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Smart-technologies in Public Transport and their Perception by the Youth Audience

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Abstract

Objectives: The aim of this paper is to identify the activity of use and the perception of existing smart-technologies by the youth audience in the area of public transport in Moscow. **Method:** The perception of smart-decisions as regards public transport, realized to date by the young audience, should be investigated for the development and adjustment of city policy in this area. The study is an online survey of young audience, who live in the Moscow region; the number of respondents was 439 people aged 18-25 years. **Findings:** The proportion of respondents who use the smart-technology capabilities to plan their trips and payment for them has been found. The main differences in the behavior of young respondents of those who use and those who do not use smart-technology capabilities in public transport in Moscow also have been identified. Using the smart-technologies in public transport by young consumers is intense; with the use of technologies users solve problems of various types. Problems of receiving information and optimization are solved more actively, while those concerning performing actions on the fare are dealt a little less actively. **Improvements:** Using smart-technologies allows partially solving the problems arising from the use of public transport.

Keywords: Public Transport, Smart-Cities, Smart-Technologies, Urban Development, Young Audience

1. Introduction

The development of smart-technology usage in public transport is one of the key aspects of the formation of smart-cities focused on attracting residents with substantial innovative and entrepreneurial potential. In the current demographic conditions, to attract and retain young people – the future of the "creative class" – is a necessary factor in the development of big cities. Therefore, the perception of smart-decisions as regards public transport, realized to date by the young audience, should be investigated for the development and adjustment of city policy in this area.

The life of the modern city is rapidly modified under the influence of technological progress, especially in information technology sphere. Over time, technological innovations are becoming more affordable, which leads to an increase in functionality and convenience in a modern city. And it is absolutely essential for a balanced development of the metropolis, where the number of inhabitants constantly grows. Population growth, increase in the area of urban development will a priori create inconvenience for current residents. The only way to maintain comfort for the citizens, as well as attracting new residents of the highest innovative and entrepreneurial potential, including representatives of the creative class, is the development of a new type of facilities based on the use of smart-technologies that negate the problem of the high population size. "Smart" is the property of an object, characterizing the integration in this object of two or more elements that were not previously connected, which is implemented with the use of the Internet¹. European, American and Asian cities are competing to attract the most promising population, in particular through the development and implementation of concepts and strategies for smart-cities, and making much emphasis on the development of transport systems and e-government.

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Not all residents of cities are equally prepared to take advantage of smart-tech; at the same time, the youth of the urban population is at the forefront, as they are more familiar with information technologies, more often use smartphones, train faster, including teaching each other. This category of citizens can be considered as a driver of smart-technology development and demonstrates behavior that will be taken over by older residents to a certain extent over time.

This youth audience of metropolis is a new generation of creative class, a significant part of which is a prerequisite for sustainable and innovative development of a big city. Due to the fact that the young audience aged 18-25 years (students and recent graduates) shows some differences in their behavior associated with the consumption of products and services, from a more adult audience; it is advisable to investigate it separately.

The article is structured as follows. Its second section will be devoted to a brief discussion of the smart-city concept, its key areas of development and the necessary conditions of its implementation with a focus on the transport component. The third section highlights the issue of consumer behavior characteristics of the youth (student) audience. The fourth section presents the method used to obtain information, characterizes the logic of research and methods of data processing. The fifth part of the material presents empirical findings on the share of active users of smart-technologies in public transport and the peculiarities of their behavior compared to non-users. The final part summarizes the study.

2. The Development of Smarttechnologies for Public Urban Transport

The concept of smart-city is still controversial in terms of development of its strict criteria, therefore a number of cities claim to this title without objective evidence^{2–4}. Modern cities should take into account the changing socio-economic conditions, consider them in their development strategies, seeking to ensure the prosperity of the citizens⁵. Big cities generate a large number of new types of problems, such as resource scarcity, pollution, health care organization, the growing number of vehicles, congestion and aging urban infrastructure, as well as the problem of settlement of divergent interests of many stakeholders, social and political complexity⁶. There

