International Scientific Methodical Conference "BALTIC SURVEYING'21"
Latvia, 6th May, 2021

Monika BALAWEJDER[1], Agnieszka BIEDA[2], Jarosław BYDŁOSZ[2], Artur WARCHOŁ[1,3], Pavlo KOLODIY[4] and Katarína PUKANSKÁ[5]

[1] PWSTE Bronisław Markiewicz State University of Technology and Economics in Jarosław, Poland
[2] AGH University of Science and Technology in Krakow, Poland
[3] ProGea 4D sp. z o.o. Krakow, Poland
[4] Lviv National Agrarian University, Faculty of Land Management in Dublany, Ukraine
[5] Technical University of Košice, Slovakia

Application of 3D technology for the virtual walks in Rzeszow and Lviv during COVID-19 pandemic

Abstract

During the COVID-19 pandemic, human mobility has been limited all over the world. People started to take advantage of computer technology in order to compensate for the lack of possibility to leave their home. Virtual travel, which can be conducted in many different ways, has become one of the ways of using this technology. Therefore, analyses have been carried out to investigate the possibility of applying 3D technology in the promotion of underground tourist attractions. The Underground Tourist Route in Rzeszow (Poland) and the underground of the Old City Hall in Lviv (Ukraine) were selected as the research objects. They were inventoried with the terrestrial laser scanning (TLS) method and with the application of Faro Focus 3D laser scanner. Then films demonstrating virtual tour around the inventoried objects were created on the basis of the clouds of points obtained during the measurements. As a part of the research, it was verified whether these methods could encourage people to visit the researched objects more than their standard advertisements presented on the Internet. The evaluation was performed with the use of semantic differentiation test. The survey research carried out for this purpose was implemented using CAWI technique. The questionnaires were available for the respondents from the last week of April 2020 to the first week of July 2020. The size of the researched group accounted for 393 people. The respondents came from 23 countries on 5 continents. Unfortunately, the conducted research did not provide a clear answer to the question whether the use of 3D technology in the promotion of tourist attractions, such as the researched objects, may change their perception among potential visitors. However, the results obtained confirm that it may be a good move, both for scientific research and for the development of a new branch of tourism.

Keywords
tourist attractions, historical city, cultural heritage sites, limited mobility, underground structures, semantic profile, laser scanning, pandemic.
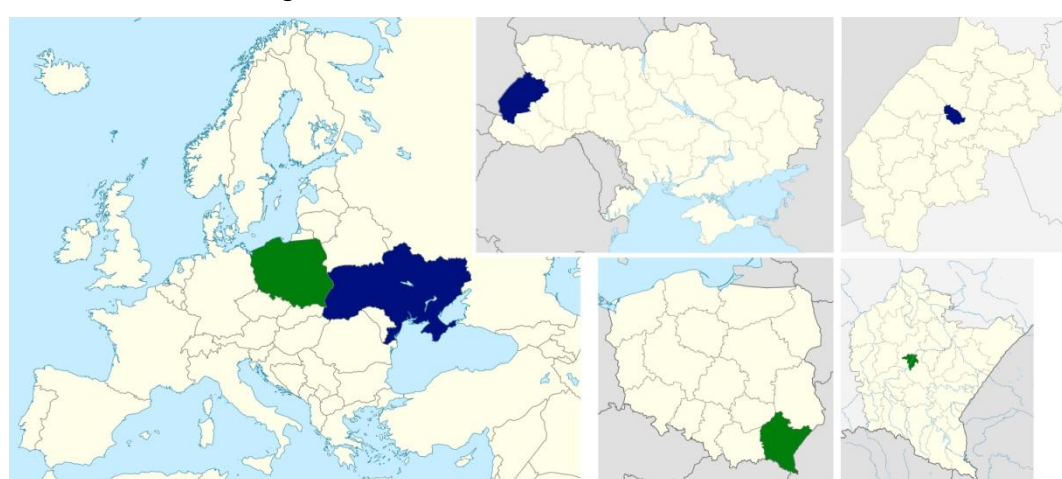
Research objects

Fig. 1. The location of Rzeszow (green colour) and Lviv (blue colour). Source: own study.

Methodology of Measurements

Fig. 2. The point cloud of the Underground Tourist Route and the Main Market Square in Rzeszow coloured with RGB values. Source: own study.

