions were employed by Lewinski et al. (2014) to validate FaceReader and to evaluate the accuracy of recognizing facial expressions. Of the matching scores, 89% were reported to FaceReader in 2005. Tests were run by Lewinski et al. (2014) on version 6.0. These scholars discovered that FaceReader recognizes 88% of the target labels of emotions in the Warsaw Set of Emotional Facial Expression Pictures (WSEFEP) and in the Amsterdam Dynamic Facial Expression Set (ADFES). Meanwhile the average was 0.69 for both datasets when using the Facial Action Coding System (FACS) index of agreement. This means there was an 85% rate of recognition of human emotions when using this index. The accuracy of the recognition of basic human emotions for those same two datasets was also computed at 87% for ADFES and 82% for WSEFEP by Lewinski et al. (2014). FaceReader has been a reliable indicator of facial expressions that divulge basic human emotions over the past decade, as the aforementioned scholars have reported. Furthermore, they report, that there is a potential for similar robustness when used in conjunction with FACS coding. In general, researchers report an 88% accuracy in recognizing basic human emotions by FaceReader 6.0. FACS accuracy pertinent to the FaceReader index of agreement is 0.69 (Lewinski et al. 2014). Numerous other investigators show very similar results regarding the validity and accuracy of FaceReader, thereby also reporting similar opinions regarding the manufacturer of this equipment, Noldus Information Technology.

The FLIR A35SC infrared camera (FLIR) is ±2% accurate. It has a <0.05°C thermal sensitivity. FLIR has been calibrated and verified by its manufacturer. Next the measurement results were documented by virtue of a calibration certificate. The assurance that the error rate does not deviate from the parameters, which the manufacturer sets, is the metrological verification conducted every 12 months on the thermographic cameras.

Text Mining Subsystem permits selecting the maximally rational information in the coverage that the user urban planning requirements. The Text Mining Subsystem assists an urban planning user for the selection of maximally rational information in the desired area of interest. Planners are able to find information they need by employing the Text Mining Subsystem. Text Mining Subsystem currently available in English. The Text Mining Subsystem was developed according to the methods described in "Electronic information retrieval method and system" in Patent EP 2187319 A1 (see https://patents.google.com/patent/EP2187319A1/en). The Text Mining Subsystem develops many alternatives and chooses the most effective personalized educational texts for every mentee by applying a system of search keywords and weights. The system of keywords and their weights cover:

- Keywords describing learning style,
- Keywords describing the most interesting previous modules,
- Current search keywords.

A description about the search for such keywords follows.

In our case, the learner responds to the Multiple Intelligences Self-Assessment Scales, which then control the education style that is the most suitable for that learner from the available styles:

- verbal-linguistic (frequently related with learning well in a university, speaking and writing by techniques),
- logical/mathematical,
- visual-spatial,
- intrapersonal,
- interpersonal (learning in a group, appropriate in broker and mentor professions),
- musical (sympathy for sounds, videos and audiovisuals),
- bodily-kinesthetic (writing and drawing diagram techniques),
- naturalistic (broad systematic reasoning in the urban planning, appropriate in researcher professions).

Once ASP establishes the learning style of a specific learner, it proceeds to implement the studies process adapted to the learning style for this particular mentee. For example, assuming the Multiple Intelligences Self-Assessment Scales indicate that the interpersonal learning style is more suitable for some specific mentee and that mentee expects to work as a tangible heritage broker in the future, the System will select learning materials that are most suitable to the interpersonal education style. While this same mentee is learning from the "Tangible heritage development" module, the Text Mining Subsystem searches for a text according to the keywords describing such a learning style: agent, broker, services, sales, tangible heritage, transactions, mentee, seller, commission and deal.

Keywords describing the most interesting previous modules contain course keywords from tests and course projects that a mentee had passed with an excellent or good mark and had a positive evaluation based on the interestedness of the course for that learner. The applicable Module card contains these keywords. The weights of these keywords depend on the grades assigned to exams and course projects and the course interestedness as rated by that mentee for him/herself.

A mentee compiles the current search keywords and their weights with respect to current requirements in real time. It is possible to select such keywords from the Keywords Database, containing the most frequently used keywords and their significances.

A user also can indicate the level of complexity and significance of the material being searched by the interface to include limitations. The evaluation of the complexity level of material being search is on a ten-point scale. Establishing the most rational material to search, the evaluation of its level of complexity and its significance takes place comprehensively, along with other criteria. The most rational information is established by indexing the text in the module, i.e., finding the number of times the words (their synonyms) being searched or their combinations are repeated in a text.

The developed System described above regarding search keywords is applied for the development of "personalized curricula" for a specific mentee. Ample data and text should be processed and assessed for performing the multivariate development and multiple criteria analysis of a course.

The Text Mining Subsystem executes a multivariate development and a multi-criteria examination of text alternatives. Additionally, it routinely chooses the most rational option according to the above-described system of search keywords, the citation of manuscripts (ScienceDirect, Scopus, Google Scholar), the h_{index} of authors of publications under deliberation (Web of Science, Google Scholar), top 25 papers, impact factor of journals and density of keywords. Furthermore, this Subsystem computes the utility degree and priority for each alternative of a text under deliberation (see Table 1).

Table 1. Selection of a rational, personalized text variant – a fragment.

The following factors determine a rational text:	**Paragraph 1**	**Paragraph 2**	**Paragraph 3**	**Paragraph 4**	**Paragraph 5**	**Paragraph 6**	**Paragraph 7**	**Paragraph 8**	**Paragraph 9**
Citation of papers:									
Citation of papers (Web of Science)	3	79	44	81	-	179	155	135	202
Top 25 papers	**-**	**24**	**-**	**2**	**-**	**15**	**-**	**20**	**18**
Impact factor of journals	0,983	1,59	1,59	1,59	2,046	1,59	1,192	1,59	1,59
Density of keywords (% of a text):									
energy	7,54716981132075	9,67741935483871	7,89473684210527	14,7239263803681	16,2162162162162	12,1019108280255	14,1176470588235	11,3207547169811	11,320754716
building	15,0943396226415	25,8064516129032	21,0526315789474	14,7239263803681	-	15,2866242038217	9,41176470588235	15,0943396226415	15,094339622
Citation of authors:									
Author 1									
Web of Science									
Sum of the Times Cited	3	18	715	82	-	69	179	140	104
Sum of Times Cited without self-citations	3	18	582	82	-	67	179	140	99
Citing Articles	3	15	499	82	-	66	177	140	88
Citing Articles without self-citations	3	15	458	82	-	64	177	140	84
Average									

5. CASE STUDIES

5.1. Practical Application of the Correlation Subsystem

As an example of the ASP Correlation Subsystem, we will briefly analyze the research results obtained with it in Vilnius.

Urban areas should, according to sustainable cultural heritage principles (ECOCITY World Summit, 2017), remain active in formulating ongoing processes that would be able to handle the frequently unpleasant crossovers of identity and differences, which would encompass the current tensions between culture and nature. The position stated by the United Nations, Unesco, Agenda 21 for culture, United Cities and Local Governments (United Cites and Local Governments, 2010; Magee et al., 2012; Öberg et al., 2017), regards the Circles of Sustainability approach, proposes that people direct their efforts to realize all their desires and goals via four modalities (economic, ecological, political and cultural), which can be analyzed across four hierarchical scales. This research endeavors to assess urban cultural heritage sustainability by virtue of human MAPS states.

Improved living conditions for the residents of a city are drafted in detail when planning the designations of that city's territory. Engaging local communities in discussions is the effort made in Lithuania, where requirements for public discussions have been established, whenever an object is meant for construction. The key points in Lithuania regarding community, i.e., public, interests regarding urban planning are as follows: the objective needs of a community relative to its quality of life, public information, decision-making involving public participation and the like. A community must be familiarized with territorial planning documents at the State level by no less than 2 months prior to implementation. The plans must be on public display for no less than one month of this time (Law on Territorial Planning of the Republic of Lithuania).

The research object that Vilnius Gediminas Technical University and Vilnius Municipality City chose relevant to their ROCK and VINERS projects implementation was Vilnius Old Town, which has been named a cultural heritage object by UNESCO. The Old Town object included the key urban areas within its security zone. The urban areas considered key include Gedimino Prospect, Pilies and Švitrigailos Streets and Lukiškių Square (see Figure 4d for the locations of these sites on a city map). These sites have their differences. For example, (1) Pilies St. is historical as part of the Old Town's 16th century urban structure, and large numbers of both city residents and touring visitors visit this area. In contrast, (2) Gedimino Prospect was built as a main avenue of the city during the 19th century modernization of Vilnius. Its renovation came early in the 21st century to include use during holiday events and fairs as well as its functioning as a pedestrian walkway and bicycle path (see attached maps). Finally, there is the 8 ha (3) Lukiškių Square, formerly Lenin Square during Lithuania's soviet period, which is currently under maintenance. This site was the object of lengthy, harsh debates regarding reconstruction into a site earmarked for recreational use. The general plan for this square only called for the start of maintenance work in 2016, which is still ongoing but with functioning pathways. What were the desires of the urban planners themselves? City planners undertook studies of human emotions; thus they selected different objects for review. Their studies were meant to review the following:

- Evaluations of diverse urban areas relevant to their quality by attendance rates with relevant visitor emotions, age group(s) of visitors and the average length of their stays.
- Factors of importance established for urban area developments along with recommendations to include planning for fostering positive emotions thereby guaranteeing good health and for stimulating attendance.
- Investigations of urban areas regarding their contributions to the satisfaction of city residents.

The objective of the H2020 ROCK (Regeneration and Optimization of Cultural Heritage in Creative and Knowledge Cities) Project is to regenerate and adapt the reclamation of historic city centers by developing an innovative, collaborative and circular systemic approach. An aim of the ROCK Project involves promoting synergies, popularizing places of interest and transforming historic areas into technology-driven hubs of knowledge and culture for contributions to creative and innovative historic building and cultural equipment reclamations. This aim also encompasses the discovery of areas with high cultural potential that are currently barren. The development of an ICT infrastructure is for improving knowledge sharing and discovering new and innovative ways to employ cultural heritage objects. This is being accomplished within the framework of the ROCK and VINERS Projects and the Affective System for Researching Emotions in Public Spaces for Urban Planning (ASP System).

Development of the Video Neuro-advertising Method and Recommender System (VINERS) Project involved two Subsystems, VINERS1 and VINERS2. An analysis and evaluation of the impact made by the content of electronic advertising by the VINERS1 Subsystem permits learning more about the effectiveness of an advertisement at each state of its creation. It helps to establish the strengths and weaknesses of an advertisement as well as to improve it until it reaches a point of being most attractive to a viewer. The VINERS2 Subsystem permits performing an integrated evaluation of viewer neurobiological feedback during intuitive broadcasts of an electronic advertisement with already composed contents. Furthermore it allows selecting the most effective advertising variant in real time.

The ROCK project implementation, conducted by Vilnius Gediminas Technical University (VGTU) and the Vilnius Municipality, involved mounting Equipment Subsystem hardware at six, different, Vilnius Old Town intersections (see Figure 4) and two buildings. Examples of such mountings from the Equipment Subsystem have been photographed at the head of Pilies St. (see Figure 4a,c) and at Gediminas Prospect (see Figure 4b,d). The MAPS states of viewers are under analysis by ASP, which then rates cultural heritage sites accordingly.

The happiness indexes of Vilnius City and the municipal building are currently presented in the official website of Vilnius City (see Figure 5; https://api.vilnius.lt/happiness-index). A map of the happiness indexes at eight Vilnius sites is also presented in real time (see https://experience.arcgis.com/experience/8c1856f8ca924ab89052e19650d80746/).

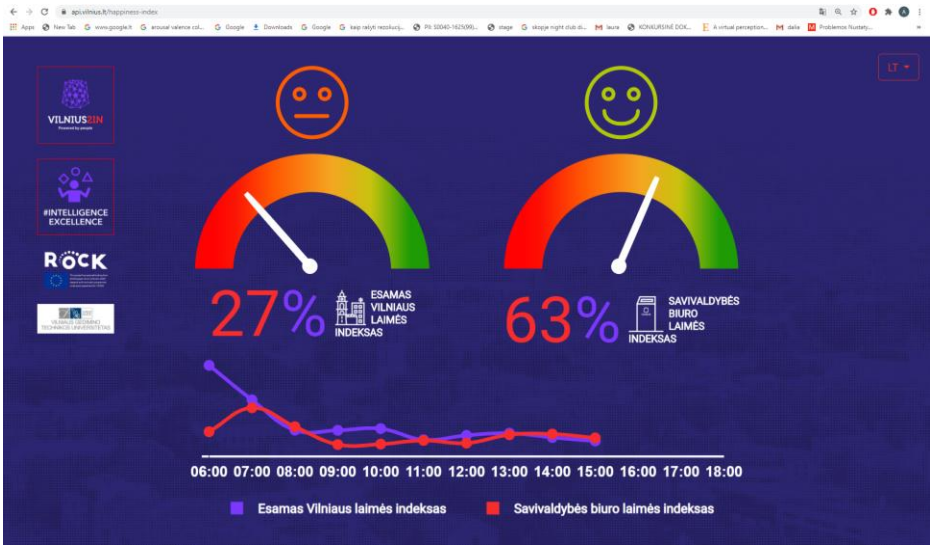


Figure 5. Happiness indexes, in real time, at Vilnius City (on the left side) and the municipal building (on the right side).

Table 2 introduces the correlations of happiness values by weekday. The values of all the happiness indices during every weekday correlate with each other. The strongest correlation falls between the values on Wednesday and Thursday (r = 0.987, p < 0.01), whereas the weakest correlation falls between the values on Monday and Tuesday (r = 0.553, p < 0.01).

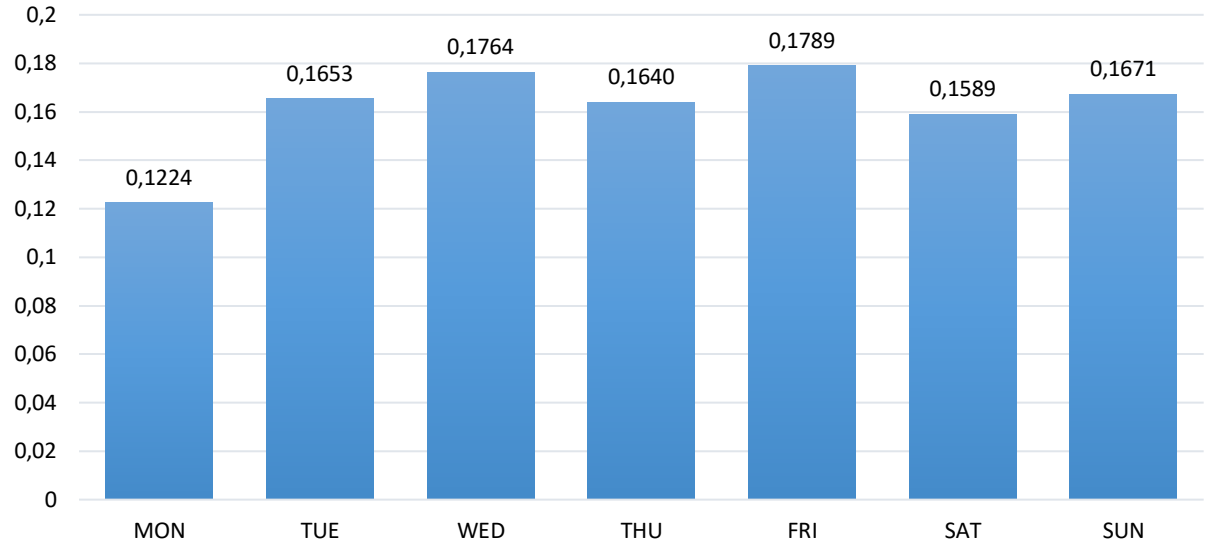
Table 2. Happiness values correlated by weekdays.

	MON	TUE	WED	THU	FRI	SAT	SUN
MON	1						
TUE	,573**	1					
WED	,553**	,973**	1				
THU	,592**	,980**	,987**	1			
FRI	,647**	,930**	,947**	,926**	1		
SAT	,739**	,772**	,766**	,786**	,843**	1	
SUN	,754**	,861**	,866**	,894**	,879**	,852**	1

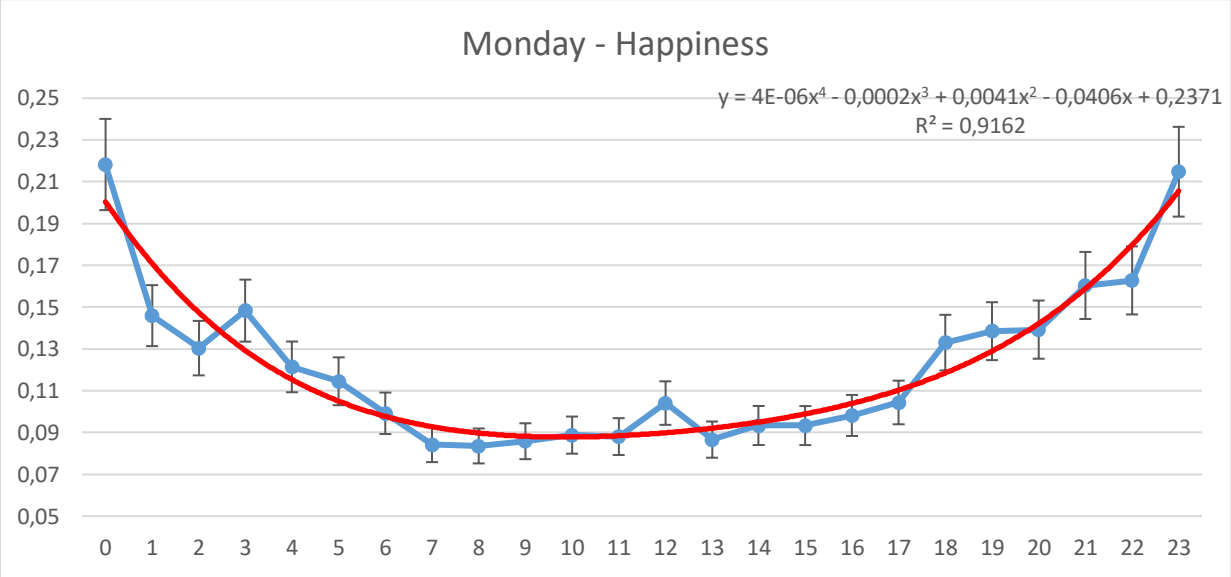
** Correlation is significant at the 0.01 level (2-tailed).