are many definitions of a smart-city, but the universal approach has not yet been found. The problem arises largely because of the complexity of the definition of "smart", therefore smart-city concept is very variable one^Z. And given the fact that the technologies are developing very fast, approach to the determination should be reviewed constantly. However, the approach of Centre of Regional Science at the Vienna University of Technology seems closest to us, which defined the direction or the axis of creation of smart-cities: smart economy, smart mobility, smart environment, smart people, smart living, and smart governance. The axes are based, respectively, on theories of regional competitiveness, transport and ICT (Information and Communication Technologies) economics, natural resources, human and social capital, quality of life, and participation of societies in cities. The definition of smart-city is as follows: when the investment in human and social capital, as well as traditional (transport) and modern (information) infrastructure are a source of sustainable economic growth and quality of life, the wise management of natural resources through participatory management⁸ is integrated in terms of understanding of goals, necessary resources and management approaches. However, a narrower definition of smart-city allows accentuating on relevant information technologies: Smart cities represent a conceptual development model that aspires to use ITCs for the development of a city's human, collective, and technological capital, with the ultimate scope of increasing urban sustainability². Regardless of the approaches, there are difficulties in determining which city can be called a smart-city, and what characteristics it must meet. It is important to note that municipal administration of many big cities strive to create a smart-city, even if it is only the introduction of some elements.

The following characteristics can be considered as the most important and the key ones². The first characteristic is the central role of technologies as the means of accumulating, handling and using a large amount of information available for use by a growing number of people to improve urban life and the preservation of resources. On the one hand technology is the driver of this process, as there is a reasonable possibility to real-time monitoring of various processes of urban life, such as car traffic and public land transport, on the other hand, due to the spread of the use of social networks and their integration with a variety of mobile applications, users-citizens actively contribute to the accumulation of information about

their activities. Thus, city officials analyzing received data have an opportunity to observe trends in behavior and predict events for proactive response. City officials can make more informed decisions and effectively address the problems of the city, and its population will have a better quality of life^{5,10}. In big cities, a high mobility of citizens is of decisive importance for the balanced development of the city, so they must have the most complete and current information about the possibilities of public transport, utilization and condition of roads, as well as convenient features for travel payment¹¹.

The second characteristic of the smart-city is the development of human and social capital through the creation and dissemination of knowledge, in particular the establishment of new forms of innovations - open innovations. Thus, in smart cities a large part of knowledge is generated collectively and everyone makes a difference. Examples of such processes are numerous forums of open innovations, as well as seeking innovative ideas from their customers by such large Russian companies as Sberbank and Russian Railways. Smart cities help attract the most highly qualified specialists, because they have the motivation and opportunities for effective use of information technologies. According to some authors, creative, intelligent and highly educated people promote urban development more intensively 12,13. The concentration of university graduates affects the rate of economic growth of the city where they live14. Furthermore, big cities can be considered as a tool of knowledge creation in the knowledge economy, where urban capital structure surrounds and supports the human capital to promote the value creation process¹⁵. Collective intelligence is much more powerful than individual¹⁶. Smart cities usually offer the internet-based platform to gather the views and evaluations of city's residents on the effectiveness and viability of urban solutions and real-time services¹⁷, which allows the city authorities to not only obtain the necessary information, but also to involve the citizens in the city's development process.

The third characteristic of smart cities is the creation of favorable conditions for business development and raising capital. The task of city authorities is to create the atmosphere and offer the spectrum of services for entrepreneurs. Smart cities strive to create an environment of support and development of a diversified business with a high degree of innovation. The long-term objective of the authorities is to develop innovative strategies to create smart-specialization of cities and regions based on their

strengths, competitive advantages and regional priorities for knowledge management18.

The fourth characteristic of smart cities is to create opportunities for networking. Cities aim to maintain a particular target image, attractive for residents, tourists and businessmen. For the dissemination of information about the city, the formation of its image, the city authorities should organize a permanent, interactive communication with residents and other stakeholders, through which information about the city's development concept, its brand, objectives of development, priorities and other important information will be spread. The fourth characteristic is the marketing activities related to the promotion of the brand of the city, various cultural, sports, scientific and business events, as well as the availability of information about the city in the digital environment: web sites, official sites or groups in social networks, mobile applications.