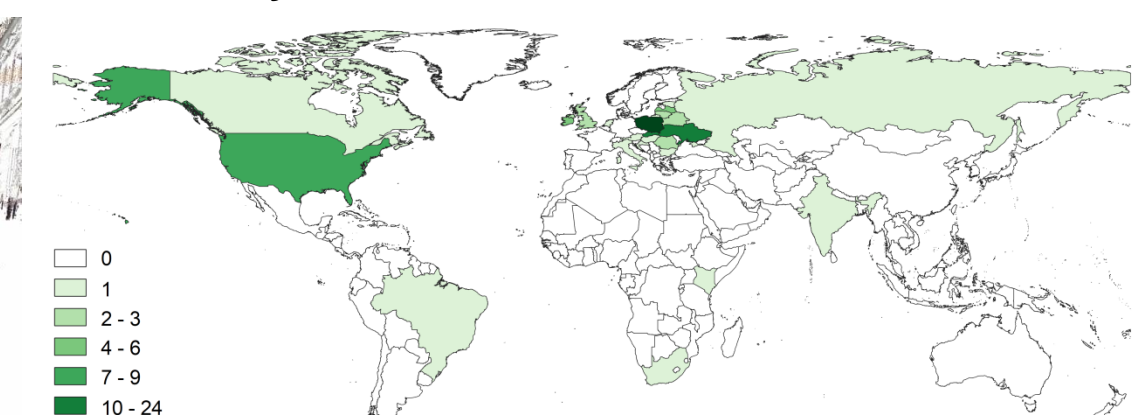*Fig. 3. The point cloud of the underground of the Old City Hall in Lviv coloured with RGB (ground level - walls) and intensity values (underground). Source: own study.*

Survey research

Fig. 4. The distribution of the respondents' origin. Source: own study.

Results and Discussion

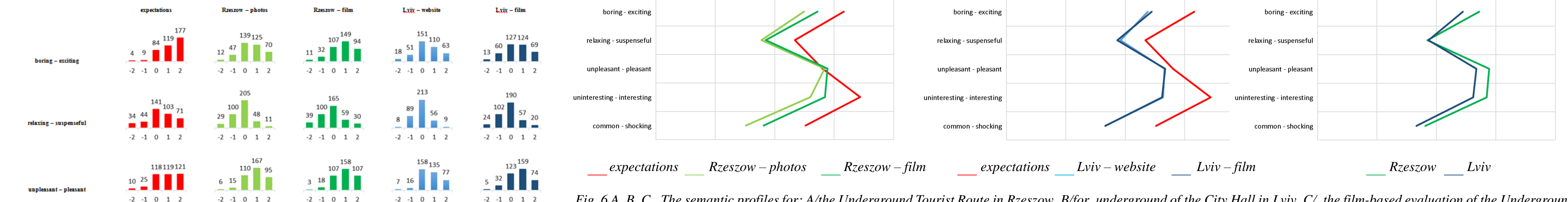*Fig. 5. Histograms of the answers given in the semantic differentials. Source: own study.*

Fig. 6 A, B, C . The semantic profiles for: A/the Underground Tourist Route in Rzeszow B/for underground of the City Hall in Lviv C/ the film-based evaluation of the Underground Route in Rzeszow and the underground of the City Hall in Lviv. Source: own study.

Fig. 7. The survey questions concerning the evaluation of the photographs and the film about the Underground Tourist Route in Rzeszow. Source: own study.

Fig. 8. The survey questions concerning the evaluation of the photographs and the film about the Underground Tourist Route in Rzeszow. Source: own study.

Conclusions

The reason for which the authors of this paper addressed the issue related to tourism was the limited mobility which resulted from the Covid-19 pandemic and started in Europe at the end of the first quarter of 2020. Having clouds of points that were created during the inventory of the Underground Tourist Route in Rzeszow and the underground of the City Hall in Lviv, films presenting the possessed measurement data were recorded and made available on the Internet together with the survey. Although the research did not demonstrate the influence of these specific materials on the perception of the researched objects, they allowed for some significant observations. The respondents were given the possibility to add some comments to the survey just upon its completion. They were willing to take use of it and pointed advantages and disadvantages of the applied method of presenting historical underground objects. In their opinions, apart from laser scanning data, panoramic (spherical) photographs could be taken in the researched objects so as to make virtual tours on their basis. The films themselves still have some deficiencies that were noticed as well (particularly by the respondents professionally engaged in surveying). Ultimately, on the basis of the cloud of points presented in the films, the authors should make some models which would much better reflect the nature of the researched objects. In addition, the films used the through-wall imaging, which some of the respondents especially enjoyed. The others, however, regarded the effect obtained in that way as a big disadvantage. Moreover, the respondents would be very eager to hear background music in the films. They also suggested showing some attractions inside the scanned objects (either real or virtual). In fact, real attractions which could be scanned together with the objects are being created in both cases. The Underground Tourist Route is just being modernised and it is to obtain a more multimedia character (as at July 2020), while the underground of the City Hall in Lviv is to be included into the *Underground Lviv* route and adapted for an exhibition on the history of the city. Virtual attractions, for example additional descriptions or references to multimedia, could be certainly implemented if a virtual tour basing on the models of these objects were to be created instead of a film. Some of these ideas will be developed by the authors in the future.

Further reading: *BIEDA ·A., BALAWEJDER M., WARCHOŁ A., BYDŁOSZ J., KOLODIY P., PUKANSKÁ K., 2021. "Use of 3D technology in underground tourism: example of Rzeszow (Poland) and Lviv (Ukraine)" Acta Montanistica Slovaca* - In press