TECHNOLOGY AND SOCIAL INEQUALITY WITHIN SMART CITIES

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ABSTRACT

Smart cities have many benefits in terms of human living; however, they haven't eliminated the problems of urban living. Some issues concern the residents within these cities that can affect public well-being and happiness and citizens' trust. At the same time, some voices are trying to highlight the meaning of these cities as socially constructed entities made up of activities and practices. In this sense, new criteria proposed for evaluating smart cities based on happiness, urban planning, mental health and the approach of a more humane side of cities. These approaches work in an alternative way and offer a complete understanding of the ever-evolving technology that brings about urban and social change and the redefinition of "smart cities" many times in smart cities, some groups not given importance. The search for technology and innovation can exclude a portion of citizens from their well-being and smooth integration into the urban and social landscape. In this study's context, questionnaires distributed to demonstrate the public perception of the ever-rising digital technology in the context of smart cities. We provide

conclusions for either the digitally disabled or those who do not have access to digital equipment.

Keywords: Smart City, Urban Living, Digital Inequalities, Social Exclusion

JEL Classification: O33

Introduction

Smart cities have many benefits in terms of human living; however, they haven't eliminated the problems of urban living. Within these cities, some issues concerning the residents' problems are about security and privacy. Issues like these can affect public well-being and happiness, and citizens' trust (Naveen J., 2019). At the same time, some voices are trying to highlight the meaning of these cities as socially constructed entities made up of activities and practices. In this sense, new criteria proposed for evaluating smart cities based on happiness, urban planning, mental health and the approach of a more humane side of cities. These approaches work in an alternative way and offer a complete understanding of the ever-evolving technology that brings about urban and social change and the redefinition of "smart cities". Many times, in smart cities, some groups not given importance, and the search for technology and innovation can exclude a portion of citizens from their well-being and smooth integration into the urban and social landscape. (Radicchi A. et al., 2017).

The visions for tomorrow's cities are related to the form we imagine the cities in the future. Smart cities are about famous dreams about urban development. Generally, people and governments assume that smart city projects will improve the lives of citizens, but their role can often be ambiguous. There are visions of smart cities that do not include people's voice, and at the same time, there are others that make citizens as active as urban sensors. In addition, there are provisions for citizens subject to technologies that restrict their freedoms. So, while intelligent cities are attracting attention, they still are controversial examples. They are mainly designed based on new technologies, but they may fulfil an older vision of urban living. The demand of the last century for urban housing was the "Functional Cities", which ultimately failed to create a successful social and urban living. This reflected in urban planning and society from the Second World War onwards. So even though the incentives for urban planning were to have adequate structures and infrastructure, as well as to have health and spatial planning, they nevertheless failed to be fulfilled effectively (Mumford E., 2002), (Greenfield A., 2013), (Radicchi A. et al. 2017).

Background

When architect Cedric Price (1933 - 2003), in 1966, started his lecture by asking the public: "Technology is the answer, but what was the question?" in this way, he managed to attract the attention. Today we should pay attention to the constantly evolving digital technologies developed in the context of smart cities (Hill D., E., 2013). The international academic community and media believe that Smart Cities implemented to promote further mass application and innovative technologies (Internet of Things, Digital Infrastructure, Artificial Intelligence, etc.) can solve all the global challenges modern cities facing. So there is a sense that the Smart City is the solution to population density, social injustice, environmental pollution, efficiency, productivity, spreading information. All the above applied through new technologies, and during their application, the "intelligence" of cities automatically evaluated (Manville C. et al. 2014), (Icitylab, 2016), (Radicchi A. et al. 2017).

Today, many examples of cities (such as in India) experience social exclusion, fragmentation, and general injustice. In such cases, smart cities can offer solutions to urbanization problems many times over, but there is a risk that social inequalities will further escalate. For this reason, innovative city projects and modernization projects, in general, are often combined with the assumption that they designed in a way that avoids public, democratic debate, resulting in some social groups being further marginalized (Vanolo A., 2016). But the social and economic gap between rich and poorer countries remains narrow. In this way, the countries that do not have economic prosperity will be at a disadvantage compared to the richer ones, which will intensify social inequalities (Papathanassopoulos S., Negrine R., 2019).

Main Focus

For a long time, there is a popular culture rooted in the assumption of the people that technology hides behind a gloomy bourgeois future, including the obstruction of our freedoms. Some products have made based on the fantastic landscape of the smart cities of the future. One such case is the video game "Watch Dogs", released in 2014 by UbiSoft. This game describes a utopian version of the City of Chicago in the USA, where the infrastructure and services provided through a central system. Each player can use their smartphone device and manage the infrastructure to their advantage. For example, it can stop trains, traffic lights or city lights, etc. It is essentially one of the first games to describe the dystopian landscape of a smart city of the future. To a large extent, the ideas of the game are related to the interconnection of urban infrastructure, the collection of big data and the possibility of access to personal data concerning conjectures about the life we will experience in the cities of the future (Vanolo A., 2016).

One of the biggest fears related to smart city developments concerns issues of privacy, security and control. Recently, a limited number of topics created regarding access to top-secret information. New terms introduced to describe individuals or groups associated with such activities as cyberpunks, Anonymous, hacktivists, and whistle-blower. (Vanolo A., 2016).