From the point of view of residents' satisfaction, as well as areas of management for city authorities, a smart city concept is practically implemented in the following areas: transport, public services, health, monitoring of condition and protection of the environment, safety and involvement of citizens in decision-making on issues of urban life. Transport is one function of the city, of which the majority of the citizens enjoy on an almost daily basis. At the same time citizens resort to the services of health care institutions and public services with different intensity depending on the health and specifics of situations. This explains the choice of the transport sector as a scope of the smart-technology for this study.

PwC Agency¹⁹ published a report on data-driven cities, in which the 5 world cities - leaders in the use of smart-technologies have been defined on the basis of the following criteria: level of implementation of technological solutions in the areas of municipal management, readiness of the urban environment for the introduction of decisions based on the data, the number of mentions of technological solutions in the official press releases of cities, the number of references to cities in scientific articles and specialized media related to technological subjects. According to the study, Moscow joined the top five along with New York, London, Barcelona and Sydney. Moscow is one of the world leaders in the implementation of solutions based on the data, particularly in the area of traffic management, safety and healthcare.

Speaking about the most successful solutions in the field of transport management, the implementation of an integrated fare collection system in public transport via the electronic payment card Troika should be noted, the use of which allows getting detailed information about the movement of citizens. According to PwC¹⁹, 47% of trips in the subway, and 54% of trips in the ground transportation are paid through Troika card. The experience of using the information obtained by monitoring the movement of citizens allowed determining the priorities for the development of the transport network, creation of new public transport routes. The city also implemented a smart parking, which analyzes the congestion of parking and informs the drivers. Public transport is equipped with GPS, which made it possible to create mobile applications that help citizens know the time of the necessary transport arriving. The most common mobile application in Moscow is Yandex. Transport, the number of users of which is approximately 4.2 million according to expert estimates, only in July 2016 the number of application downloads reached 218,000. There are several other applications, but the number of downloads does not exceed 150 000. Since the beginning of the introduction of smart-technologies in public transport in Moscow (from 2014), the behavior of transport users has begun to change. And city authorities encourage passengers to do so more and more actively, in particular, there are new modern opportunities for transport fare and for payment for visiting some other city facilities, such as the zoo or planetarium by the same card.

3. Peculiarities of Young Consumers' Behavior

In this article, under the "young consumers" we mean people aged 18-25 years. A number of researchers, analyzing the behavior of young consumers, in particular exploring their preferences when buying clothes²⁰, show that "...it is important that the emphasis is on fresh innovative designs and not just on producing the same designs again and again, that reflects peculiarities of their consumer intentions. This factor is also important for young consumers as regards high-tech devices and software applications. Thus, the "2014 Mobile Behavior Report"21 has noted that the factor of "technological leadership" is important for 76% of consumers aged 18-24 years. In addition, by virtue of their information retrieval skills and the ease of use of information technologies, young consumers have a major impact on their families, and are often considered as the most important group of consumers²². An important issue in this case is the dominance of hedonic and utilitarian consumption among young consumers and its relation to their values, consumer intentions and subsequent selection. In ²³ conducted on a sample of students (young consumers), a statistically significant association of hedonic and utilitarian factors with satisfaction and consumer intentions has been found. In other studies, also conducted as regards the student audience, the authors analyzing the factors influencing the preferences of young consumers point out that "convenience" is one of the most important factors in consumer choice of young audiences²⁴.

In-25 studying student audience showed that the changes in consumer behavior and their attitudes to brands observed because of the fact that the consumer values, along with the result of the process of globalization, affect changes in consumption patterns. The spread of different models of consumer behavior among the young audience is largely due to the exchange of consumer experiences through social media²⁵. According to some researchers²⁶, young consumers are the most active users of the Internet, so they feel connected with the world and show global consciousness. The main feature of their behavior is the ease of use of information technologies, including smart-technologies. The Internet is the main channel of searching and receiving information for this group of consumers.