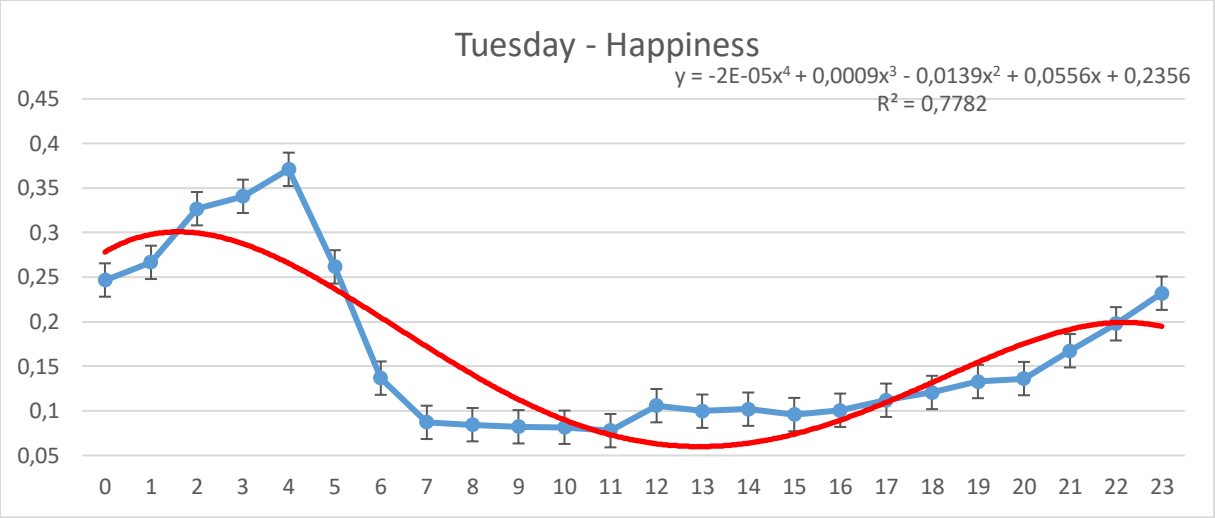
Average happiness values by weekdays appear in Figure 6a. The graphs of happiness per hour for each weekday appear in Figure 6b. It can be seen that the happiest day of the week is Saturday, and the least happy – Monday. This is in line with global practices. More than 29 million items of data on happiness were measured. The values of average happiness and their changes among passersby in Vilnius are taken and recorded every hour. Meanwhile happiness measurements are recorded every second. The accumulated values by weekdays are at a 95% confidence interval. The x axis shows each hour starting at 12:00 midnight, while the y axis shows 7 days of the averages of happiness values. The fluctuations of happiness measurements are between 0 and 1.

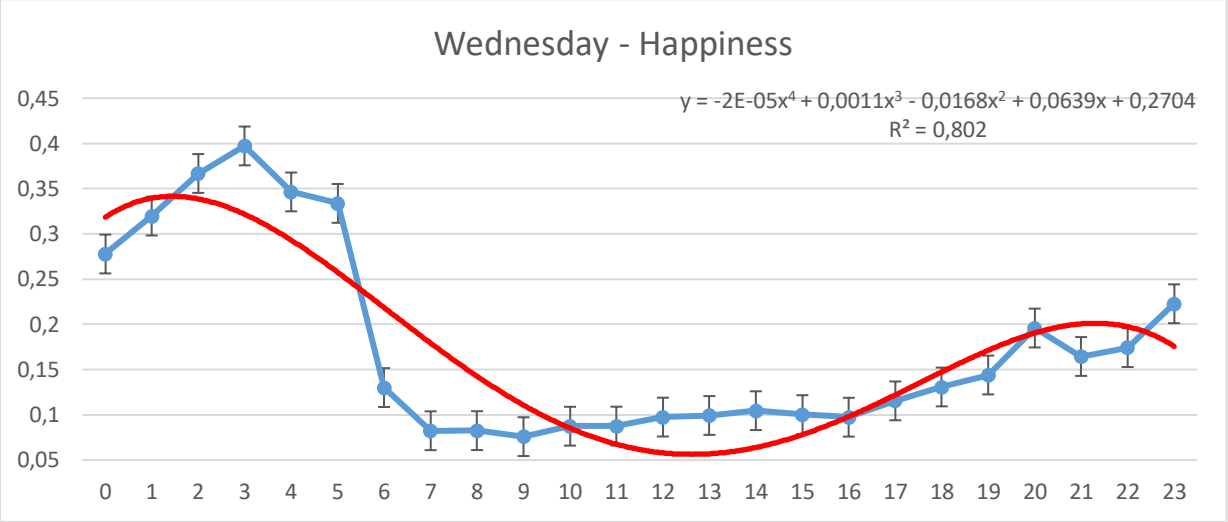
a)

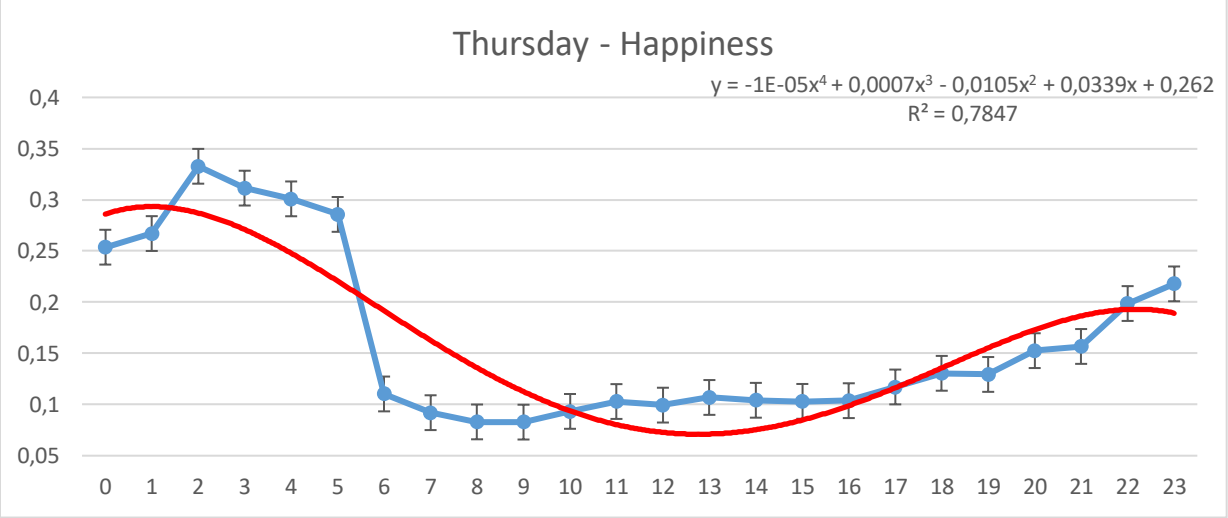

0,2
0,18
0,16
0,14
0,12
0,1
0,08
0,06
0,04
0,02
0
0,1224
0,1653
0,1764
0,1640
0,1789
0,1589
0,1671
MON
TUE
WED
THU
FRI
SAT
SUN

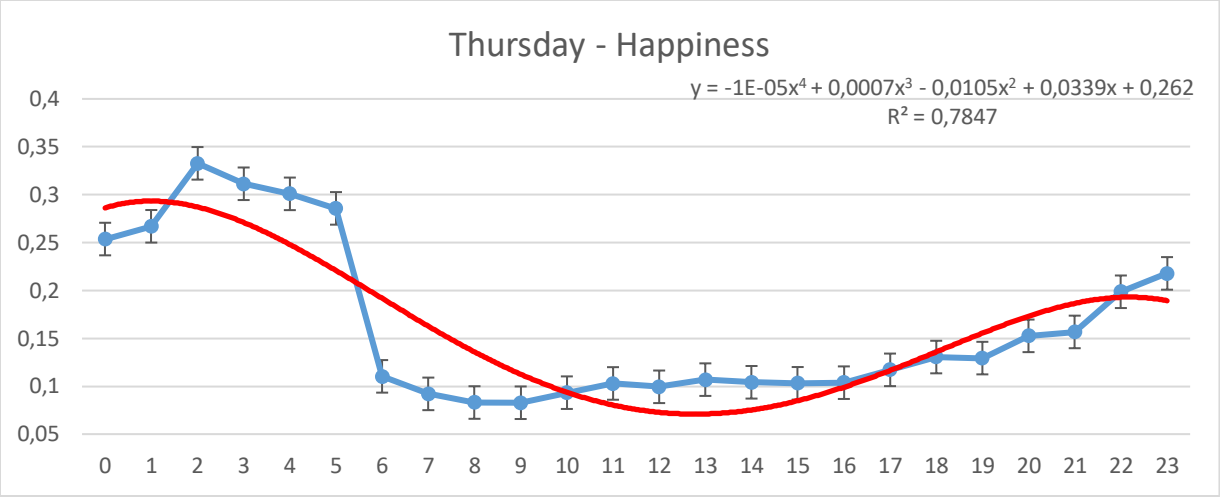
b)

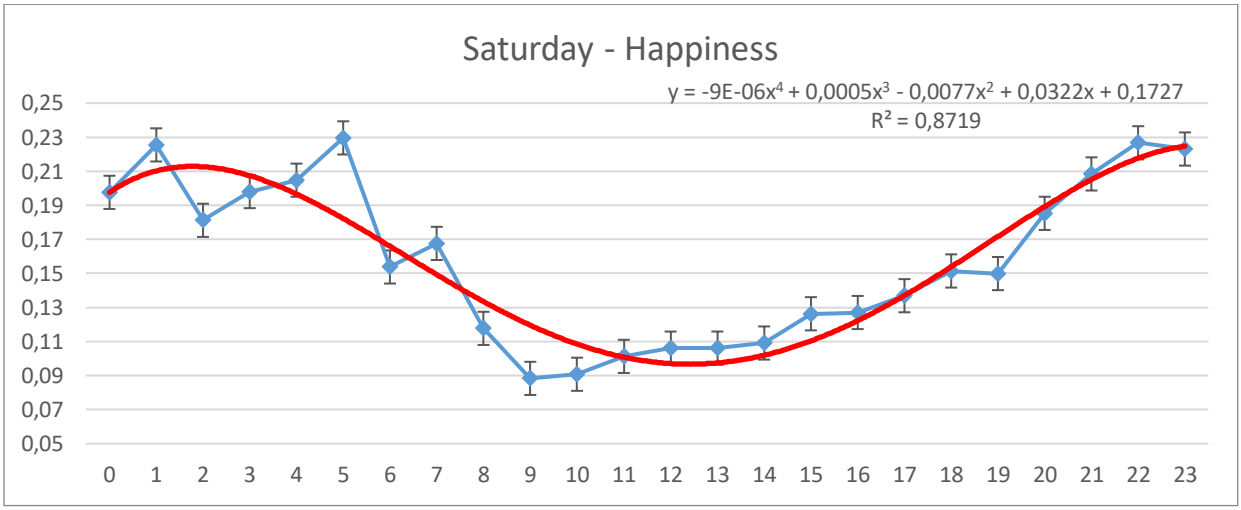

Monday - Happiness
y = 4E-06x⁴ - 0,0002x³ + 0,0041x² - 0,0406x + 0,2371
R² = 0,9162
0,25
0,23
0,21
0,19
0,17
0,15
0,13
0,11
0,09
0,07
0,05
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23

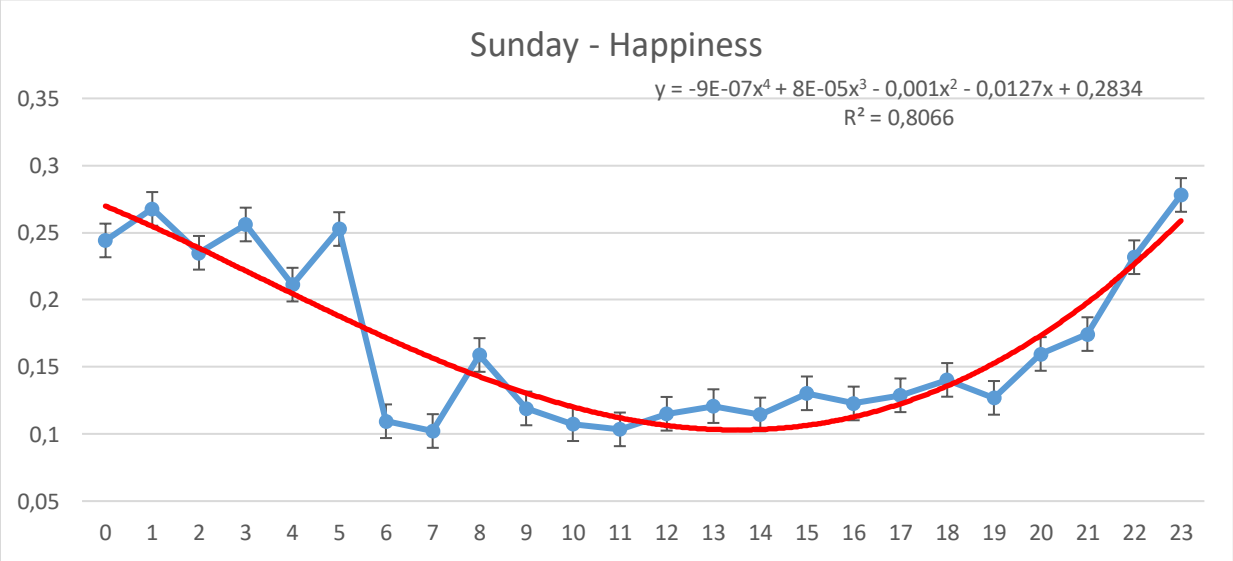

Tuesday - Happiness
y = -2E-05x⁴ + 0,0009x³ - 0,0139x² + 0,0556x + 0,2356
R² = 0,7782
0,45
0,4
0,35
0,3
0,25
0,2
0,15
0,1
0,05
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23


Wednesday - Happiness
y = -2E-05x⁴ + 0,0011x³ - 0,0168x² + 0,0639x + 0,2704
R² = 0,802
0,45
0,4
0,35
0,3
0,25
0,2
0,15
0,1
0,05
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23


Thursday - Happiness
y = -1E-05x⁴ + 0,0007x³ - 0,0105x² + 0,0339x + 0,262
R² = 0,7847
0,4
0,35
0,3
0,25
0,2
0,15
0,1
0,05
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23


Thursday - Happiness
y = -1E-05x⁴ + 0,0007x³ - 0,0105x² + 0,0339x + 0,262
R² = 0,7847
0,4
0,35
0,3
0,25
0,2
0,15
0,1
0,05
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23


Saturday - Happiness
y = -9E-06x⁴ + 0,0005x³ - 0,0077x² + 0,0322x + 0,1727
R² = 0,8719
0,25
0,23
0,21
0,19
0,17
0,15
0,13
0,11
0,09
0,07
0,05
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23


Sunday - Happiness
y = -9E-07x⁴ + 8E-05x³ - 0,001x² - 0,0127x + 0,2834
R² = 0,8066
0,35
0,3
0,25
0,2
0,15
0,1
0,05
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23

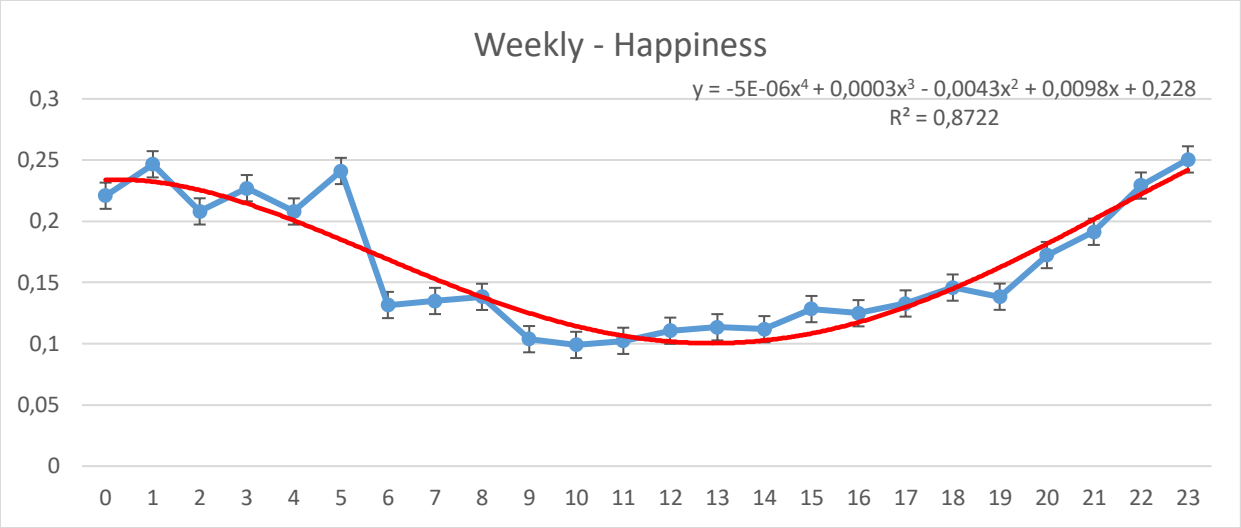


Figure 6. Diagrams of (a) average happiness values by weekdays and (b) happiness per hour for each weekday.

An analysis of happiness and arousal (see Figure 7) shows that the two parameters are linked by an average relationship. The values measured in Gedimino Avenue indicate an average dependency of 0.5282. In Figure 7, the left y-axis shows the aggregate daily happiness values (recorded between 23/01/2018 and 04/03/2018) and the right y-axis shows the aggregate daily arousal values; a total of 170,223 records were considered. It was established that growing happiness of a passer-by is accompanied by an increase in the passer-by's arousal. The same relationship was noted by foreign scientists (Minhad et al., 2017; Zimasa et al., 2017; Gilet and Jallais, 2011; Jefferies et al., 2008; Masmoudi et al., 2012). High intensity emotions are expressed by happiness or anger, as Minhad et al. (2017) explain. However, classification of these emotions is extremely difficult due to a high level in the arousal (activation) dimension. Zimasa et al. (2017) claim that „happy mood is considered to be a high-arousal physiological state".