For the prior approval of the above factors in consumer behavior of youth student audience, the research has been conducted as a sub study on the basis of the grant allocated by Plekhanov Russian University of Economics, for the development and testing methodology of wave market research, consumer preferences and values of student audience. As a method of research focus groups with students at Plekhanov Russian University of Economics have been selected. Focus groups have been conducted based on the method described in 27. Two focus groups have been totally conducted by researchers with gender division for identifying consumer preferences and one joint group to determine value orientations. Gender division has been used to eliminate the influence of the opposite sex on the respondents' answers. Before the beginning of the conversation participants completed the classification questionnaire containing questions about the course number, faculty and financial dependence on parents' support. Analysis of obtained results that can be attributed to the subject of this article has shown that students who we refer to "young consumers" category

(the overwhelming majority of students in Russia, with first degree of Bachelor or Master, are in the age group of 18-25 years) also note the factor of "technological leadership" as one of the most important factors. In addition, evaluating a variety of mobile applications and "gadgets", participants of the focus groups, regardless of gender differences highlighted the importance of "simplicity and intuitive interface". Many participants of the focus groups have noted the importance of opportunities to keep in touch through social networks and instant messengers and the need for their communication with various smart-technologies. The results have been used by us to study the behavior of young users of transport services.

4. The Method of Investigating the **Behavior of Young Consumers** of Transport Services

The aim of the research is the study of the change in the behavior of young consumers (18-25 years) when using smart-technologies in public transport. In the study, we relied on studies of Moscow public transport previously conducted at the Plekhanov Russian University of Economics in 2014 and 2015^{28,29}. We proceed from their assumption that the younger generation between 18 and 25 years are the main users of smart-technologies.

The hypothesis of the study suggests that there are differences in the behavior of public transport passengers between the age of 18 to 25 year, those who use and those who do not use smart-technologies.

The study has been conducted using the online survey in July 2016. Totally 439 respondents have been interviewed. Questions have been divided into two blocks:

- socio-demographic profile of the respondent;
- the impact of smart-technologies on passengers of the public transport in Moscow.

Results of subsequent studies are based on valid observations. But this study is characterized by the following limitations. Firstly, judgmental sampling method has been used, so the results cannot be extended to the general population of youth audience. Secondly, the study has been conducted simultaneously, and the area under study is very dynamic, in particular innovative solutions in the field of public transport, based on

smart-technologies are deployed rapidly. Therefore, more accurate results would be obtained if the studies were of wave character.

The study used the following socio-demographic indicators and their categories: gender; income level; the level of education; marital status; occupation; the most commonly used mobile device (mobile phone (with buttons); Android Tablet; iPad, the Windows tablet; Android smartphone, Apple smartphone, Windows Smartphone).

Initial analysis of the data showed the following. Among respondents there are 35% men and 65% women (439 observations). Respondents related to the lower segment of the middle class (63% - they have sufficient income for clothes and small household appliances purchase) dominate according to their income level. The distribution by level of education: 47% have incomplete higher education (3 complete university courses), 31% higher education (bachelor degree), others - secondary education. Singles/unmarried respondents make up the vast majority - 84%. The main category by occupation students/learners make up 62% of the respondents. The most commonly used mobile devices are Apple smart phones (50% of respondents) and Android (32%).

Analysis of respondents' answers to questions related to the theme of transport has been conducted. The list of issues is presented below; each question corresponds to a quantitative or categorical variable.

- How often do you use public transport;
- How often do you go by bus;
- How often do you go by trolley bus;
- How often do you go by tram;
- How often do you use the subway;
- How often do you use electric trains;
- How often do you use taxi services;
- Which payment method is preferred;
- You use public transport most often in order to...;
- How significant the following problem is when using public transport: too many passengers in public transport;
- How significant a problem is when using public transport: long line to buy a ticket;
- How significant a problem is when using public transport with inconvenient work schedule (for example, the metro closes before I get to it);
- How significant a problem is when using public transport: high cost of travel;

- How significant a problem is when using public transport: sudden traffic jams on the route;
- How significant a problem is when using public transport: no possibility to plan itinerary;
- How significant a problem is when using public transport: no actual schedule;
- How significant a problem is when using public transport: road jams;
- How significant a problem is when using public transport: too long waiting time;
- How significant a problem is when using public transport: the lack of information about the changes in public transit;
- How significant a problem is when using public transport: difficulties with finding entrance to the subway;
- Do you use mobile applications to solve problems encountered in transport;
- Do you use any special sites and applications for more productive movement;
- If you use mobile applications, what problems do you solve with their help.

To solve this problem, two working hypotheses have been put forward before analysis in the study based on the causal relationship between the variables.

The variables that allow classifying respondents by degree of use of smart-technologies have been selected:

- Which payment method is preferred?
- Do you use mobile applications to address problems arising in transport?

Hypotheses characterize the influence of various factors on the method of payment for travel and the use of mobile applications to meet the challenges in public transport.

- 1. Hypothesis H₁: Problems when using public transport affect the payment method.
- 2. Hypothesis H₂: problems when using public transport affect the use of mobile applications to meet the challenges in transport.

Further analysis has been aimed at the confirmation/refutation of these hypotheses which will be considered in pairs.

5. Research Results

As a result of the primary data analysis, the following findings have been obtained.

51% of respondents use public transport several times a day, 78% – on a daily basis. Only 10% of respondents do not belong to the target group – the permanent passengers use public transport 1-2 times a month or less.

As for the types of public transport, the most popular means of transportation is the subway; by a considerable margin, 47% of respondents use it on a daily basis; the number of those who use it rarely amounts to 19%. The bus comes in the second place in popularity (27% use it daily and 24% rarely), the third place is taken by the train commuter (13% and 46%, respectively), the fourth – a trolley (12% and 54%), the least popular are taxi service (8% and 43%) and the tram (9% and 60%).

The vast majority of respondents (60%) answered that the main reason for the use of public transport is the need to travel to work/school and back.

The most significant problem is the large number of passengers (59%); traffic jams on the route and the high cost of travel are in second place in importance (43% and 41%, respectively).

The preferred method of fare payment is as follows: 22% of respondents actively use smart-technologies in choosing the method of payment (bank transfer); 49% partly use it (they prefer cash payment by electronic purse), i.e. smart-technologies for them are not strangers. Thus 71% of respondents use these technologies to varying degrees.

The proportion of respondents who use mobile applications to address problems arising in transport is quite high and constitutes 54%.

As for the use of specialized sites and applications for more productive movement: specialized resources are not used by 17% of respondents. The proportion of using mobile apps is 83% – the audience, in fact, already applies smart-technologies.

Distribution of respondents by problems solved with the help of mobile applications in transport: the main objectives are to build the route and timing paths (24% of respondents), 22% of respondents have added tracking of the traffic to the first problem. Thus, the construction of the route is a priority for 64% of respondents.

5.1 Testing Hypotheses

Since the study of the problems when using public transport has been carried out on a 5-point scale of importance (1 is not a significant problem at all, 2 is not a significant problem; 3 is a partially significant problem; 4 is a significant problem; 5 is a very significant problem), it is appropriate to make the comparison of the average

values of significance when using public transport for each payment method and the use of mobile applications. For qualitative analysis, it is necessary to classify respondents according to the importance of the problems, and then to evaluate the behavior of respondents in each cluster.

As a method of classification a hierarchical cluster analysis has been chosen, Ward's measure method with the square of the Euclidean distance.

As a result of classification, three significant clusters have been obtained comprising 70%, 18% and 12% of the respondents. Schedule of average values of the problems related to the transport across the $3^{\rm rd}$ cluster is shown in Figure 1.

The first cluster includes respondents for whom the most important issue is the number of passengers, partially significant problems are waiting time and transport time (differentiation of problems). The second cluster presents the respondents, for which all the problems are significant, the 3rd one – all the problems are significant enough.

Graphs have been constructed on the basis of contingency tables describing the importance of the connection problems when using public transport, and the dependent variables (Figure 2, 3).

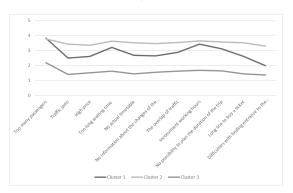


Figure 1. Schedule of average values of problem importance when using public transport according 3 clusters.

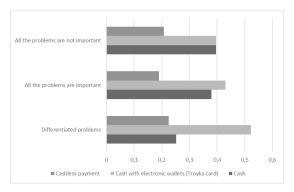


Figure 2. Connection of referring of respondents to clusters according to the importance of problems when using public transport and ways of fare.

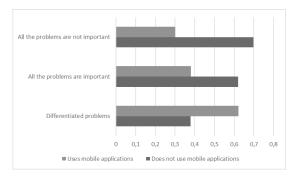


Figure 3. Connection of referring of respondents to clusters according to the importance of problems when using public transport and Mobil Apps.