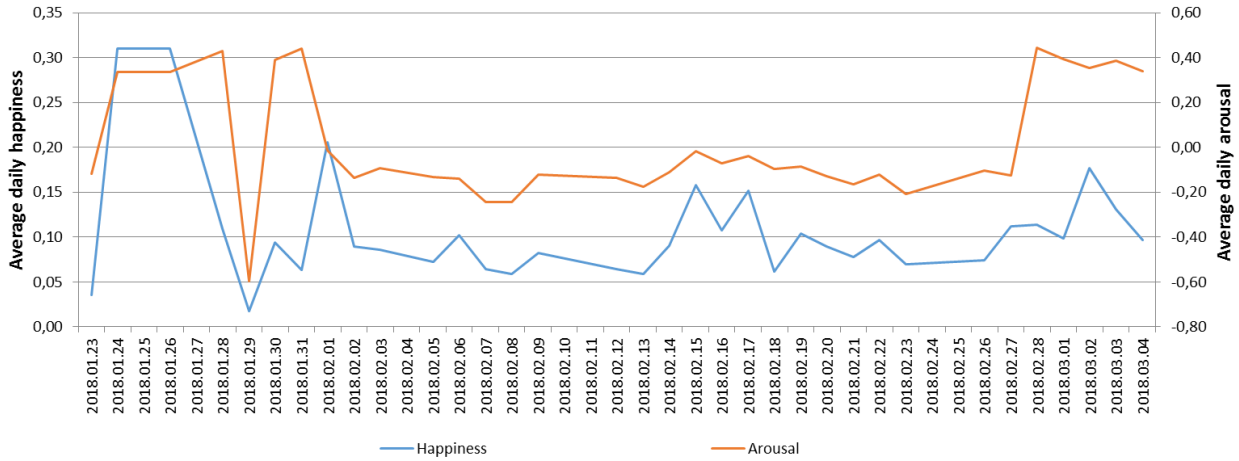


Figure 7. The dependency between average daily happiness and arousal (r=0.5282) based on the values measured in Gedimino Avenue.

Scientists argue that happiness and valence are also linked (Ma et al., 2016; Calvo and Beltrán, 2013; Stavrova and Luhmann, 2016; Wojcik et al., 2015). Upon seeing a happy virtual face, research participants in a study by Ma et al. (2016) would mimic the expressed emotion. The verification of this included their higher valence scores as well as their improved mood-sensitive, divergent-thinking, task performances. Calvo and Beltrán (2013) claim that happy expressions cause positive valence. The measurements in Pilies Street indicate the same trend. Our analysis of the aggregate data for the period between November and February (Figure 8; a total of 395,157 records were considered) shows an average relationship between happiness and valence (r=0.62). It can be argued that as the sense of happiness is growing or diminishing, so is the valence.

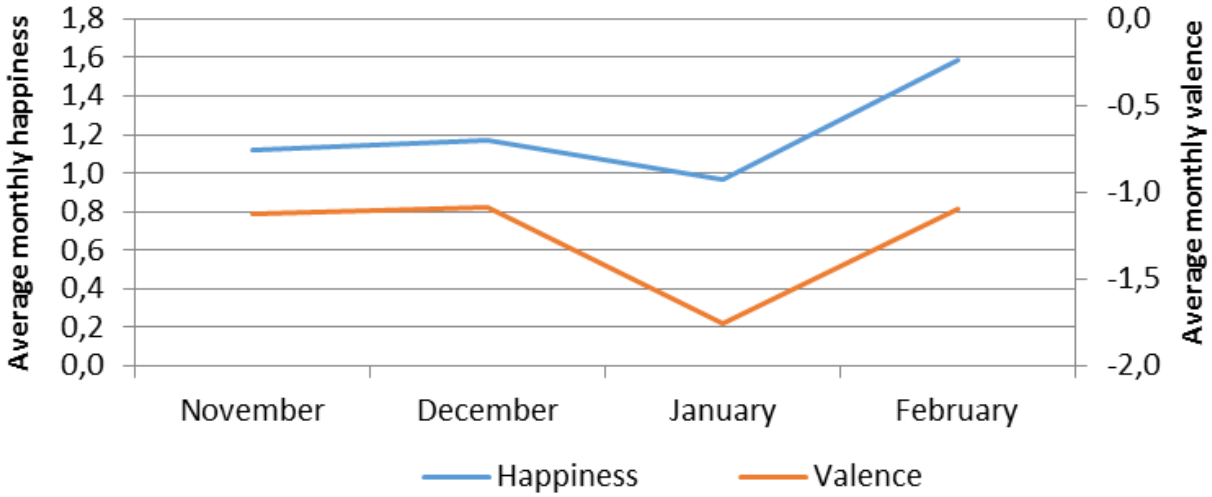


Figure 8. A comparison of average monthly happiness and valence values measured between November and February in Pilies Street (r=0.62).

Weather is another important aspect that contributes to variations in human physiological and biometric parameters. This dependence was examined by many foreign scientists (Sharp, 2011; Spasova, 2011; Tsutsui, 2013). Differing weather conditions prompted emotional state changes, which also resulted in positive or negative characteristics for the human organism, as Spasova (2011) proclaimed. Pertinent to this, Klimstra et al. (2011) studied correlations between happiness, anxiety, and anger, the three indicators of mood, and temperature, sunshine and precipitation, the three weather possibilities. These scholars established significant correlations between these variables, in most cases. Sharp (2011) argues that wind is also a factor contributing to changes in human emotions. A wind speed increase of over 12 miles/hour makes the person feel physical discomfort. Our physiological and biometric measurements in Gedimino Avenue and Pilies Street also show a dependency between emotions and weather. Figure 9 presents the aggregate arousal and outdoor temperature values measured in Pilies Street between 21/12/2017 and 20/02/2018. An average correlation was determined between arousal and outdoor temperatures (0.4831). The results suggest that outdoor temperature is one of the

factors contributing to changes in arousal. The same trend is noticeable when we look at the effect of the wind on human emotions and moods. Figure 10 shows that the stronger the wind, the higher the arousal, with a correlation of 0.5035.

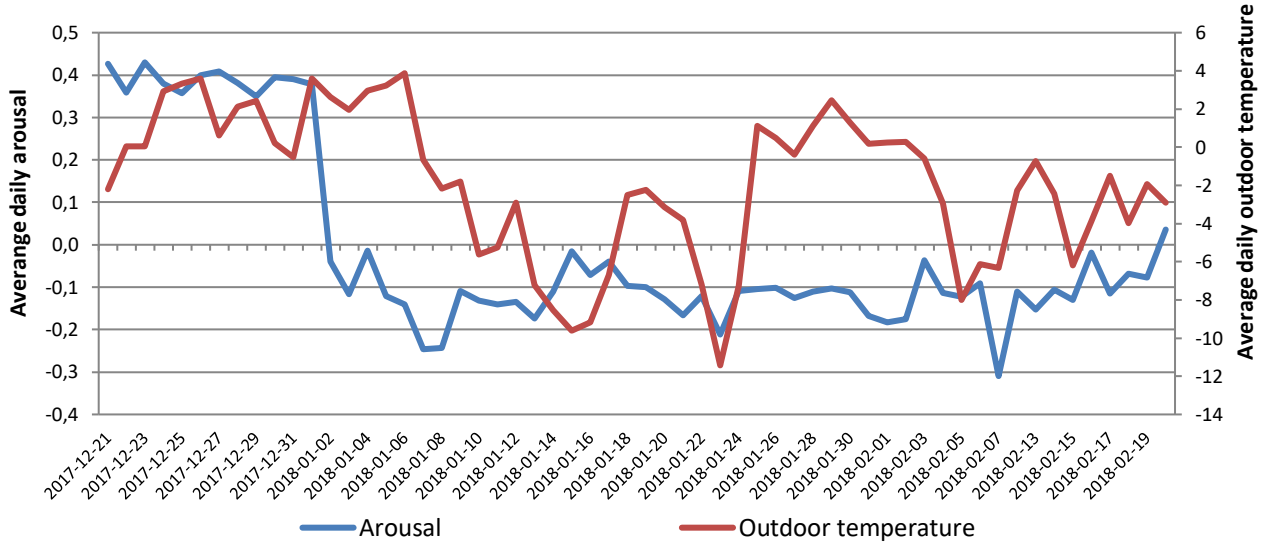


Figure 9. The dependency between average daily arousal and outdoor temperatures (r=0.4831) based on the values measured in Pilies Street.

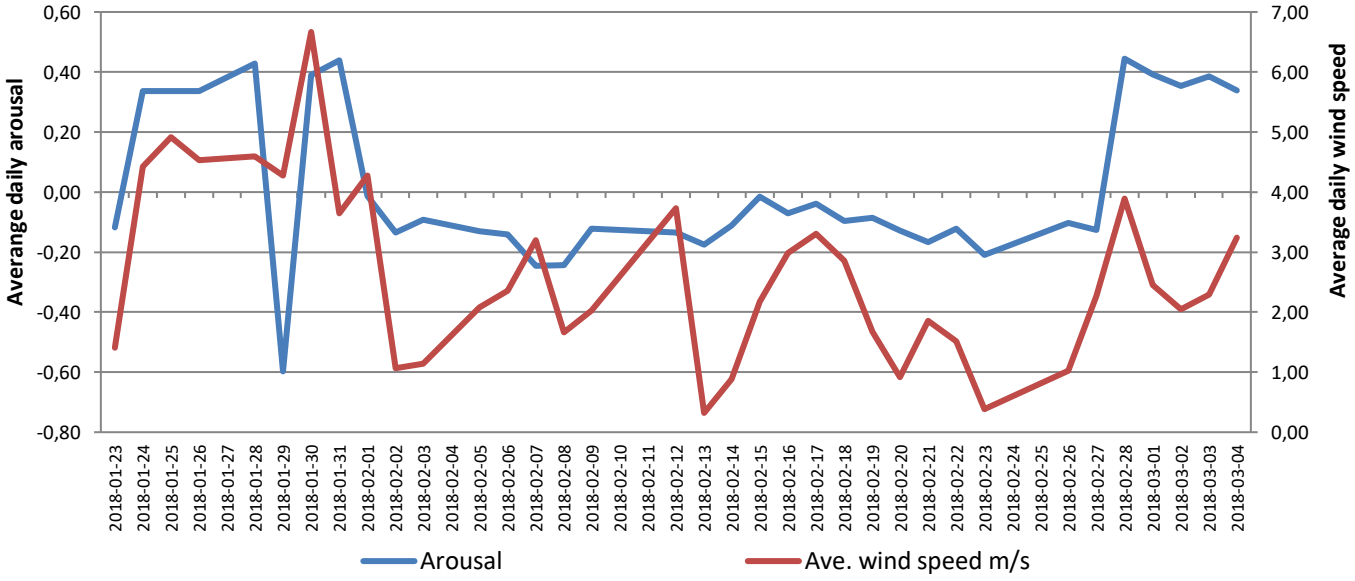


Figure 10. The dependency between average daily arousal and wind speeds (r=0.5035) based on the values measured in Gedimino Avenue.

Figure 11 shows the happiness values per day recorded between 15/12/2017 and 01/01/2018 with happiness peaking on 24 December 2017 (Christmas Eve) and on 31 December

2017 (New Year's Eve). The holiday season also produced higher respiratory rates (see Figure 12). The values measured in Pilies Street between November and February presented in Figure 12 show higher respiratory rates on December 24–26 and December 31 and throughout the month of December.

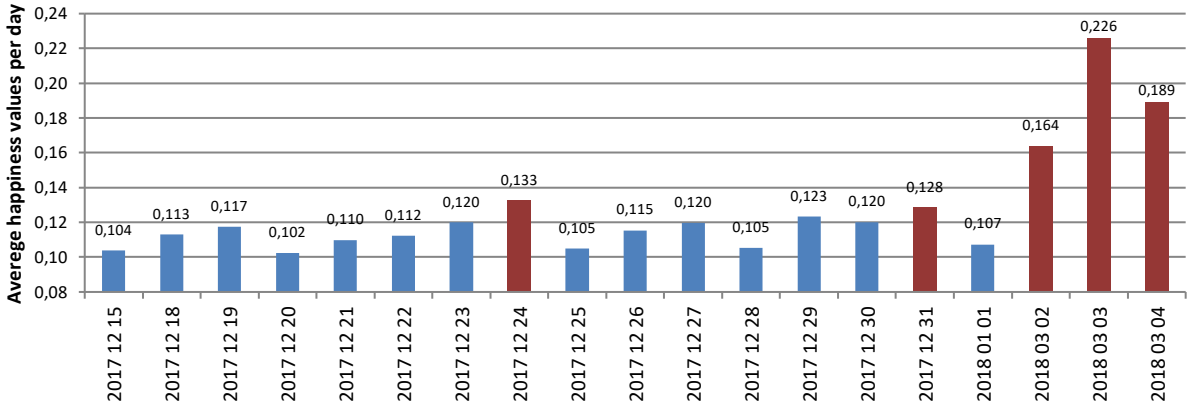


Figure 11. The changes in happiness per day between 15/12/2017 and 01/01/2018. Compared to the months analysed, residents were happier during the St. Casimir's Fair.

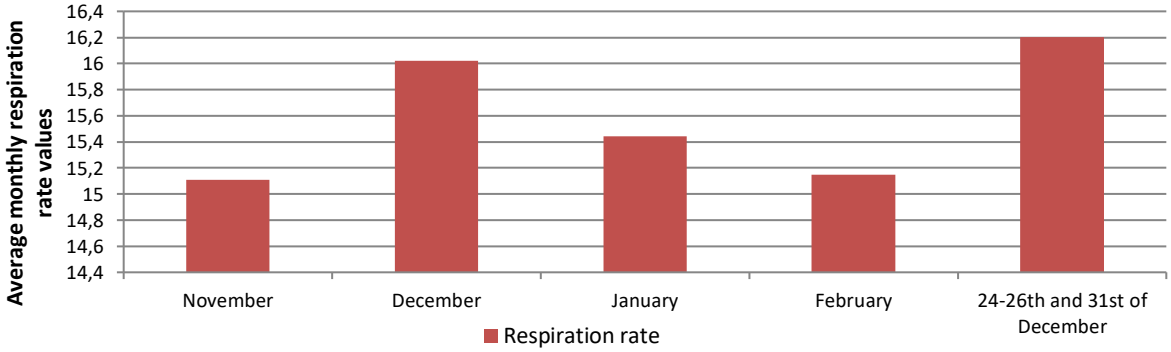


Figure 12. The average monthly values measured in Pilies Street between November 2017 and February 2018 show higher respiratory rates on December 24–26 and December 31 and throughout the month of December.

Gomez and Danuser (2007) have stated that the heart rate (HR) and the respiratory rate increased, as did the subjective arousal. Other scientists examined this relationship as well (Briefer et al., 2015; Gomez et al., 2016; Vlemincx et al., 2013). The same trend has been determined after comparing the aggregate values measured in Vilnius among 2017.12 and 2018.02. Figure 13 compares the results for the arousal (a), heart rate (b) and respiratory rate (c). It has been determined that the average arousal, heart rate and respiratory rate between December and February were higher in Gedimino Avenue than in Pilies Street. A comparison of the January data, for instance, shows the arousal higher by 11.9%, the heart rate higher by 1.2% and the respiratory rate higher by 7.31%. It can be argued then that Gedimino Avenue triggers stronger emotions in passers-by than Pilies Street and therefore their arousal (a), heart rate (b) and respiratory rate (c) are higher (see Figure 13).

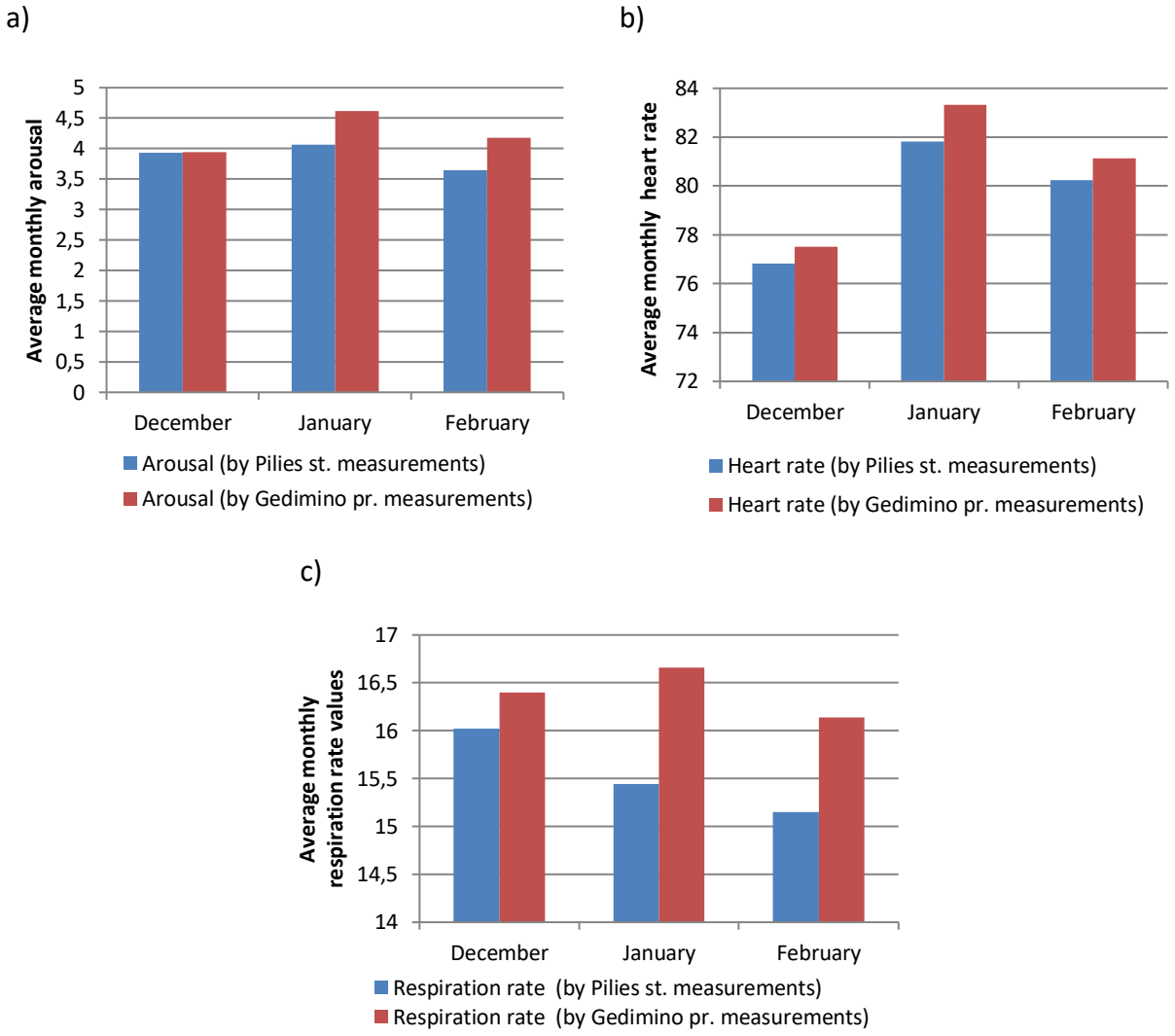


Figure 13. A comparison of the average monthly arousal (a), heart (b) and breathing rates (c).