The largest share of users of smart-technologies for the fare (75%), and the largest proportion who prefer cashless payments (23%) are among the respondents, for which the problems are the number of passengers, waiting time and transport time (cluster 1). Respondents, for which all issues are significant (cluster 2) prefer cash payment by electronic wallet (43%) and on-site (38%). Respondents for whom all problems are insignificant (the third cluster) are of the smallest share, they prefer cash using both electronic purses, and on-site (40%) payment.

Only among the users of the 1^{st} cluster, the number of mobile application solutions for the traffic problems is prevalent (62%). For the 2^{nd} and the 3^{rd} clusters there is the opposite picture – users of mobile applications, 38 and 30%, respectively.

Hypothesis H₁: problems when using public transport affect the payment method of travel – has been confirmed.

Hypothesis H_2 : problems when using public transport affect the use of mobile applications to meet the challenges of transport – has been confirmed.

6. Discussion and Implications

Smart-technologies can be used to solve four types of problems (tasks) by users: receiving information (about the time of arrival of the vehicle to a stop, etc.), optimization (construction of the shortest route to the desired destination), performing the action (travel) and discussing the experience of the use of transport services (feedback, comments, ratings). Different types of problems require different levels of user engagement and activity, as well as require a different level of preparedness. Thus, getting information and solving optimization problems require less activity from the user than the performance of actions and discussions, so it

is logical to assume that the first two types of problems are more common with the use of smart-technologies by users. Talking about the issues raised in the study, the use of mobile applications related to public transport allows solving the problem of obtaining information, and payment for trip costs by using smart-technologies is an example of an action.

The results showed that the youth segment of Moscow passengers actively uses current possibilities offered by smart-technologies. 71% of them use them to pay for the trip, 83% of respondents use mobile applications for more convenient use of public transport. Thus youth audience uses smart-technologies more extensively for information and optimization, but with a slight margin from action performance.

The importance of smart-technologies to address problems of Moscow passengers will increase with time due to the development of transport infrastructure and increase in the proportion of passengers that are adapted to smart-technologies.

It should be noted that the use of smart-technologies (especially the use of mobile applications) may allow passengers to partially solve some important problems: Too many passengers on the route, traffic jams – find less congested routes; the transport waiting time is too long; inconvenient time – the opportunity to complain to the appropriate service via mobile devices; the absence of the actual schedule; sudden overlap of traffic, lack of opportunities to plan the movement, lack of information about the changes in the movement – preliminary information about the time of arrival of transport, timing paths, offering alternative routes.

In general, through the use of smart-technologies in public transport, the city government can solve the problems of the population, partly due to the fact that people can differentiate the problem more clearly, which allow them to solve them aptly. Youth audience is at the forefront of the opportunities of smart-technologies, so the study of the audience allows the user to understand the basic benefit and to predict the future behavior of the citizens who currently are not users of smart-technologies. It is necessary to stimulate the audiences of other ages for a more active use of the opportunities of smart-technologies in public transport in order to maximize benefits and increase satisfaction with municipal services.

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8. References

- 1. Global Development Strategy of Smart Society [Internet]. [cited 2012 Mar 22]. Available from: http://smartmesi.blog-spot.ru/2012/03/smart-smart.html.
- 2. Nam T, Pardo T. Smart city as urban innovation: Focusing in management, policy and context. 5th International Conference on Theory and Practice of Electronic Governance, Tallin, Estonia; 2011. p. 185–94.
- 3. Lombardi P, Giordano S, Farouh H, Yousef W. Modelling the smart city performance, Innovation. The European Journal of Social Science Research. 2012; 25(2):137–49.
- 4. Will the smart city please stand up? City. 2008; 12(3):303–20.
- 5. Komninos N. Intelligent cities: Variable geometries of spatial intelligence. Intelligent Buildings International. 2011; 3(3):172–88.
- Chouraby H, Nam T, Walker S, Gill-Garcia JR, Mellouli S, Nahon K, Pardo T, Scholl HJ. Understanding smart cities: An Integrative Framework. 45th International Conference of System Sciences, Hawaii; 2012. p. 2289–97.
- Nam T, Pardo T. Conceptualizing smart city with dimensions of technology, people and institutions. 12th Annual International Conference on Digital Government Research, USA; 2011. p. 282–91.
- 8. Caragliu A, Del Bo C, Nijkamp P. Smart cities in Europe. Serie Research Memoranda 0048, VU University Amsterdam, Faculty of Economics, Business Administration and Econometrics; 2009. p. 1–15.
- 9. Angelidou M. Four European smart city strategies. International Journal of Social Science Studies. 2016; 4(4):18–30.
- 10. Komninos N. What makes the cities smart? Smart Cities Conference, Edinburg; 2011b.
- Kinnunen T, Majava J, Kess P. Smart cards in public transportation – global diffusion, local platforms. Managing Intellectual Capital and Innovation for Sustainable and Inclusive Society. Management, Knowledge and Learning Conference, Bari, Italy; 2015.
- 12. Florida R. The flight of the creative class. Harper Business; 2005.
- 13. Landry C. The creative city: A toolkit for urban innovators. Earthscan; 2000.
- 14. Shapiro J. Smart cities: Quality of life, productivity, and the growth effects of human capital. Review of Economics and Statistics. 2006; 88(2):324–35.