Azarbarzin et al. (2014) argue that there is a strong correlation between arousal scale and heart rate within inhabitants. Other scientists have also determined a relationship between the parameters (Pfaff, 2005; Schmidt, 1984; Gomez and Danuser, 2007; Kuo et al., 2015). If we compare the heart rate and arousal looking at the days of the week (Figure 14), at the beginning of the week (Monday and Tuesday) the heart rate and arousal are the lowest, but by Tuesday the parameters start increasing. Rossi and Rossi (1977) established that positive moods were higher on Friday through Sunday and that negative moods lesser on Saturday and Sunday. This research gives encourage for a weekend effect. Also, McFarlane et al. (1988) detected support for a weekend effect in mood, measured in terms of both valence and arousal among college students. Both mood valence and arousal were highest on Fridays and Saturdays, followed closely by Sundays (McFarlane et al., 1988). We need further studies of the heart rate and arousal, however, to determine how average heart rates and arousal change depending on the day of the week.

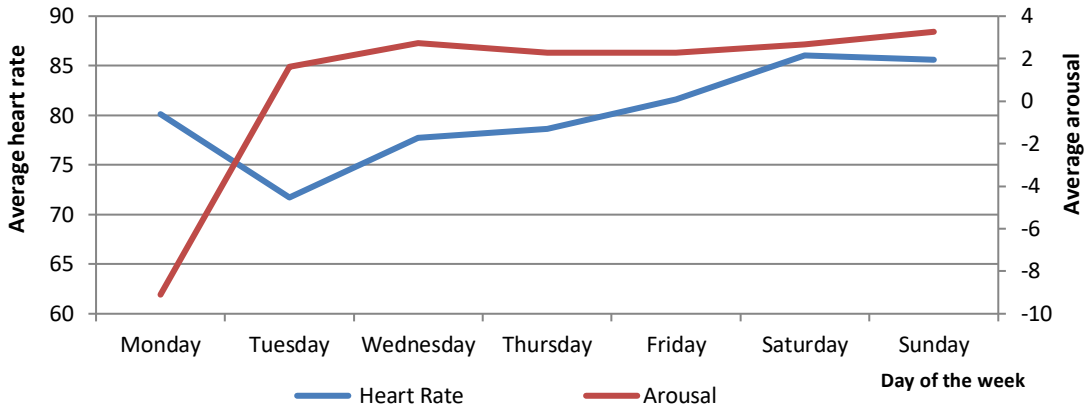


Figure 14. The average weekly heart rate and arousal compared looking at the days of the week (as measured in Gedimino Avenue).

5.2. Multiple Criteria Analysis of Heritage Buildings by Applying the Simulators Database

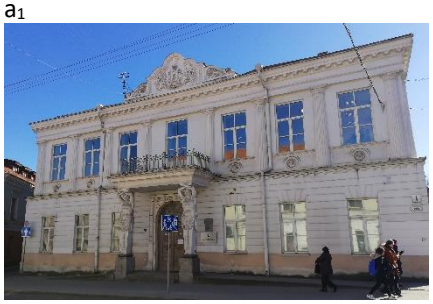
5.2.1. Applications of the INVAR Method for Establishing the Degrees of Priority and Utility of Cultural Heritage Buildings

A multiple criteria assessment for sustainable alternatives is enacted by employing the INVAR Method (Degree of Project Utility and Investment Value Assessments along with Recommendation Provisions) for a multiple criteria decision analysis (MCDA) developed by Kaklauskas (2016). Additional features of the INVAR Method include assistance for setting some considered project's investment, hedonic, customer perceived, integrated, hedonic-market, and hedonic-investment values as well as submissions of digital recommendations for improving projects. Another feature of the INVAR Method is the optimization of some criterion selected for the improvement of a considered project, which would make the project equally competitive with other projects on the market. The value of a considered project can be set by the INVAR Method (Kaklauskas 2016) that would make it the best among other considered projects.

Experts in the field performed a multicriteria assessment of the Juozapas Tiškevičius Palace (a_1), Vilnius Basilian Monastery (a_2) and The Abramavičiai Palace (a_3) (see Table 3).

Table 3. The decision matrix for assessment and the results of multiple criteria evaluation of the cultural heritage objects.

a_1



a_2

a_3

Quantitative and qualitative information pertinent to alternatives						
	*	Measuring units	Weight	Juozapas Tiškevičius Palace (a_1)	Vilnius Basilian Monastery (a_2)	Abramavičiai Palace (a_3)
Average market value	-	Eur.	0,42	1343000	4581000	1644000
Construction period	+	Century	0,08	16	16	18
Land plot area	+	Ha	0,06	0,69	2,0852	0,19
Total building area	+	m^2	0,11	2376,92	7565,81	2623,1
Number of floors of the building	+	Number	0,03	2	3	3
Value and quality of refurbishment	-	Points	0,04	3,3	8,2	2,8
Value and quality of walls	+	Points	0,05	7,3	8,1	7,7
Value and quality of roof	+	Points	0,03	6,8	7,5	7,1
Quality of engineering communications	+	Points	0,02	8,1	7,8	9,3
Status	+	Points	0,01	8,4	8,7	7,9
Significance level (national/regional)	+	Points	0,02	6,9	8,5	5,9
Architectural style	+	Points	0,02	9,4	8,9	7,1
Archaeological significance	+	Points	0,01	6,3	5,1	6,9
Architectural significance	+	Points	0,01	7,6	9,5	7,8
Historical significance	+	Points	0,01	5,6	8,2	8,6
Art significance	+	Points	0,01	7,7	9,4	4,8

Physical condition of the building	+	Points	0,03	8,4	7,9	5,3
Sums of weighted, normalized, maximizing alternative indices (project "pluses")				0,1411	0,2235	0,1355
Sums of weighted, normalized, maximizing alternative indices (project "minuses")				0,0837	0,2771	0,099
Significance of the alternative				0,3552	0,2882	0,3165
Priority of the alternative				**1**	3	2
Utility degree of the alternative N_j (%)				100%	81,13%	89,11%

*- The sign + (-) indicates that a greater (lesser) criterion value corresponds to a greater (lesser) significance for stakeholders

Juozapas Tiškevičius Palace (a_1) is a building located in the Old Town of Vilnius. A masonry structure was already standing on the plot back in the 15th century, and a few of its extant fragments are part of the current building. At the end of the 18th century the site and its buildings were bought by the Tiškevičiai. A mid-19th century addition to the façade was a doorway designed by the architect Nikolay Chagin with a balcony supported by atlantes hinting at the Empire style. The palace was a venue for musical performances and hosted part of Eustachijus Tiškevičius' famous collections of antiquities, including archaeological artefacts, artworks and other valuable items. Today Juozapas Tiškevičius Palace hosts the Faculty of Architecture of Vilnius Gediminas Technical University (Kultūros vertybių registras, 2018a).

Vilnius Basilian Monastery (a_2) stands atop the Holy Trinity Hill, known as a place where Lithuania's three first Christian martyrs Jonas, Antonijus and Eustachijus lost their lives. The architecturally unified group of buildings comprising the monastery and the church started taking shape in 1514. Later Vilnius Basilian Monastery became a hub of the Uniate Church and the Basilian Province of the Holy Trinity established in 1617. In 1869 the buildings, then owned by an Orthodox seminary, were reconstructed. Part of the monastery is now occupied by Basilian monks, who established Vilnius Residence of the Holy Trinity, part of the Ukrainian Basilian Province. Another, larger, part of the monastery hosts the ISM and a hotel (Kultūros vertybių registras, 2018b).

The Abramavičiai Palace (a_3) is a building located in Rotušė Square, the Old Town of Vilnius. The palace comprises wings of various sizes surrounding a rectangular courtyard with two access lanes. The West Wing abutting Didžioji Street shows characteristics of early classicism. Now the building hosts Vilnius Juozas Tallat-Kelpša Conservatoire (Kultūros vertybių registras, 2018c).

The State Enterprise the Centre of Registers has applied mass valuation to establish the average market values of Buildings a_1, a_2 and a_3 categorised as educational (administrative) buildings. At €4,581,000, the average market value of Building a_2 captures its economic value, but not its cultural significance as heritage.

After reconstruction cultural heritage buildings increase in value and last longer. Their adequate maintenance is, therefore, very important, as is important their repurposing, if required, and reconstruction efforts that preserve their high-value characteristics. Buildings a_1 and a_3 were reconstructed several centuries ago, but not in our times. Building a_2, however, was

reconstructed ten years ago. Considering this fact the experts assigned 8.2 points for this criterion to the building—the top score.

The centuries-old buildings located in the Old Town of Vilnius were mostly constructed with plastered brick walls that are 70 centimetres thick or more. Of Old Town's ancient wooden buildings almost none survived. The same building also has the thickest walls, for which the experts assigned 8.1 points to the building, again the top score.

Most cultural heritage buildings have pitched roofs constructed from wooden rafters covered with (red) ceramic tiles. Another important roof element of such buildings is, of course, brick chimneys. The highest-value roof belongs to Building a_2 as well, and the experts have recognised this fact by giving it 7.5 points.

All cultural heritage buildings analysed in this research have modern building services installed such as electricity, water supply, sanitation and heating, and one of them even has gas supply. Building a_3, however, has gas supply installed and thus received the top score.

The criterion "status" means that the building is listed in the Register of Cultural Heritage, is recognised by the Government as a cultural property and is protected by the state. A protected property can be of regional or national significance. Protected buildings a_1 and a_3 are of regional significance; the significance of Building a_2 is national, hence the expert score assigned to it was the highest at 8.5 points.

Vilnius is one of the largest urban complexes in Eastern Europe. The city emerged in the Middle Ages and thus is home to a range of architectural styles—you can come across authentic gothic, renaissance, baroque, classical, modernist buildings and structures (churches, homes, monuments, museums). Because of the fact that in 1600s and 1700s most of its architectural properties assumed some features of the baroque style, Vilnius is sometimes called "a Baroque city". Buildings a_1 and a_2 analysed in this research are considered to represent early and late classicism, and Building a_3 represents only late classicism. At 9.4 points, Building a_1 received the highest score from the experts.

MCDA of the heritage buildings under analysis was done with the help of the Simulators Database. Table 3 presents these results. Upon completing the estimation, a list in order of priorities was set: $Q_2 < Q_3 < Q_1$. The Juozapas Tiškevičius Palace (a_1) achieved an assessment of first position (N_1 – 100%) in comparison with the other two heritage buildings. The Abramavičiai Palace (a_3) took second position (N_3– 89,11%), and the Vilnius Basilian Monastery (a_2) took third position (N_2– 18,87 %, less than that of the Juozapas Tiškevičius Palace.

5.2.2. Digital Recommendation Provision

Digital recommendations were being delivered with the help of the Simulators Database and INVAR techniques (Kaklauskas, 2016) about how to increase the effectiveness of the heritage buildings under analysis. One example could be analyzing the criteria "Physical condition of the building" (see Table 4). The Juozapas Tiškevičius Palace (a_1) was assessed as the optimum in terms of the criteria "Physical condition of the building" ($x_{17\,1}$=8.4) criteria based on the data from Table 3. The physical condition of the Abramavičiai Palace (a_3, $x_{17\,3}$=5.3) should be increased by 58,49 % by applying various renovation means when endeavoring to have the physical condition of the

Juozapas Tiškevičius Palace (a_1, $x_{17\,1}$=8.4). In such an instance, the integrated assessment for the Abramavičiai Palace (a_3) would increase by 1,8278% in the overall assessment (see Table 4).

Table 4. A fragment of digital recommendations matrix.

Quantitative and qualitative information pertinent to alternatives						
Criteria describing the alternatives	*	Measuring units	Weight	Compared alternatives Possible improvement of the analysed criterion by % Possible market value growth of alternatives by % as first impacted by criterion value growth		
				Juozapas Tiškevičius Palace	Vilnius Basilian Monastery	Abramavičiai Palace
...						
Physical condition of the building	+	Points	0.03	8.4 (0%) (0%)	7.9 (6.33%) (0.1978%)	5.3 (58.49%) (1.8278%)

5.2.3. Optimization of the Value

We also analyzed the Average market value. The aim was to determine, what the value $x_{1\,3\,cycle\,e}$ of the average market value must be for Abramavičiai Palace (a_3) to be equally competitive on the market, as collated to the other cultural heritage objects under juxtaposition (a_1 and a_2) by a set valuation of all their pluses and minuses. The new INVAR Method gave the possibility to optimize any one of the criteria or their composite parts. The optimization of the score of the average market value, which appears next, will assist as an example (Table 5). The setting of the optimized value $x_{1\,3\,cycle\,e}$ for the average market value under estimation a_3 presented in Table 5. Table 5 demonstrates that Inequality was insufficient for the first 54 cycles. The value x_{13} was decreased in each cycle (since $x_{13\ cycle\ 0}$ = 1644000) by an amount of 1000 till Inequality was sufficient ($x_{1\,3\,cycle\,56}$ = 1588000). In this case, we optimized the average market value and set how much to reduce the value of the Abramavičiai Palace, to make it equally competitive in the market with the other heritage buildings under juxtaposition.

Table 5. What score $x_{1\,3\,cycle\,e}$ should be for Abramavičiai Palace (a_3) to be equally competitive in the market with other heritage buildings under juxtaposition (a_1 and a_2)?

Approximation cycles	Average market value, $x_{1\,3\,cycle\,e}$	Utility degree N_{3e}	Utility degree N_{1e}	Utility degree N_{2e}	*	**
0	1644000	89,11%	100%	81,13%	90,08%	|-0,97| >0,01 %
...	...	...	...	...	...	...
44	1600000	90,44%	100%	81,44%	90,63%	|-0,19| >0,01 %
...	...	...	...	...	...	...
54	1590000	90,72%	100%	81,50%	90,74%	|-0,02| >0,01 %
...	...	...	...	...	...	...
56	1588000	90,77%	100%	81,52%	90,76%	0,01 = 0,01 %

* $(N_{1e} + N_{2e} + N_{3e}) \div 3$

**Inequality to determine, whether the calculation of revised value $x_{1\,3\,cycle\,e}$ of under valuation a_3 is sufficiently accurate.

5.2.4. Hypothetical Calculation of Average Market Value for the Vilnius Basilian Monastery Building

Market, investment, customer-perceived, hedonic, emotional, synergistic, and fair values stakeholders can calculate with the INVAR method. As an example, we will calculate a hypothetical average market value ($x_{1\ 2\ cycle\ e}$) for the Vilnius Basilian Monastery (a_2). This value had to let this heritage building to go up one position upper in its overall valuation, i.e., from third to second place in comparison to the other two heritage buildings (a_1 and a_3), while considering all the indicators under analysis. The calculations carried out show in Table 6.

Table 6. Hypothetical calculation of the average market value for the Vilnius Basilian Monastery.

Approximation cycles	Average market value, $x_{1\ 2\ cycle\ e}$	Vilnius Basilian Monastery (a_2), Utility degree (N_{2e})	Rank
0	4581000	81,13%	3
…	…	…	…
281	4300000	82,43%	3
…	…	…	…
1081	3500000	87,21%	3
…	…	…	…
1381	3200000	89,54%	2

The average market value for the Vilnius Basilian Monastery building was 4,581,000 euro ($x_{1\ 2\ cycle\ 0}$) based on expert valuations (see Tables 3 and 6). The Vilnius Basilian Monastery took third place in the overall valuation of the heritage buildings under analysis (a_1 and a_3). Table 6 shows that the Vilnius Basilian Monastery building stayed on in third place, even after 1081 approximation cycles. However, with a reduction in the average market value by 1,43 times (up to $x_{1\ 2\ cycle\ 1381}$=3,200,000 euro), the utility degree (N_{4e}) for the Vilnius Basilian Monastery comprises 89.54%. Now this heritage building rises to second from third place.

6. SOCIO-POLITICAL AND CULTURAL CONTEXT

6.1. Vilnius, Lithuania

COVID-19 cases have increased significantly in Lithuania. At the beginning of December, Lithuania is one of the first countries in Europe in terms of COVID-19.

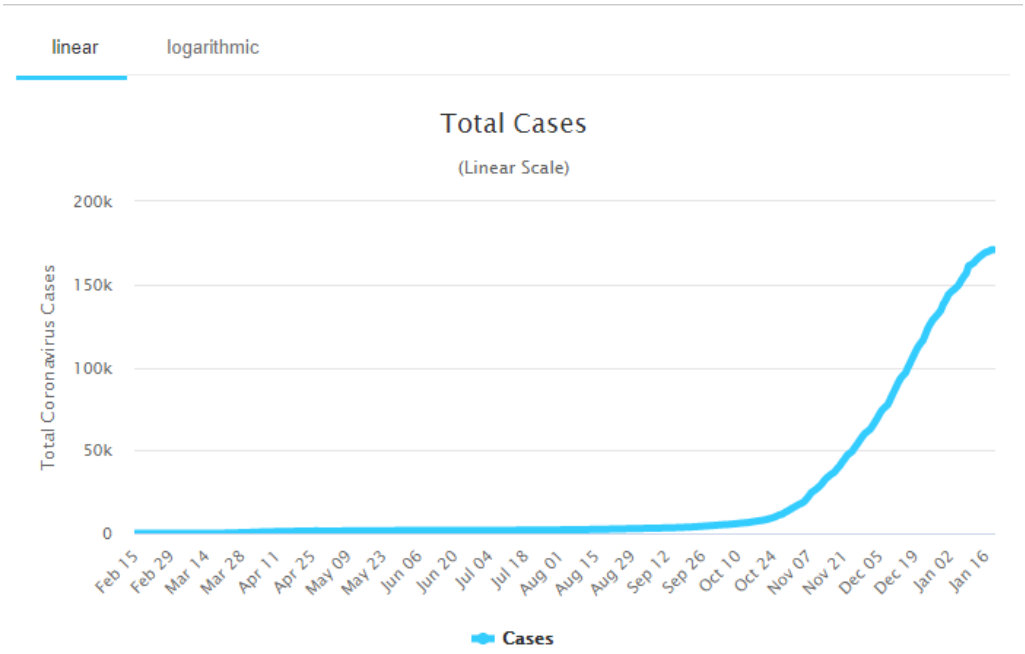


Figure 15. Total coronavirus cases in Lithuania (Worldmeter, 2021)

Lithuania tightened lockdown from December 16, 2020. The majority of shops, with the exception of those selling food, was closed in Lithuania. People are allowed to leave their homes only for serious reasons but families will be allowed to go for walks in open spaces within their municipality, without meeting with other people.

The Government of the Republic of Lithuania has created an official source of published information on the situation of Covid - 19 in Lithuania, which also publishes information and recommendations for the educational community (https://koronastop.lrv.lt/).

6.2. Sofia, Bulgaria

COVID- 19 cases have increased significantly in Bulgaria (fig. 16).

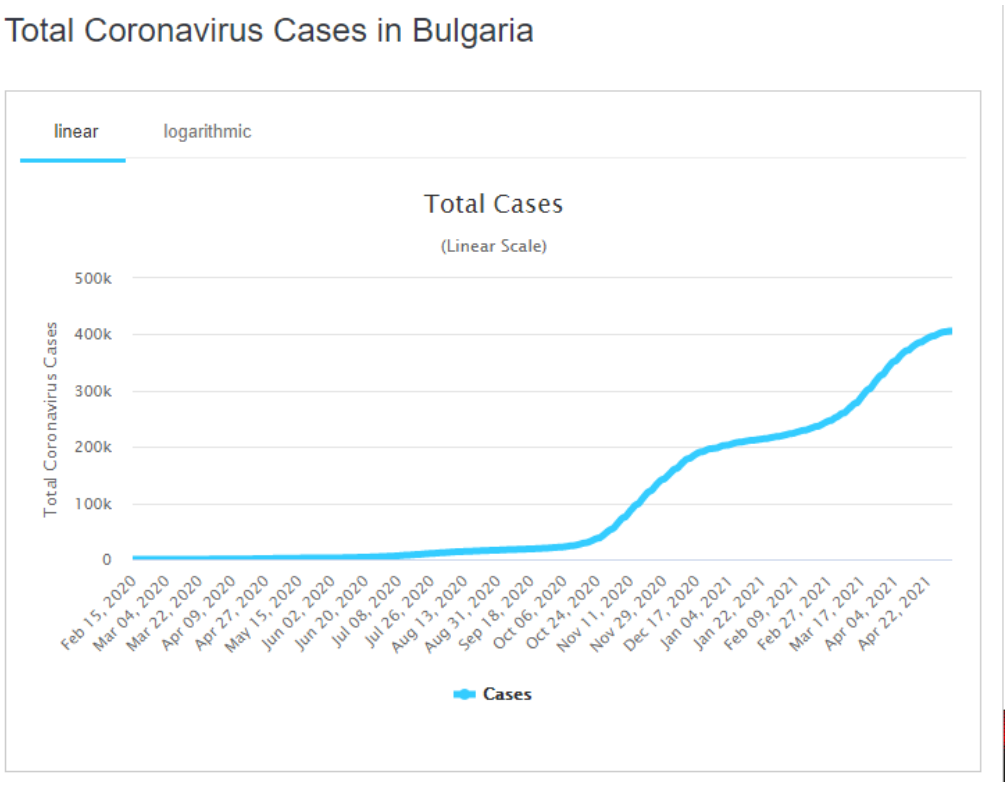


Figure 16. Total coronavirus cases in Bulgaria (Worldmeter, 2021)

It was decided, on an extraordinary government meeting (26.01.2021), the emergency epidemic situation to be extended to April 30, 2021. The Government of the Republic of Bulgaria has created an official website for information on Covid-19 situation in Bulgaria: https://coronavirus.bg

The COVID-19 pandemic constitutes the largest global public health crisis in a century, with daunting health and socioeconomic challenges. Trying to control the pandemic, EU governments have put in place a series of restrictive measures, including 'social distancing', school closures and then effective lockdown. Young people are already among the most affected by the socioeconomic impacts of the coronavirus response, according to the survey conducted in April 2020 by Eurofound among 85,000 citizens across all EU countries. The results show how young people in Europe are struggling to respond to the crisis, reporting poorer mental wellbeing and greater loneliness than other age groups – coupled with job loss and a dramatic decrease in working time and overall insecurity about their professional and financial future. Young people, especially socioeconomically disadvantaged ones are more likely to suffer from infection control measures and to be hit particularly hard by the economic ramifications of COVID-19.

For young people, the COVID-19 crisis poses considerable risks in the fields of education, employment, mental health and disposable income.

According to Eurostat, in May 2020, a third month marked by COVID-19 containment measures in most Member States, some 2.815 million young persons (under 25) were unemployed in the EU, of whom 2.267 million were in the euro area.

The survey also found that some 15% of the respondents aged 18-34 reported feeling downhearted or depressed most of the time, 20% reported feeling lonely, and 21% reported

feeling particularly tense. The survey indicates that more than half (53%) were at-risk of depression.

6.3 Tallin, Estonia

According to Worldmeter (2021), total coronavirus cases in Estonia are 52 827, deaths - 501, recovered - 41 461 as of the date of 15.02.2021. Estonian Government has set a target to hold down the number of infection cases to 500 per day. Figures 17 and 18 show the linear trajectory for Estonian coronavirus cases.

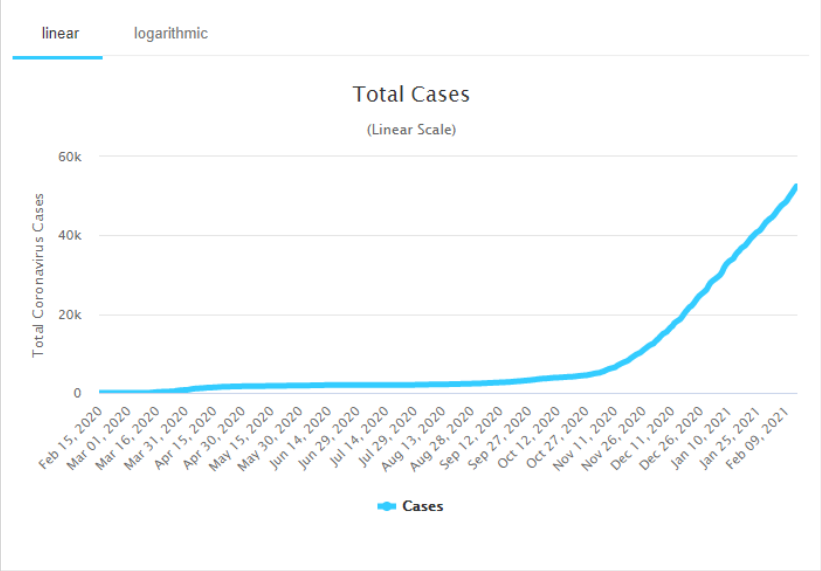


Figure 17. Total coronavirus cases in Estonia (Worldmeter, 2021) as of the date of 15.02.2021

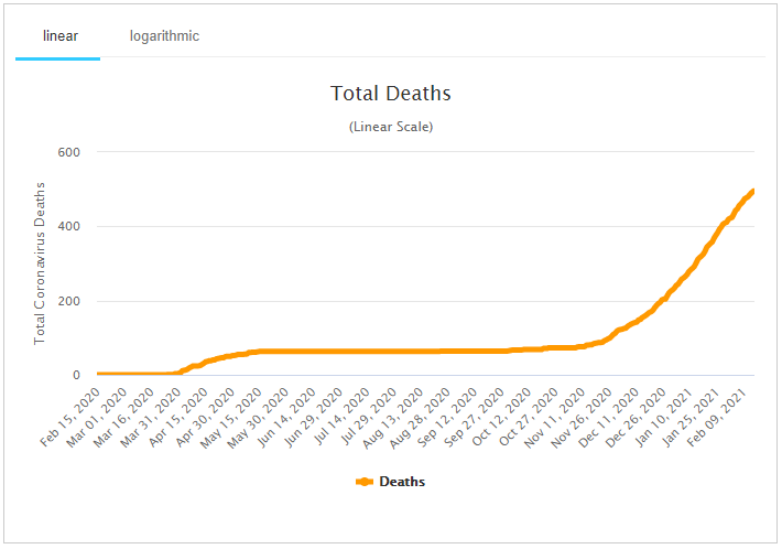


Figure 18. Total coronavirus deaths in Estonia (Worldmeter, 2021) as of the date of 15.02.2021

The first lockdown and the beginning of distance learning for educational institutions (hobby clubs, kindergartens, schools, universities) is dated 16th of March, 2020. As of 25th January 2021,

contact learning has been permitted on all levels on educational institutions. We have now faced a year of rapid disruption of the way we live, learn and work.

Estonian Government has initiated a separate web-portal https://www.kriis.ee/ (available in Estonian, English and Russian languages) to collect and disseminate updated information concerning COVID-19 spreading situation and restrictions that apply locally.

HOIA mobile app

It was decided that additional help is needed with tracing the infected contacts and the Health Board has a team tasked with calling everyone infected with the coronavirus, finding out with whom they were in close contact and in turn informing those close contacts about a possible infection. This work is very important to limit the transmission of the infection, but it has certain natural shortcomings. Not every infected person may be able to remember all the people they were in close contact with: some people tend to forget and some cannot easily identify them. For example, most people do not know who they were sitting next to on a bus. Therefore, HOIA (https://hoia.me/) creates significant added value to the work of the Health Board, as it can also identify those close contacts that the infected person does not know or remember.

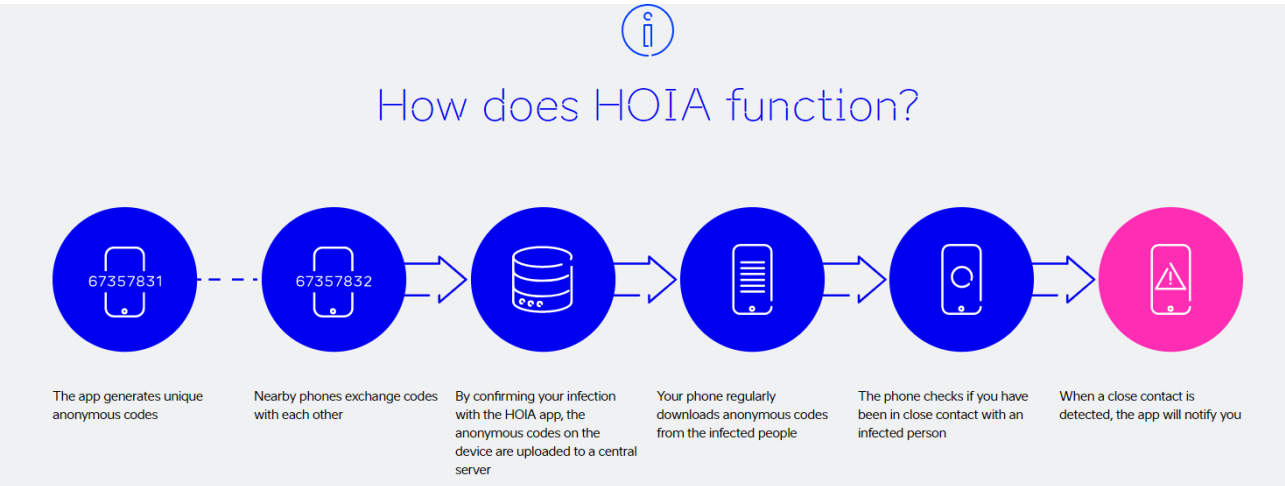


Figure 19. HOIA mobile app functioning scheme (https://hoia.me/)

Viruses such as COVID-19 can spread before symptoms occur, therefore, an infected person may spread the disease without the knowledge of themselves and others. This means that by the time the symptoms appear, the virus may have already spread to others, and it is not enough for symptomatic people to stay at home to stop the virus from spreading. Through the HOIA app, an infected person can quickly inform all people with whom they have been in close contact during the infectious period. In this way, the app users can find out about a possible infection early on and take steps to protect themselves and the health of others. By using the HOIA app, you contribute to reducing the number of infections in Estonia, regardless of whether you are infected or in close contact.

6.4. Biologna, Italy

Since the spread of the coronavirus (COVID-19) in Italy, started in February 2020, many people who contracted the infection died. The number of deaths amounted to 87,381 as of January 28, 2021. On December 3, 993 patients died, the highest daily toll since the start of the pandemic. The region with the highest number of deaths was Lombardy, which is also the region that registered the highest number of coronavirus cases and is the epicenter of the outbreak in the country.

Italy's death toll was one of the most tragic in the world. In the last weeks, however, the country started to see the end of this terrible situation: at the end of December 2020, the administration of the first doses of COVID-19 vaccine began.

Figure 20. Daily infection trend in Italy since the beginning of Covid-19 pandemic (source: Civil Protection Department COVID-19 Italy)

After the second wave of Covid-19 pandemic that hit Italy over last autumn, since the beginning of the 2021 we've been witnessing a slow decline of the curve. Nevertheless restrictions are still severe and applied nonuniformly all across the country, according to a combination of various factors.

In fact in Italy the government, due to the worsening of the epidemiological situation, has decided to apply a colour for each region (white, yellow, orange or red) by combining factors such as risk analysis, weekly incidence of cases and actual reproduction index Rt (also called infection index).

On the basis of these indicators, every Friday the control room of the Ministry of Health has attributed the color to the region and the respective restrictions.

This system has been updated and currently Italy has been divided into RED, ORANGE and YELLOW zones, depending on the seriousness of the situation. The territories or regions that enter the orange or red band must stay there for at least 14 days, then they will be re-evaluated, again on the basis of monitoring of scientific and non-discretionary data.

The Minister of Health will update the bands periodically. The assignment is based on the scientific data provided by the Technical-Scientific Committee.

The classification of a Region in one of the three scenarios indicated above is decided by the Ministry of Health on the evaluation of 21 criteria such as the Rt contagion index, the presence of outbreaks, the occupancy situation of hospital beds and places bed in intensive care. The monitoring capa**city** will also be taken into account, the so-called contact tracking. Then there are 6 other parameters that describe the ability to diagnose, investigate and manage contacts. For example, the percentage of positive swabs excluding the second and third tests on the same people, or the time from symptoms to quarantine and diagnosis.

RED AREA, HIGH RISK: The following shops and businesses remain open in the red area: bookstores, flower shops, computer and electronics shops, sporting goods, bicycles, car and motorcycle dealerships, shops selling cleaning products, hardware stores, toy and children's clothing stores, newsagents, pharmacies, perfumeries and herbalists and bookstores. In general, all food stores and supermarkets, as well as those that sell and basic necessities, from linen to soap, continue to be open. In addition to laundries and dry cleaners, hairdressers and barbers are also open. Industries, crafts, construction are also open. As for the catering, however, only home delivery is allowed.

ORANGE AREA. INTERMEDIATE RISK: This is called “scenario 3”, with an Rt between 1.25 and 1.5 and a sustained and widespread transmissibility with risks of maintaining the health system in the medium term. All the limitations of the yellow zone are foreseen, with slightly less restrictive interventions than the red zone.

YELLOW AREA, AT MODERATE RISK: In the yellow band all the Regions that have a risk index compatible with scenario 2, where the RT is between 1 and 1.25 only nationally valid measures will apply here. That is, distance learning for high schools, ban on leaving home from 10pm to 5am and closing of all activities at night, stop for museums, closing of shopping centers on weekends, total closure for bingo halls and betting centers. Furthermore, competitions are suspended, smart working is strongly recommended and the maximum capa**city** for local transport, from buses to regional trains, drops to 50%.

As far as education system is concerned, as a result of the last months trend of the spread of the coronavirus in Italy, the Government has decided to move the education of all grades online, with the exception of early childhood education.

Scholastic Autonomy, introduced in the national order more than twenty years ago, is a privileged tool to elaborate a strategy for the restart of the school year that responds as much as possible to the needs of the territories of reference in respect of the above mentioned health indications. The Regulation of March 8, 1999, n. 275, laying down rules on the autonomy of educational institutions, gives institutions the ability to build training courses functional to the realization of the right to learn and educational growth of all students, through the definition of precise areas of organizational intervention.

Therefore, in this context, it remains the opportunity for educational institutions to take advantage of additional forms of flexibility arising from the instrument of Autonomy, based on the space available and the needs of families and the territory, which contemplate, for example:

- a reconfiguration of the class group into more learning groups;
- the modular articulation of groups of students coming from the same or different classes or from different course years;
- school attendance in differentiated shifts, also varying the application of solutions in relation to the age groups of pupils and students in the various school grades;
- for secondary schools of the second degree, a use for students, appropriately planned, of didactic activities in presence and, in a complementary way, integrated digital education, where the context conditions make it a preferable option or the technological opportunities, age and skills of students allow it;
- the aggregation of disciplines into areas and subject areas, where not already provided for by recent innovations in the school system;
- a different weekly modulation of school time, by resolution of the competent collegial bodies.

The educational institutions will take care to ensure, for each student, the same educational offer, without prejudice to the opportunity to adopt different organizational solutions, to achieve educational activities or training in parallel or alternative to traditional teaching.

The local authorities carry out, therefore, in the territories of their competence, the reconnaissance of existing school spaces, also with the collaboration of the schools, to know data or to deepen specific situations of context; they prepare the adaptation of spaces never (or no longer) used as school buildings (data available in the information dashboard mentioned in the introduction), also proceeding to the assignment in use to the schools of spaces usually intended for citizenship, to be readapted for the purpose of school attendance, as well as the realization of external solutions of suitable size to accommodate classes, in internal spaces or even outside the school grounds.

The school managers will constantly communicate to the local authorities and to the bodies identified in this document the data related to the direct scholastic institutions.

On the basis of the actions to be carried out and the relative costs to be faced, the territorial body of reference will take charge of the works considered necessary, following a joint assessment carried out with the single headmaster or during a special conference of services, agreeing with the school institutions the eventual economic co-participation or technical expertise of the project. For the widest realization of school service in the conditions of the present scenario, local

authorities, public and private institutions operating in various ways in the territory, the Third Sector and schools can sign specific agreements, such as "Educational community pacts", subject to the availability of adequate financial resources. The involvement of the various public and private actors, in a logic of maximum adherence to the principle of subsidiarity and educational co-responsibility, takes place through the instrument of the conference of services mentioned above, called to evaluate the individual proposals for cooperation and the methods of implementation, through the above-mentioned agreements, which define the aspects of implementation. Thus implementing those constitutional principles and values, for which all components of the Republic are committed to ensuring the realization of education and upbringing, and strengthening the educational, civil and social alliance of which school institutions are necessary, but not unique, interpreters, this conference is also convened at the request of the same school institutions, in order to

- encourage the provision of other facilities or spaces, such as parks, theaters, libraries, archives, cinemas, museums, in order to be able to carry out educational activities complementary to the traditional ones, however aimed at educational purposes;
- Support the autonomous schools, taking into account the different conditions and criticalities of each, in the construction of collaborations with the various territorial actors that can contribute to the enrichment of the educational offer, identifying purposes, roles and tasks of each on the basis of available resources.

The ultimate goal is to provide unity of vision to an organizational, pedagogical and didactic project also linked to the specifi**cities** and opportunities of the territory.

It is also essential to have the active collaboration of students and families, who will have to continue to put into practice the general behaviors required to combat the spread of the epidemic, in the context of a shared and collective responsibility.