- 15. Edvinsson L. Aspects on the city as a knowledge tool. Journal of Knowledge Management. 2006; 10(5):6–13.
- 16. Ratti C, Townsend A. The social nexus [Internet]. 2011. [cited 2016 Apr 12]. Available from: https://moodle.technion.ac.il/.../2011_Ratti_.
- 17. Carter P, Rojas B, Sahni M. Delivering next-generation citizen services: Assessing the environmental, social and economic impact of intelligent x on future cities and communities. IDC White Paper, IDC Go-to-Market Services; 2011.
- 18. Foray D, Goddard J, Beldarrian XGG, Landabaso M, McCann P, Morgan K, Nauwelaers C, Ortega-Argiles R. Guide to research and innovation strategies for smart specialization (RIS 3). European Union; 2012.
- 19. PwC. Data driven cities [Internet]. 2016. [cited 2015 Oct 12]. Available from: http://www.pwc.ru/ru/government-and-public-sector/assets/ddc_rus.pdf.
- 20. Kansra P. Determinants of the buying behavior of young consumers of branded clothes: An empirical analysis. Journal of Brand Management. 2014; 11(3):57–70.
- 21. Mobile behavior report [Internet]. 2014. [cited 2016 Jun 01]. Available from: https://www.marketingcloud.com/sites/exacttarget/files/deliverables/etmc-2014mobile behaviorreport.pdf.
- 22. Tapscott D. Grown up digital: How the next generation is changing your world. New York: McGraw-Hill; 2008.
- 23. Basaran U, Buyukyilmaz O. The effects of utilitarian and hedonic values on young consumers' satisfaction

- and behavioral intentions. Eurasian Journal of Business and Economics. 2015; 8(16):1-18. DOI: 10.17015/ejbe.2015.016.01.
- 24. Ergin EA, Akbay HÖ. Factors influencing young consumers' preferences of domestic and international fast food brands. 11th International Marketing Trends Conference Venice, 2012 Jan 19–21; 2012.
- 25. Kayabaşı A, Mucan B, Tanyeri M. Analysis on young consumers' consumer values and their attitudes toward foreign firms. Procedia Social and Behavioral Sciences; 2012.
- 26. Kacprzak A, Dziewanowska K. Does a global young consumers exist? A comparative study of South Korea and Poland. Journal of Marketing and Consumer Behavior in Emerging Markets. 2015; 1(1).
- 27. Golubkov EP. Marketing research: Theory, methodology and practice. 2nd Edition. Moscow: Finpress; 2000.
- Sidorchuk R, Efimova D, Lopatinskaya I, Kaderova, V. Parametric approach to the assessment of service quality attributes of municipal passenger transport in Moscow. Modern Applied Science. 2015; 9(4):303–11. DOI: 10.5539/mas.v9n4pxx.
- 29. Sidorchuk R, Skorobogatykh I. Marketing evaluation of public transport quality attributes: Review of two waves of research. Mediterranean Journal of Social Sciences. 2015; 6(3):275–82. DOI: 10.5901/mjss. 2015.v6n3s3p275.
- 30. Allwinkle S, Cruickshank P. Creating smarter cities: An overview. Journal of Urban Technology. 2011; 18(2):1–16.