In this regard, the strengthening of the school-family alliance can be further concretized in the updating of the "Educational Co-responsibility Pact" which, where necessary, can be recalibrated in a form more responsive to the new cultural needs of sharing between school and family, becoming the place where adult educators recognize themselves, formally and substantially, in the achievement of the same objective. https://www.miur.gov.it/documents/20182/2467413/Le+linee+guida.pdf/4e4bb411-1f90-9502-f01e-d8841a949429

As for staff training, as provided by both private companies and public institutions, each Regional Authority is entitled to issue specific regulatory Acts. For example, in the Emilia-Romagna area, training courses can only take place remotely, with the exception of one-to-one activities (for example, in the field of music or foreign language lessons, etc.). These can take place in person, only in compliance with the protocol approved by the Regional Governor's Act no. 87 of 23 May 2020 subsequently amended by the Governor's Ordinance no. 109 of 12 June 2020.

It's to be noticed how covid is currently affecting nursery and high schools choice made by parents and adolescents in Emilia-Romagna region, who usually make a decision on which school to be attended over next scholastic year at the beginning of the year.

Analysing data some trends can be glimpsed: as for nursery schools, those ones located in the hill and those ones that prioritize outdoor educational activities are being preferred.

As far as high schools are concerned, trends show that thos ones offering more chances to get a job, in view of an uncertain future and probable economic crisis, are mostly picked, such as technical and professional schools. Among them information technology schools subscriptions raised by over 10%, most likely linked to the phase we're experiencing.

A problem concerning rooms enough for all the students expected to attend next scholastic year has raised: the risk is that classes will be too crowded and possible safety measures might not be accomplished.

6.5. Granada, Spain

COVID-19 showed us from the beginning of the pandemic that it does not understand ideologies, gender or borders. The Emergency's State was approved on 14 March 2020 and on 21 June 2020, once the Emergency's State ends the orders derived from it lapse, the whole country entered into what was called "new normality". From that moment on, a series of urgent prevention, containment and coordination measures had to be adopted to continue controlling the pandemic and to be prepared for an upsurge in cases.

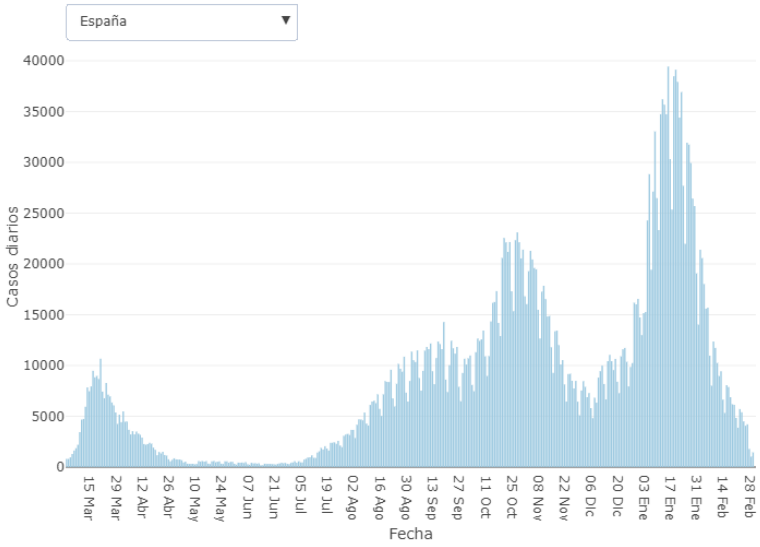


Figure 21. Daily reported cases of COVID-19 from the Ministry of Health

The State Strategy against the second wave describes the criteria, instruments, indicators and actions shared by all public administrations. It is the framework for action; the Spain's Government and its Regions make decisions jointly. This Strategy is developed on three bases:

a) Common criteria and indicators, through the methodology proposed in the document on Coordinated Response Actions.
b) Coordinated actions to bend the curve and keep the pandemic under control. The main ones are those in the field of public health approved by the Interterritorial Council of the National Health System and the declaration of the Emergency's State in force.

c) Shared monitoring and evaluation of results, both bilaterally between the Ministry of Health and each of the Region, and jointly within the Interterritorial Council of the National Health System.

First, the Government approved the Royal Decree-Law on "new normality" on 9 June, agreed with the Region and supported by a majority in the Plenary of Congress on 26 June. The main measures, it contains and which are in force are related:

- Prevention and hygiene in different areas.
- Early detection of cases and contacts for clinical follow-up, isolation and quarantine.
- Guidelines to ensure the supply of medicines and medical devices.
- The protection of residential centres for the elderly or disabled.
- The obligation of the Regions to continue providing epidemiological information to the Ministry of Health.

To organise this response in an effective and coordinated manner, the Ministry of Health designed the Early Response Plan in a COVID-19 pandemic control scenario, which technically makes up the National Pandemic Control Plan, with contributions from several ministries, as well as from all the Regions and Cities. It was approved on 16 July by the plenary session of the Interterritorial Council of the National Health System. The fundamental objectives of the Plan are threefold:

1. To design the bases for preparedness and response in the current scenario and possible future scenarios for the control of the disease.
2. To establish a risk assessment framework associated with the available information.
3. Recommend public health interventions commensurate with the level of risk. This Plan includes the following elements:
    - The setting up of a strategic stockpile of protective equipment and medicines.
    - The reinforcement of influenza vaccination, which is currently underway.
    - Contingency plans to strengthen the healthcare and public health capacities of the Regions.
    - The definition of epidemiological and healthcare indicators to raise the level of risk in a territory and propose, when necessary, additional measures in coordination with the Regions.

Measures adopted by the Regions, the epidemiological context shows, that very different transmission scenario have coexisted and continue to coexist in the different territories, which may require different control measures. Therefore, each Regions has adopted different actions based on these different scenarios, by the Early Response Plan and with the support of the Ministry of Health. Despite this, all of them coincide in limiting the number of people at meetings and in a limited capacity. Moreover, almost 95% have opted for the limitation of movement at night, while almost 74% have determined the perimeter closure of the Region. Concerning the hotel and catering industry, we generally find a greater diversity in the measures, although all of the Regions have opted to reduce opening hours and some of them (30%) have decided to close the hotel and catering industry. The main measures implemented in each Region are:

- Perimeter closure of the Regions.
- Perimeter closures are smaller than those of the Regions are.
- Limitation of night-time movement.

- Limitation of people at meetings.
- Limitation of capacity.
- Total closure of the hotel and catering trade.
- Reduction of night-time opening hours for the hotel and catering trade.

Since August, five packages of Coordinated Public Health Actions have been approved:

1. The first was agreed on 14 August by the Plenary of the Interterritorial Council of the National Health System. It contains eleven control measures in seven different areas, three recommendations and an indication of compliance with the points included in the Early Response Plan, with aspects related to the closure of nightlife, the ban on smoking in outdoor spaces and the reinforcement of the protection of homes for the elderly. The first region to apply the eleven measures was *La Rioja*, where they came into force the following day.
2. The second was approved on 27 August, with a view to the start of the school year, following the joint meeting of the Interterritorial Council and the Sectoral Conference on Education. It includes a total of twenty-nine measures and five recommendations for implementation by the competent administrations.
3. The third was agreed on 9 September and consists of measures in four areas: COVID's vaccination, screening, coordination with Local Entities and the implementation of new rounds of the national seroprevalence study.
4. The fourth package of these measures was adopted on 30 September, with coordinated public health actions aimed at municipalities with incidences of the disease well above nationally and internationally acceptable risk thresholds, with increasing pressure on the health care system and populations of more than 100,000 inhabitants. When the epidemiological situation has so required, the Ministry of Health has exercised its coordinating role, proposing the adoption of coordinated public health actions based on the shared work being carried out with the Regions.
5. The fifth package of coordinated actions was approved on 28 October to respond to the special risk situation arising from public attendance at international professional sporting events.

Two measures were adopted in the State Strategy against the second wave in the event of a risk situation. On the one hand, on 22 October, the Plenary of the Interterritorial Council of the National Health System agreed by a very large majority, and without any votes against, on the document on Coordinated Response Actions, developed and agreed upon by the technical heads of all the Regions and the Ministry of Health. On the other hand, and since this was also requested by several Regions, on 25 October the Government approved the Royal Decree declaring an Emergency's State to contain the spread of infections caused by SARS-CoV-2, the extension of which was supported by a large majority in the Plenary Session of the Congress of Deputies on 29 October.

The Coordinated Response actions document for the control of the transmission of COVID-19 technically extends the Early Response Plan, which establishes a framework of common criteria, based on scientific evidence, for the interpretation of the combined epidemiological indicators and the adoption of pandemic containment measures according to four alert levels, from one to four, with four being an extreme level. The common framework of actions aims to ensure sufficient coordination between territories, without preventing the Regions from taking the

complementary measures they deem appropriate. Since the coordinated response, process is adaptable to the situation and the demographic, mobility or social vulnerability context of each territory (Regions, province, island, municipality, department, health area, basic health area or equivalent), both in scenarios of increased or reduced risk of transmission. In other words, the Regions have a wide margin to apply the measures they consider most appropriate in their territories. However, it should be noted that 74.9% of the Regions agree on the application of the same measures mentioned above. The document is based on technical-scientific foundations, taking into account the available evidence, national and international experience in pandemic management. The opinion of experts and technicians from all the territories, that of the Scientific's Committee, and the international recommendations of the World Health Organisation, the European Centre for Disease Prevention and Control, and the Member States of the European Union through multilateral meetings coordinated by the European Commission. This document is intended as an evolving guide, which will be adjusted as more information becomes available or as new national and international scientific evidence is generated. It establishes thresholds for main indicators and complementary indicators that classify the outcome of each of them as low, medium, high or very high risk: epidemiological indicators on the level of transmission (cumulative incidence, positivity and traceability) and indicators of health service utilisation (hospital occupancy), as well as complementary indicators that help to assess and characterise the situation.

Despite the measures adopted, Spain is suffering the third wave. Broadly speaking, the third wave of the pandemic in our country has been stronger than, the second and the peak of infections occurred sometime between 20 and 24 January, depending on the evolution of each territory. However, 18 provinces have had a lower peak incidence than in November.

The number of deaths in this third wave is 19,200 people have lost their lives to COVID-19 between December and February, according to data provided by the National Epidemiological Surveillance Network (RENAVE), through the Ministry of Health. In two months, almost the same number of citizens died in around six months of the second one.

Three events have been the driving forces behind the third wave: *Black Friday*, the long weekend in December and Christmas. These events were directly related to the social and travel spheres, which served to facilitate the nationwide spread.

The December holiday period served as fuel for the coronavirus: crowds in shops and hotels, increased gatherings in homes, illegal parties and travel between Regions and provinces. Furthermore, Christmas celebrations and gatherings were the latest triggers.

The hope, in this third wave transition, has been the arrival of vaccines. The current challenge is to vaccinate more than 30 million Spaniards (70% of the population) by summer, while the country gradually increases the pace of inoculations.

REFERENCES

Abubakar, I.R., Dano, U.L., 2020. Sustainable urban planning strategies for mitigating climate change in Saudi Arabia. Environment, Development and Sustainability 22, 5129-5152. DOI: 10.1007/s10668-019-00417-1.

Adelaar, T., Chang, S., Lancendorfer, K.M., Lee, B., Morimoto, M., 2003. Effects of media formats on emotions and impulse buying intent. Journal of Information Technology 18 (4), 247–266. DOI: 10.1080/0268396032000150799.

Aichholzer, G., Rose, G., Hennen, L., Lindner, R., Goos, K., Korthagen, I., van Keulen, I., Nielsen, R.Ø., 2018. Prospects for E-democracy in Europe: Part I: Literature review. European Parliament, p.140. DOI: 10.2861/49654.

Akinci, C., Sadler-Smith, E., 2019. Collective intuition: Implications for improved decision making and organizational learning. British Journal of Management 30 (3), 558-577. DOI: 10.1111/1467-8551.12269.

Anderson, C.L., Monroy, M., Keltner, D., 2018. Awe in nature heals: Evidence from military veterans, at-risk youth, and college students. Emotion 18 (8), 1195–1202. DOI: 10.1037/emo0000442.

Arnott, D., Gao, S., 2019. Behavioral economics for decision support systems researchers. Decision Support Systems 122, 113063. DOI: 10.1016/j.dss.2019.05.003.

Arnstein, S.R., 1969. A ladder of citizen participation. Journal of the American Institute of planners 35 (4), 216-224. DOI: 10.1080/01944366908977225.

Azarbarzin, A., Ostrowski, M., Hanly, P., Younes, M., 2014. Relationship between arousal intensity and heart rate response to arousal. Sleep 37 (4), 645-53. DOI: 10.5665/sleep.3560.

Aziz, A., Anwar, M. M., Dawood, M., 2020. The impact of neighborhood services on land values: an estimation through the hedonic pricing model. GeoJournal, 1-11. DOI: 10.1007/s10708-019-10127-w.

Barrett, L.F., 2017. How emotions are made: The secret life of the brain. Mariner Books; Illustrated Edition (March 7, 2017), 449 p.

Baumeister, R.F., Ainsworth, S.E., Vohs, K.D., 2015. Are groups more or less than the sum of their members? The moderating role of individual identification. Behavioral & Brain Sciences 39, e137. DOI:10.1017/S0140525X15000618.

Berke, P.R., Godschalk, D.R., 2006. Urban Land Use Planning, 5th Edition. University of Illinois Press, 504 p.

Betancourt, J.R., Green, A.R., Carrillo, J.E., Owusu Ananeh-Firempong, I.I., 2016. Defining cultural competence: a practical framework for addressing racial/ethnic disparities in health and health care. Public health reports 118 (4), 293-302. DOI: 10.1016/S0033-3549(04)50253-4.

Bodin, Ö., 2017. Collaborative environmental governance: achieving collective action in social-ecological systems. Science 357 (6352), eaan1114. DOI: 10.1126/science.aan1114.

Bojesen, M., Boerboom, L., Skov-Petersen, H., 2015. Towards a sustainable capacity expansion of the Danish biogas sector. Land Use Policy 42, 264–277. DOI: 10.1016/j.landusepol.2014.07.022

Boone, K., 2015. Disembodied voices, embodied places: Mobile technology, enabling discourse, and interpreting place. Landscape and Urban Planning 142, 235–242. DOI: 10.1016/j.landurbplan.2015.07.005

Boukherroub, T., D'amours, S., Rönnqvist, M., 2018. Sustainable forest management using decision theaters: Rethinking participatory planning. Journal of Cleaner Production 179, 567–580. DOI: 10.1016/j.jclepro.2018.01.084

Boyer, M.C., 1996. The city of collective memory: its historical imagery and architectural entertainments. Mit Press, p. 572.

Brackett, M., 2019. Permission to feel: Unlocking the power of emotions to help our kids, ourselves, and our society thrive. Celadon Books, p. 304.

Briefer, E.F., Tettamanti, F., McElligott, A.G., 2015. Emotions in goats: mapping physiological, behavioural and vocal profiles. Animal Behaviour 99, 131–143. DOI: 10.1016/j.anbehav.2014.11.002

Bruder, M., Fischer, A., Manstead, A.S.R., 2014. Social appraisal as a cause of collective emotions. In C. von Scheve & M. Salmela (Eds.), Collective emotions (pp. 141–155). New York: Oxford University Press. DOI: 10.1093/acprof:oso/9780199659180.003.0010.

Butler, E.A., 2015. Interpersonal affect dynamics: It takes two (and time) to tango. Emotion Review 7 (4), 336-341. DOI: 10.1177/1754073915590622.

Calvo, M.G., Beltrán, D., 2013. Recognition advantage of happy faces: Tracing the neurocognitive processes. Neuropsychologia 51 (11), 2051-2061. DOI: 10.1016/j.neuropsychologia.2013.07.010.

Chao, T.Y.S., Liu, S.K., Kalman, B., Lu, H.C.C., Cai, M., 2017. Delivering community well-being from the happy city concept: A practical approach to urban planning and design. In Handbook of Community Well-Being Research (pp. 435-452). Springer, Dordrecht.

Chaudhuri, A., 2002. A study of emotion and reason in products and services. Journal of Consumer Behaviour: An International Research Review 1 (3), 267-279. DOI: 10.1002/cb.72.

Cheesbrough, A.E., Garvin, T., Nykiforuk, C.I., 2019. Everyday wild: Urban natural areas, health, and well-being. Health & place 56, 43-52. DOI: 10.1016/j.healthplace.2019.01.005.

Ching, C.L., Chan, V.L., 2020. Positive emotions, positive feelings and health: A life philosophy. Linguistics and Culture Review 4 (1), 1-14. DOI: doi.org/10.37028/lingcure.v4n1.16.

Choudhury, S., Pradhan, M.P., Kar, S.K., 2016. A survey on determining urban emotions using geo-data classification: a case study around Majitar, East District, Sikkim. International Journal of Computer Applications 135 (2), 26-29.

Copenhaver, R., Odenbaugh, J., 2020. Experiencing Emotions. The Epistemology of Non-Visual Perception, p. 213.

Corburn, J., 2004. Confronting the challenges in reconnecting urban planning and public health. American journal of public health 94 (4), 541-546. DOI: 10.2105/ajph.94.4.541.

Cosmides, L., Tooby, J., 1989. Evolutionary Psychology and the Generation of Culture, Part II. Case Study: A Computational Theory of Social Exchange. Ethology and Sociobiology 10, 51-98.

Das, A., Dahiya, B., 2020. Towards inclusive urban governance and planning: emerging trends and future trajectories. In New Urban Agenda in Asia-Pacific (353-384). Springer, Singapore.

Dillbeck, M.C., Cavanaugh, K.L., 2016. Societal violence and collective consciousness: Reduction of US homicide and urban violent crime rates. SAGE Open 6 (2), 2158244016637891. DOI: 10.1177/2158244016637891.

Durkheim, E., 1960. The Suicide. London: Allen & Unwin.

ECOCITY World Summit, 2017. Principles for better cities [Online]. Available: https://www.ecocity2017.com/about/principles-for-better-cities/ [Accessed 22 September 2020].

Erfan, A., 2017. Confronting collective traumas: An exploration of therapeutic planning. Planning Theory & Practice 18 (1), 34–50. DOI:10.1080/14649357.2016.1249909.

European Commission, 2014. Establishing Conservation Measures for Natura 2000 Sites [Online]. Available: http://ec.europa.eu/environment/nature/natura2000/management/docs/conservation%20measures.pdf [Accessed 22 September 2020].

European Environment Agency, 2016. Europe's Environment - The Dobris Assessment. Chapter 37: The urban stress — The problem [Online]. Available: https://www.eea.europa.eu/publications/92-826-5409-5/page037new.html [Accessed 13 July 2020].

European Commission, 2018. 2018 reform of EU data protection rules [Online]. Available: https://ec.europa.eu/commission/priorities/justice-andfundamental-rights/data-protection/2018-reform-eu-data-protectionrules_en [Accessed 13 March 2020].

FEMA, 2010. Decision Making and Problem Solving. Independent Study 241.a [Online}. Available: https://www.hsdl.org/?view&did=721741 [Accessed 22 September 2020].

Ferreira, A., 2013. Emotions in planning practice: A critical review and a suggestion for future developments based on mindfulness. Town Planning Review, 703-719. DOI: 10.3828/tpr.2013.37.

Fischer, F., 2010. Policy deliberation: confronting subjectivity and emotional expression. Critical policy studies 3 (3-4), 407-420. DOI: 10.1080/19460171003619832.

Fogel, A., Nwokah, E., Dedo, J.Y., Messinger, D., Dickson, K.L., Matusov, E., Holt, S.A., 1992. Social process theory of emotion: A dynamic systems approach. Social Development 1 (2), 122–142. DOI: 10.1111/j.1467-9507.1992.tb00116.x.

Frijda, N.H., 1988. The laws of emotion. American Psychologist 43, 349-358.

Fritz, R.L., Vandermause, R., 2018. Data collection via in-depth email interviewing: Lessons from the field. Qualitative Health Research 28 (10), 1640-1649. DOI: 10.1177/1049732316689067.

Gabriel, S., Naidu, E., Paravati, E., Morrison, C.D., Gainey, K., 2020. Creating the sacred from the profane: Collective effervescence and everyday activities. The Journal of Positive Psychology 15 (1), 129-154. DOI: 10.1080/17439760.2019.1689412.

Gao, J., Chen, W., Liu, Y., 2018. Spatial restructuring and the logic of industrial land redevelopment in urban China: II. A case study of the redevelopment of a local state-owned enterprise in Nanjing. Land Use Policy 72, 372–380. DOI: 10.1016/j.landusepol.2018.01.006.

Ghodsi, S.H., Kerachian, R., Estalaki, S.M., Nikoo, M.R., Zahmatkesh, Z., 2016a. Developing a stochastic conflict resolution model for urban runoff quality management: Application of info-gap and bargaining theories. Journal of Hydrology 533, 200–212. DOI: 10.1016/j.jhydrol.2015.11.045.

Ghodsi, S.H., Kerachian, R., Zahmatkesh, Z., 2016b. A multi-stakeholder framework for urban runoff quality management: Application of social choice and bargaining techniques. Science of The Total Environment 550, 574–585. DOI: 10.1016/j.scitotenv.2016.01.052.

Gibbs, R. J., 2012. Principles of Urban Retail Planning and Development, 1st Edition. Wiley, 272 p.

Gilet, A.-L., Jallais, C., 2011. Valence, arousal and word associations. Cognition and Emotion 25 (4), 740–746. DOI: 10.1080/02699931.2010.500480

Giubilini, A., Levy, N., 2018. What in the world is collective responsibility? dialectica 72 (2), 191-217. DOI: 10.1111/1746-8361.12228.

Glenn, J.C., 2009. Collective intelligence: one of the next big things. Futura 28, 4.

Glenn, J.C., Gordon, T.J., Florescu, E., 2014. 2013-14 State of the Future. The Millennium Project, p. 256.

Goldenberg, A., Garcia, D., Halperin, E., Gross, J.J., 2020. Collective emotions. Current Directions in Psychological Science 29 (2), 154-160. DOI: 10.1177/0963721420901574.

Goldenberg, A., Halperin, E., van Zomeren, M., Gross, J.J., 2016. The process model of group-based emotion: Integrating intergroup emotion and emotion regulation perspectives. Personality and

Social Psychology Review 20, 118–141. DOI:10.1177/1088868315581263.
Goleman, D., 2007. Social intelligence: The New Science of Human Relationships. New York, NY: Random House, 416 p.
Gomez, P., Danuser, B., 2007. Relationships Between Musical Structure and Psychophysiological Measures of Emotion. Emotion 7 (2), 377–387. DOI: 10.1037/1528-3542.7.2.377.
Gomez, P., Filippou, D., Pais, B., Gunten, A., Danuser, B., 2016. Breathing and affective picture processing across the adult lifespan. Biological Psychology 119, 101–111. DOI: 10.1016/j.biopsycho.2016.07.011
Gong, Y., Palmer, S., Gallacher, J., Marsden, T., Fone, D., 2016. A systematic review of the relationship between objective measurements of the urban environment and psychological distress. Environment international 96, 48-57. DOI: 10.1016/j.envint.2016.08.019.
Goya-Martinez, M., 2016. The emulation of emotions in artificial intelligence: Another step into anthropomorphism. In Emotions, Technology, and Design (pp. 171-186). Academic Press. DOI: 10.1016/B978-0-12-801872-9.00008-9.
Greenberg, M.S., 2010. Corsini Encyclopedia of Psychology. Hoboken. DOI: 10.1002/9780470479216.
Hacking, N., Flynn, A., 2017. Networks, power and knowledge in the planning system: A case study of energy from waste. Progress in Planning 113, 1–37. DOI: 10.1016/j.progress.2015.12.001
Hämäläinen, R.P., Luoma, J., Saarinen, E., 2013. On the importance of behavioral operational research: The case of understanding and communicating about dynamic systems. European Journal of Operational Research 228 (3), 623–634. DOI: 10.1016/j.ejor.2013.02.001.
Hansen, H., Trank, C.Q., 2016. This is going to hurt: Compassionate research methods. Organizational Research Methods 19 (3), 352-375. DOI: 10.1177/1094428116637195.
Hedström, J., 2019. Confusion, seduction, failure: Emotions as reflexive knowledge in conflict settings. International Studies Review 21 (4), 662-677. DOI: 10.1093/isr/viy063.
Hegel, G.W.F., 1793. On the Prospects for a Folk Religion. Hegel, Tubingen. Three Essays, 1793-1795. The Tübingen Essay, Berne Fragments, The Life of Jesus, by G.W.F. Hegel, edited and translated with Introduction and Notes by Peter Fuss and John Dobbins. University of Notre Dame Press. Notre Dame, Indiana, p. 186, p. 1984.
Heinskou, M.B., Liebst, L.S., 2016. On the Elementary Neural Forms of Micro-Interactional Rituals: Integrating Autonomic Nervous System Functioning into Interaction Ritual Theory. Sociological Forum 31, 354–76. DOI: 10.1111/ socf.12248.
Hoch, C., 2006. Emotions and planning. Planning Theory & Practice 7 (4), 367-382. DOI: 10.1080/14649350600984436.
Hong, F.Y., Chiu, S.I., Huang, D.H., Chiu, S.L., 2020. Correlations Among Classroom Emotional climate, Social Self-Efficacy, and Psychological Health of University Students in Taiwan. Education and Urban Society, 0013124520931458. DOI: 10.1177/0013124520931458.
Hornsby, C., Ripa, M., Vassillo, C., Ulgiati, S., 2017. A roadmap towards integrated assessment and participatory strategies in support of decision-making processes. The case of urban waste management. Journal of Cleaner Production 142, 157–172. DOI: 10.1016/j.jclepro.2016.06.189.
Howes, C., 2011. Social play of children with adults and peers. Pellegrini, A. (Ed.), Oxford Handbook of the Development of Play, Oxford University Press, New York, NY, pp. 231-244. DOI: 10.1093/oxfordhb/9780195393002.013.0018.
Hung, W., 2013. Team-based complex problem solving: A collective cognition perspective. Educational Technology Research and Development 61 (3), 365-384. DOI: 10.1007/s11423-013-9296-3.

Inch, A., Laurian, L., Mouat, C., Davies, R., Davy, B., Legacy, C., Symonds, C., 2017. Planning in the face of immovable subjects: A dialogue about resistance to development forces. Planning Theory & Practice 18(3), 469-488. DOI:10.1080/14649357.2017.1328811.

Iruka, I., Morgan, J., 2014. Patterns of quality experienced by African American children in early education programs: predictors and links to children's preschool and kindergarten academic outcomes. Journal of Negro Education 83 (3), 235-255. DOI: 10.7709/jnegroeducation.83.3.0235.

Jefferies, L.N., Smilek, D., Eich, E., Enns, J.T., 2008. Emotional valence and arousal interact in attentional control. Psychological Science 19 (3), 290–295. DOI: 10.1111/j.1467-9280.2008.02082.x.

Johnson-Laird, P. N., Oatley, K., 1992. Basic emotions, rationality, and folk theory. Cognition & Emotion 6 (3-4), 201–223. DOI: 10.1080/02699939208411069

Kahneman, D., 2003. Maps of bounded rationality: Psychology for behavioral economics. American economic review 93 (5), 1449-1475.

Kahneman, D., 2011. Thinking, fast and slow. Macmillan.

Kaklauskas A., 2015. Biometric and Intelligent Decision Making Support. Series: Intelligent, tutoring and mentoring systems Reference Library, Vol. 81. 2015, XII. Springer-Verlag, Berlin, 228 p.

Kaklauskas, A., 1999. Multiple criteria decision support of building life cycle. Research report presented for habilitation (DrSc): Technological sciences, civil engineering, Vilnius Gediminas Technical University, Vilnius, Technika, p. 118.

Kaklauskas, A., 2016. Degree of project utility and investment value assessments. International Journal of Computers, Communications & Control, 11(5), 666–683. DOI: 10.15837/ijccc.2016.5.2679.

Kaklauskas, A., Abraham, A., Dzemyda, G., Raslanas, S., Seniut, M., Ubarte, I., Kurasova, O., Binkyte-Veliene, A., Cerkauskas, J., 2020. Emotional, affective and biometrical states analytics of a built environment. Engineering Applications of Artificial Intelligence 91, 103621. DOI: 10.1016/j.engappai.2020.103621.

Kaklauskas, A., Jokubauskas, D., Cerkauskas, J., Dzemyda, G., Ubarte, I., Skirmantas, D., Podviezko, A., Simkute, I., 2019b. Affective analytics of demonstration sites. Engineering Applications of Artificial Intelligence, 81, 346-372. DOI: 10.1016/j.engappai.2019.03.001.

Kaklauskas, A., Kuzminske, A., Zavadskas, E.K., Daniunas, A., Kaklauskas, G., Seniut, M., Raistenskis, J., Safonov, A., Kliukas, R., Juozapaitis, A., Radzeviciene, A., Cerkauskiene, R., 2015. Affective tutoring system for built environment management. Computers & Education 82, 202–216. DOI: 10.1016/j.compedu.2014.11.016.

Kaklauskas, A., Zavadskas, E.K., Bardauskiene, D., Cerkauskas, J., Ubarte, I., Seniut, M., Dzemyda, G., Kaklauskaitė, M., Vinogradova, I., Velykorusova, A., 2019a. An Affect-Based Built Environment Video Analytics. Automation in Construction, 106, 102888. DOI: 10.1016/j.autcon.2019.102888.

Kaklauskas, A., Zavadskas, E.K., Radzeviciene, A., Ubarte, I., Podviezko, A., Podvezko, V., Kuzminske, A., Banaitis, A., Binkyte, A., Bucinskas, V., 2018. Quality of city life multiple criteria analysis. Cities 72, 82-93. DOI: 10.1016/j.cities.2017.08.002.

Kaklauskas, A., Dias, W. P. S., Binkyte-Veliene, A., Abraham, A., Ubarte, I., Randil, O. P. C., Siriwardana, C.S.A., Lill, I., Milevicius, V., Podviezko, A., Puust, R. (2020). Are environmental sustainability and happiness the keys to prosperity in Asian nations? Ecological Indicators, 119, 106562. http://dx.doi.org/10.1016/j.ecolind.2020.106562

Kaklauskas, A., Herrera-Viedma, E., Echenique, V., Zavadskas, E.K., Ubarte, I.; Mostert, A., Podvezko, V., Binkyte, A., Podviezko, A., 2018. Multiple criteria analysis of environmental sustainability and quality of life in post-Soviet states. Ecological Indicators, 89, 781-807.

http://dx.doi.org/10.1016/j.ecolind.2017.12.070
Keltner, D., Gross, J.J., 1999. Functional accounts of emotions. Cognition & Emotion 13 (5), 467-480. DOI: 10.1080/026999399379140.
Kiken, L.G., Fredrickson, B.L., 2017. Cognitive aspects of positive emotions: A broader view for well-being. In The happy mind: Cognitive contributions to well-being (pp. 157-175). Springer, Cham. DOI: 10.1007/978-3-319-58763-9_9.
Kliewer, W., Riley, T., Zaharakis, N., Borre, A., Drazdowski, T.K., Jäggi, L., 2016. Emotion dysregulation, anticipatory cortisol, and substance use in urban adolescents. Personality and individual differences 99, 200-205. DOI: 10.1016/j.paid.2016.05.011.
Klimstra, T.A., Frijns, T., Keijsers, L., Denissen, J.J., Raaijmakers, Q.A., van Aken, M.A., Koot, H.M., van Lier, P.A., Meeus, W.H., 2011. Come rain or come shine: Individual differences in how weather affects mood. Emotion 11, 1495–1499. DOI: 10.1037/a0024649.
Korthagen, I., van Keulen, I., Aichholzer, G., Rose, G., Nielsen, R.Ø., Freundlich, C., Lindner, R., Goos, K., Hennen, L., 2018b. Prospects for E-democracy in Europe: Part II: Case studies. European Parliamentm, p. 248. DOI: 10.2861/565349.
Korthagen, I., van Keulen, I., Hennen, L., Aichholzer, G., Rose, G., Lindner, R., Nielsen, R.Ø., 2018a. Prospects for E-democracy in Europe: Study Summary: In-depth Analysis. European Parliament. DOI: 10.13140/RG.2.2.33421.23521.
Koshkaki, E.R., Solhi, S., 2016. The facilitating role of negative emotion in decision making process: A hierarchy of effects model approach. The Journal of High Technology Management Research 27 (2), 119-128. DOI: 10.1016/j.hitech.2016.10.010.
Kourtit, K., Nijkamp, P., Wahlström, M., 2020. How to Make Cities the Home of People–A 'Soul and Body' Analysis of Urban Attractiveness. Land Use Policy, In Press, Corrected Proof. DOI: doi.org/10.1016/j.landusepol.2020.104734.
Kramer, R.M., Schaffer, J., 2015. Intergroup Relations. Wiley Encyclopedia of Management, 1-3. DOI: 10.1002/9781118785317.weom110172.
Kultūros vertybių registras, 2018a. Juozapo Tiškevičiaus rūmai [Online]. Available: https://kvr.kpd.lt/#/static-heritage-detail/949ab9c3-241f-4315-954e-10d7d20c9ced [Accessed 22 September 2020].
Kultūros vertybių registras, 2018b. Vilniaus bazilijonų vienuolyno statinių ansamblis [Online]. Available: https://kvr.kpd.lt/#/static-heritage-detail/06cabf58-1daa-4641-af11-c7de1aa4f2c5 [Accessed 22 September 2020].
Kultūros vertybių registras, 2018c. Rūmai, vad. Abramavičių [Online]. Available: https://kvr.kpd.lt/#/static-heritage-detail/b9e682cd-d1a8-4095-9202-df335f78b4f6 [Accessed 22 September 2020].
Kuo, J., Koppel, S., Charlton, J.L., Rudin-Brown, C.M., 2015. Evaluation of a video-based measure of driver heart rate. Journal of Safety Research 54, 55–59. DOI: 10.1016/j.jsr.2015.06.009.
Kuusela, H., Koivumäki, S., Yrjölä, M., 2019. M&As get another assist: when CEOs add intuition to the decision mix. Journal of Business Strategy 41 (3), 57-65. DOI: 10.1108/JBS-01-2019-0021.
Lane, M.B., 2005. Public Participation in Planning: An Intellectual History. Australian Geographer 36 (3), 283–299. DOI: 10.1080/00049180500325694
Larson, J.R., 2010. In search of synergy in small group performance. Psychology Press.
Lazarus, R.S., 1991. Emotion and adaptation. Oxford University Press, New York, p. 570.
Lazarus, R.S., 2000. How emotions influence performance in competitive sports. Sport Psychol. 14, 229–252. DOI: 10.1123/tsp.14.3.229
Lederbogen, F., Kirsch, P., Haddad, L., Streit, F., Tost, H., Schuch, P., Wüst, S., Pruessner, J.C., Rietschel,

M., Deuschle, M., Meyer-Lindenberg, A. (2011). City living and urban upbringing affect neural social stress processing in humans. Nature 474 (7352), 498-501. DOI: 10.1038/nature10190.
Levenson, R.W., 1994. Human emotions: A functional view. In P. Ekman & R. Davidson (Eds.), The nature of emotion: Fundamental questions (pp. 123–126). New York: Oxford University Press.
Levine, L., 1994. Listening with spirit and the art of team dialogue. Journal of Organizational Change Management 7 (1), 61-73. DOI: 10.1108/09534819410050803.
Levy, J.M., 2016. Contemporary Urban Planning, 11th Edition. Routledge, 476 p.
Lewinski, P., den Uyl, T.M., Butler, C., 2014. Automated facial coding: validation of basic emotions and FACS AUs in FaceReader. J. Neurosci. Psychol. Econ. 7 (4), 227–236. DOI: 10.1037/npe0000028.
Li, X., Hijazi, I., Koenig, R., Lv, Z., Zhong, C., Schmitt, G., 2016. Assessing Essential Qualities of Urban Space with Emotional and Visual Data Based on GIS Technique' ISPRS. International journal of geo-information 5 (11), 218. DOI: 10.3390/ijgi5110218.
Lin, K., Xia, F., Li, C., Wang, D., Humar, I., 2019. Emotion-aware system design for the battlefield environment. Information Fusion 47, 102-110. DOI: 10.1016/j.inffus.2018.07.008.
Locher, D.A., 2002. Collective behaviour. Upper Saddle River, NJ: Prentice Hall.
Lollini, M., Farley, A., Levy, P., 2019. Collective Intelligence, the Future of Internet and the IEML. Humanist Studies & the Digital Age 6 (1), 5-31. DOI: 10.5399/uo/hsda.6.1.2
Lupton, D., 2017. How does health feel? Towards research on the affective atmospheres of digital health. Digital Health 3, 2055207617701276. DOI: 10.1177/2055207617701276
Lyles, W., Swearingen White, S., 2019. Who cares? Arnstein's ladder, the emotional paradox of public engagement, and (re) imagining planning as caring. Journal of the American Planning Association 85 (3), 287-300. DOI: 10.1080/01944363.2019.1612268.
Lyles, W., White, S.S., Lavelle, B.D., 2018. The prospect of compassionate planning. Journal of Planning Literature 33 (3), 247-266. DOI:10.1177%2F0885412217735525.
Ma, K., Sellaro, R., Lippelt, D.P., Hommel, B., 2016. Mood migration: How enfacing a smile makes you happier. Cognition Volume 151, 52-62.DOI: 10.1016/j.cognition.2016.02.018.
Magee, L., James, P., Scerri, A., 2012. Measuring Social Sustainability: A Community-Centred Approach. Applied Research in the Quality of Life 7 (3), 239–61. DOI: 10.1007/s11482-012-9166-x.
Manstead, A.S.K., Hewstone, M., 1996. Blackwell Encyclopedia of Social Psychology. Oxford, UK: Blackwell. pp. 152–156. DOI:10.1002/9781405166072.
Masmoudi, S., Dai, D.Y., Naceur, A., 2012. Attention, representation, and human performance: Integration of cognition, emotion, and motivation. Psychology Press, 288.
Matsumoto, D., Nezlek, J.B., Koopmann, B., 2007. Evidence for universality in phenomenological emotion response system coherence. Emotion 7 (1), 57. DOI: 10.1037/1528-3542.7.1.57.
Mayer, J.D., Caruso, D., Salovey, P., 1999. Emotional intelligence meets traditional standards for an intelligence. Intelligence 27, 267-298.
McFarlane, J., Martin, C.L., Williams, T.M., 1988. Mood fluctuations: Women versus men and menstrual versus other cycles. Psychology of Women Quarterly 12, 201-223. DOI: 10.1111/j.1471-6402.1988.tb00937.x
McGill, 2015. About urban planning [Online]. Available: https://mcgill.ca/urbanplanning/planning [Accessed 22 September 2020].
Meerow, S., Pajouhesh, P., Miller, T.R., 2019. Social equity in urban resilience planning. Local Environment, 24(9), 793-808. DOI: 10.1080/13549839.2019.1645103.
Minhad, K.N., Ali, S.H.M., Reaz, M.B.I., 2017. Happy-anger emotions classifications from electrocardiogram signal for automobile driving safety and awareness. Journal of Transport & Health 7 (Part A), 75–89. DOI: 10.1016/j.jth.2017.11.001.

Natanian, J., Aleksandrowicz, O., Auer, T., 2019. A parametric approach to optimizing urban form, energy balance and environmental quality: The case of Mediterranean districts. Applied Energy 254, 113637. DOI: 10.1016/j.apenergy.2019.113637.

Nesse, R. M., 1990. Evolutionary explanations of emotions. Human nature 1 (3), 261-289. DOI: 10.1007/BF02733986.

Nesse, R.M., 2019. Good reasons for bad feelings: insights from the frontier of evolutionary psychiatry. Penguin, p. 362.

Nussbaum, M., 2001. Upheavals of thought. Cambridge: Cambridge University Press.

Öberg, M., Nilsson, K.L., Johansson, C., 2017. Major transport corridors: the concept of sustainability in EU documents. Transportation Research Procedia 25, 3694–3702. DOI: 10.1016/j.trpro.2017.05.339.

Olafsdottir, G., Cloke, P., Vögele, C., 2017. Place, green exercise and stress: An exploration of lived experience and restorative effects. Health & Place 46, 358-365. DOI: 10.1016/j.healthplace.2017.02.006.

Osborne, N., Grant-Smith, D., 2015. Supporting mindful planners in a mindless system: limitations to the emotional turn in planning practice. Town Plan Rev 86 (6), 677-698. DOI:10.3828/tpr.2015.39.

Otero, M.C., Levenson, R.W., 2019. Emotion regulation via visual avoidance: Insights from neurological patients. Neuropsychologia 131, 91-101. DOI: 10.1016/j.neuropsychologia.2019.05.003.

Pfaff, D., 2005. Brain Arousal and Information Theory: Neural and Genetic Mechanisms, 1st Edition. Harvard University Press, 224 p.

Pianta, R.C., Downer, J., Hamre, B., 2016. Quality in early education classrooms: definitions, gaps, and systems. The Future of Children 26 (2), 119-137.

Porter, L., Sandercock, L., Umemoto, K., Umemoto, K., Bates, L.K., Zapata, M.A., Kondo, M.C, Zitcer, A., Lake, R.W., Fonza, A., Sletto, B., Erfan, A., Sandercock, L., 2012. What's love got to do with it? Illuminations on loving attachment in planning. Planning Theory & Practice 13 (4), 593-627. DOI:10.1080/14649357.2012.731210

Pykett, J., Chrisinger, B., Kyriakou, K., Osborne, T., Resch, B., Stathi, A., Toth, E., Whittaker, A.C., 2020. Developing a Citizen Social Science approach to understand urban stress and promote wellbeing in urban communities. Palgrave Communications 6 (1), 1-11. DOI: 10.1057/s41599-020-0460-1.

Pykett, J., Osborne, T., Resch, B., 2020. From urban stress to neurourbanism: how should we research city wellbeing? Ann Assoc Am Geograp (in press). DOI: 10.1080/24694452.2020.1736982.

Resch, B., Summa, A., Sagl, G., Zeile, P., Exner, J.P., 2015. Urban Emotions—Geo-Semantic Emotion Extraction from Technical Sensors, Human Sensors and Crowdsourced Data. Progress in Location-Based Services 2014, 199–212. DOI: 10.1007/978-3-319-11879-6_14.

Roediger III, H.L., Abel, M., 2015. Collective memory: a new arena of cognitive study. Trends in cognitive sciences 19 (7), 359-361. DOI: 10.1016/j.tics.2015.04.003

Rose, J.F.R., 2017. The Well-Tempered City: What Modern Science, Ancient Civilizations, and Human Nature Teach Us About the Future of Urban Life. Harper Wave; Reprint edition, 480 p.

Rossi, A.S., Rossi, P.E., 1977. Body time and social time: Mood patterns by menstrual cycle phase and day of the week. Social Science Research 6, 273-308. DOI: 10.1016/0049-089X(77)90013-8.

Rupprecht, C., 2019. Guidelines for Developing and Implementing a Sustainable Urban Mobility Plan [Online]. Available: https://www.eltis.org/sites/default/files/sump_guidelines_2019_interactive_document_1.pdf [Accessed 22 September 2020].

Sandercock, l., 1998. Towards Cosmopolis: Planning for Multicultural Cities. New York, NY, John Wiley and

Sons.
Sandercock, L., 2003. Dreaming the sustainable city: Organizing hope, negotiating fear, mediating memory. Story and sustainability: Planning, practice, and possibility for American cities, 142-164.
Sanders, K.E., Molgaard, M., Shigemasa, M., 2019. The relationship between culturally relevant materials, emotional climate, ethnic composition and peer play in preschools for children of color. Journal for Multicultural Education 13 (4), 338-351. DOI: 10.1108/JME-02-2019-0014.
Schmidt, B., 1984. Empirische Untersuchung emotionaler Wirkungen verschiedener Tempi bei rhythmisch betonter Musik. Jahrbuch der deutschen Gesellschaft fu¨r Musikpsychologie 1, 149–159.
Schulte, J., 2019. Streets of comfort: design of urban streets and parks for users impacted by severe stress and traumatic stress in Cairo, Egypt. Kansas State University.
Seitz, M.J., Templeton, A., Drury, J., Köster, G., Philippides, A., 2017. Parsimony versus reductionism: how can crowd psychology be introduced into computer simulation? Review of General Psychology 21 (1), 95-102. DOI: 10.1037/gpr0000092.
Semin, G., Cacioppo, J.T., 2008. Grounding social cognition: Synchrnonization, coordination, and co-regulation. In G. Semin & E. Smith (Eds.), Embodied grounding: Social, cognitive, affective, and neuroscientific approaches (pp. 119–147). New York, NY: Cambridge University Press.
Sharp, J.R., 2011. The Emotional Calendar: Understanding Seasonal Influences and Milestones to Become Happier, More Fulfilled, and in Control of Your Life, 1st Edition, 288 p.
Shu, H., Xiong, P.P., 2019. Reallocation planning of urban industrial land for structure optimization and emission reduction: a practical analysis of urban agglomeration in China's Yangtze River Delta. Land Use Policy, 81, 604-623. DOI: 10.1016/j.landusepol.2018.11.034.
Simon, H.A., 1967. Motivational and emotional controls of cognition. Psychological Review 74 (1), 29–39. DOI: 10.1037/h0024127.
Simon, H.A., 1983. Reason in human affairs. Stanford, CA: Stanford University Press.
Simon, H.A., 1997. Models of bounded rationality: Empirically grounded economic reason (Vol. 3). MIT press, p. 336.
Slaper, T.F., Hall, T.J., 2011. The triple bottom line: What is it and how does it work. Indiana business review 86 (1), 4-8.
Śliwińska-Kowalska, M., Zaborowski, K., 2017. WHO environmental noise guidelines for the European region: a systematic review on environmental noise and permanent hearing loss and tinnitus. International journal of environmental research and public health 14 (10), 1139. DOI: 10.3390/ijerph14101139
Soroka, S., Fournier, P., Nir, L., 2019. Cross-national evidence of a negativity bias in psychophysiological reactions to news. Proceedings of the National Academy of Sciences 116 (38), 18888-18892. DOI: 10.1073/pnas.1908369116.
Soroka, S., McAdams, S., 2015. News, politics, and negativity. Political Communication 32 (1), 1–22. DOI: 10.1080/10584609.2014.881942.
Spasova, Z., 2011. The effect of weather and its changes on emotional state – individual characteristics that make us vulnerable. Advances in Science & Research 6, 281–290. DOI: 10.5194/asr-6-281-2011.
Stavrova, O., Luhmann, M., 2016. Are conservatives happier than liberals? Not always and not everywhere. Journal of Research in Personality 63, 29-35. DOI: 10.1016/j.jrp.2016.04.011.
Steinheuser, V., Ackermann, K., Schönfeld, P., Schwabe, L., 2014. Stress and the city: Impact of urban upbringing on the (re) activity of the hypothalamus-pituitary-adrenal axis. Psychosomatic Medicine 76 (9), 678-685. DOI: 10.1097/PSY.0000000000000113.
Stott, C., Drury, J., 2017. Contemporary understanding of riots: classical crowd psychology, ideology and

the social identity approach. Public Understanding of Science 26 (1), 2-14. DOI: 10.1177/0963662516639872.

Streich, B., 2012. Stadtplanung in der Netzwerkgesellschaft. arcAktuell 4, 19–21.

Surakka, V., Tenhunen-Eskelinen, M., Hietanen, J.K., Sams, M., 1998. Modulation of human auditory information processing by emotional visual stimuli. Cognitive Brain Research 7 (2), 159-163. DOI: 10.1016/s0926-6410(98)00021-4.

Svalgaard, L., 2016. Staying mindful in action: the challenge of 'double awareness' on task and process in an Action Lab. Action Learning: Research and Practice 13 (1), 50-59. DOI: 10.1080/14767333.2015.1130350.

Sweet, E.L., 2018. Cultural Humility: An Open Door for Planners to Locate Themselves and Decolonize Planning Theory, Education, and Practice. E-Journal of Public Affairs, 1-17.

Sznycer, D., Cosmides, L., Tooby, J., 2017. Adaptationism carves emotions at their functional joints. Psychological Inquiry 28 (1), 56-62. DOI: 10.1080/1047840X.2017.1256132.

Tausch, N., Becker, J.C., Spears, R., Christ, O., Saab, R., Singh, P., Siddiqui, R.N., 2011. Explaining radical group behavior: Developing emotion and efficacy routes to normative and nonnormative collective action. Journal of Personality and Social Psychology 101, 129–148. DOI: 10.1037/a0022728.

The Allen Consulting Group, 2005. Valuing the Priceless: The Value of Heritage Protection in Australia. Research Report 2, Heritage Chairs and Officials of Australia and New Zealand, Sydney.

Tofallis, C., 2020. Which formula for national happiness? Socio-Economic Planning Sciences 70, 100688. DOI: 10.1016/j.seps.2019.02.003.

Trejo, M.R., 2019. The role of emotions in feminist research. Knowledges, Practices and Activism from Feminist Epistemologies, 39.

Tsutsui, Y., 2013. Weather and Individual Happiness. Weather, Climate, and Society 5, 70–82. DOI: 10.1175/WCAS-D-11-00052.1.

United Cites and Local Governments, 2010. Culture: Fourth Pillar of Sustainable Development [Online]. Available: http://www.agenda21culture.net/sites/default/files/files/documents/en/zz_culture4pillarsd_eng.pdf [Accessed 22 September 2020].

Van Assche, K., Beunen, R., Duineveld, M., de Jong, H., 2013. Co-evolutions of planning and design: Risks and benefits of design perspectives in planning systems. Planning Theory 12 (2), 177–198. DOI: 10.1177/1473095212456771.

Van der Linden, S., 2017. The nature of viral altruism and how to make it stick. Nature Human Behaviour 1, 0041. DOI: 10.1038/s41562-016-0041

Van Kleef, G.A., Fischer, A.H., 2016. Emotional collectives: How groups shape emotions and emotions shape groups. Cognition and Emotion 30 (1), 3-19. DOI: 10.1080/02699931.2015.1081349.

Van Ness, J., Summers-Effler, E., 2016. Reimagining Collective behavior. Handbook of Contemporary Sociological Theory, 527-546. Springer, Cham. DOI: 10.1007/978-3-319-32250-6_25.

Van Zomeren, M., Leach, C.W., Spears, R., 2012. Protesters as "passionate economists": A dynamic dual pathway model of approach coping with collective disadvantage. Personality and Social Psychology Review 16, 180–199. DOI: 10.1177/1088868311430835.

Van Zomeren, M., Spears, R., Fischer, A.H., Leach, C.W., 2004. Put your money where your mouth is! Explaining collective action tendencies through group-based anger and group efficacy. Journal of Personality and Social Psychology 87 (5), 649–664. DOI: 10.1037/0022-3514.87.5.649.

Varghese, R., 2020. Intergroup dialogue: frequencies of social justice. Social Work with Groups, 43 (1-2), 109-113. DOI: 10.1080/01609513.2019.1639976

Verkuyten, M., Yogeeswaran, K., 2020. Cultural diversity and its implications for intergroup relations. Current opinion in psychology 32, 1-5. DOI: 10.1016/j.copsyc.2019.06.010.

Vlemincx, E., Vigo, D., Vansteenwegen, D., Van den Bergh, O., Van Diest, I., 2013. Do not worry, be mindful: Effects of induced worry and mindfulness on respiratory variability in a nonanxious population. International Journal of Psychophysiology 87 (2), 147–151. DOI: 10.1016/j.ijpsycho.2012.12.002.

Von Scheve, C., Ismer, S., 2013. Towards a theory of collective emotions. Emotion review 5 (4), 406-413. DOI: 10.1177/1754073913484170.

Wahlström, M., Kourtit, K., Nijkamp, P., 2020. Planning Cities4People–A body and soul analysis of urban neighbourhoods. Public Management Review 22 (5), 687-700. DOI: 10.1080/14719037.2020.1718190.

Wojcik, S.P., Hovasapian, A., Graham, J., Motyl, M., Ditto, P.H., 2015. Conservatives report, but liberals display, greater happiness. Science 347 (6227), 1243-1246. DOI: 10.1126/science.1260817.

Woods, M., Anderson, J., Guilbert, S., Watkin, S., 2012. The Country(side) Is Angry': Emotion and Explanation in Protest Mobilization. Social & Cultural Geography 13, 567–85. DOI: 10.1080/14649365.2012.704643.

Xing, Y., Brimblecombe, P., 2020. Urban park layout and exposure to traffic-derived air pollutants. Landscape and Urban Planning 194, 103682. DOI: 10.1016/j.landurbplan.2019.103682.

Yang, J., 2019. Safety urban planning and design based on disaster prevention, crime prevention and psychological safety. Open House International 44 (3), 84-87.

Yoon, E.J., Kim, B., Lee, D.K., 2019. Multi-objective planning model for urban greening based on optimization algorithms. Urban Forestry & Urban Greening, 40, 183-194. DOI: 10.1016/j.ufug.2019.01.004.

Yu, S.J., 2019. Can affective atmospheres justify megaprojects? A case study of the 'Asia New Bay Area'in Kaohsiung, Taiwan. Emotion, Space and Society 31, 1-9. DOI: 10.1016/j.emospa.2019.01.003.

Zaino, A.A., Abbas, M.Y., 2020. Single-case experimental research; Designing emotions by designing Spaces: A pilot study. Environment-Behaviour Proceedings Journal 5 (13), AicQoL2020Malacca, 18-19 Mar 2020. DOI: 10.21834/e-bpj.v5i13.2103.

Zavadskas, E.K., Bausys, R., Kaklauskas, A., Raslanas, S., 2019. Hedonic shopping rent valuation by one-to-one neuromarketing and neutrosophic PROMETHEE method. Applied Soft Computing 85, 105832. DOI: 10.1016/j.asoc.2019.105832.

Zavadskas, E.K., Bausys, R., Kaklauskas, A., Ubarte, I., Kuzminske, A., Gudiene, N., 2017a. Sustainable market valuation of buildings by the single-valued neutrosophic MAMVA method. Applied Soft Computing 57, 74-87. DOI: 10.1016/j.asoc.2017.03.040.

Zavadskas, E.K., Cavallaro, F., Podvezko, V., Ubarte, I., Kaklauskas, A., 2017b. MCDM assessment of a healthy and safe built environment according to sustainable development principles: A practical neighborhood approach in Vilnius. Sustainability 9 (5), 702. DOI: 10.3390/su9050702.

Zeile, P., Resch, B., Dörrzapf, L., Exner, J.P., Sagl, G., Summa, A., Sudmanns, M., 2015. Urban emotions–tools of integrating people's perception into urban planning. Real corp 2015. Plan Together–Right Now–Overall, 905–912.

Zhang, F., Zhou, B., Liu, L., Liu, Y., Fung, H.H., Lin, H., Ratti, C., 2018. Measuring human perceptions of a large-scale urban region using machine learning. Landscape and Urban Planning 180, 148-160. DOI: 10.1016/j.landurbplan.2018.08.020.

Zhou, W., Zhu, Z., Vredenburgh, D., 2020. Emotional intelligence, psychological safety, and team decision making. Team Performance Management 26 (1/2), 123-141. DOI: 10.1108/TPM-10-2019-0105.

Zimasa, T., Jamson, S., Henson, B., 2017. Are happy drivers safer drivers? Evidence from hazard response times and eye tracking data. Transportation Research Part F: Traffic Psychology and Behaviour 46 (Part A), 14–23. DOI: 10.1016/j.trf.2016.12.005.

Zúñiga, X., 2003. Bridging differences through dialogue. About Campus 7 (6), 8-16. DOI: 10.1177/108648220300700603.