Violation of privacy and constant monitoring of smart cities' systems and natural things and spaces could lead to citizens feeling insecure and subject to surveillance. The security of the data generated is also an important issue and has its origins in data collection for smart city environments. As mentioned above, "data vaults" are often prone to various attacks with malicious programs to the detriment of citizens' data accessibility (Naveen J., 2019).

Many scholars pointed out that human labour will be affected due to the rapid adoption of new technologies in the workplace. Adverse effects can accompany artificial intelligence and robotics on humans. Fewer scholars have considered the possibility of job loss by a large section of the population due to technological changes and developments and their invasion of modern living. However, the social and economic projections of the digital economy and employment future show that some fears based on technological development are exacerbating concerns of job loss and financial insecurity (McClure PK 2017) on the part of societies.

Some injustices arise through open government and are associated with excluded groups as new technologies become more entrenched. Some governments may encourage citizen participation and access. However, there is still a gap between who ultimately has access to data and can benefit from it. As the world grows digitally, more and more respectively social injustice inflated due to digital inequalities. As described above, spatial data do not benefit all people equally, although increased access to ICT and the state has expanded digital technologies. At the same time, how both citizens and central governments participate has changed. Other phenomena of exclusion, marginalization, and new forms of inequality in the light of social justice should therefore be considered (Beischer A et al. 2015).

Sometimes social injustice can arise through the incorrect distribution of personal data by disclosing personal data freely for any use and misleading processing and presentation, making vulnerable people who receive it without refuting anything presented to them. Therefore, data management and monitoring practices restructured to reduce the social impact further so that it functions as a defender of social equality rather than oppression (Cinnamon J., 2017).

Social justice aims to achieve social equality at the expense of colonial oppression, which occurs in cases where a social group exploits for its benefit consciously or even unconsciously (Bonnycastle 2011). There are different social gaps in today's societies, and social justice identifies and tackles oppressors. Democratic action is therefore directly related to social equality. Thus, the concept of distribution is essential for eliminating the rates of segregation of social groups or units and building social justice. The images of social and distributive justice are often confused and used interchangeably. This evidence through the United Nations and its claim that social justice equals distributive justice (UN Department of Social and Economic Affairs 2006: 13), (Cinnamon J., 2017,)

There are various types of digital trading platforms, smart applications, and systems available today that generate large amounts of data about users' routines, preferences, desires, or beliefs. These data have a tremendous economic and bargaining value for the stakeholders. On the one hand, the production of this data is inexpensive to produce. On the other hand, they cannot transfer the competitive advantage to their owner and bring huge profits from selling them in the personal data market, evolving at breakneck speed and pace. Personal data is not currently in use for the first time for advertising purposes or strategic marketing, or customer management. Instead, there is a new trend for the accumulation and analysis of personal data, which gives the impression that the market activity impartially. Today we are going through the period when the study of large-scale data is a kind of transaction with great importance (Cinnamon J., 2017).

Also, any data processing lurks the risk of their incorrect use in any environment to lead to wrong conclusions; this is a case of (Bias Data). Inaccurate results can, in turn, cause inadvertent discrimination against specific religions, ethnicities or genders and therefore have consequences for different groups of individuals (Naveen J., 2019).

The whole world focused on creating more intelligent urban environments, using digital technologies to have more efficient and sustainable cities. As the urban populations grow, also urban infrastructures are under pressure. The smart cities of the future will be able to manage the rapidly evolving changes optimally. As digital systems are becoming more widespread, there is a danger that inequalities will deepen. If only local authorities realize that digital technologies are essential to both the poor and the affluent. City planners sometimes are accused of using digital facilities to favor people with more money than low-income people. But as examples of cities worldwide show, some technologies are accessible to the public and even to people of the social margin. Along with cities, people can become just as bright and live-in inclusive environments. Solution found in the convergence of digital differences between communities (Kharas H., Remes J., 2018).

The response to the ever-increasing criticism of emerging intelligent city strategies worldwide has prompted debates that once revolved around smart cities to turn to smart citizens alike. The role of the citizen is twofold. There is both the citizen in the general, messy and ambiguous sense and the active citizen who makes his presence clear, accurate and dynamic concerning his City (Shelton T., Lodato T., 2019).

Awareness-raising and citizen participation are essential for exciting smart cities. Citizens' ignorance of ever-changing policies and their impact can be significant obstacles. Citizens' awareness of their involvement in smart cities is shallow, even in quite developed countries (Naveen J., 2019).

There is often the perception that at the beginning of creating strategic, intelligent cities, there are inadvertently or voluntarily dividing lines that either includes or exclude citizens from their activity with the public. Possibly in building innovative city strategies, a vaguer image of citizens is used, which leads to further exclusion from collective decision-making and the formulation of new policies. (Shelton T., Lodato T., 2019).

Innovative city governance is a significant challenge for stakeholders. But when governance accompanied by limited transparency, fragmented accountability, unequal divisions, and an outflow of resources, there is a need to take new paths away from anachronistic features of regular governance. Effective smart city management somehow requires the transition from conventional to digital / e-government. Citizens in the smart City must play an active role. Innovative governance involves the active participation of citizens. Citizens' positions and initiatives should be considered by the local government and used in the best way and consistently to serve them better. Using ICT, E-government includes productive assistance in the decision-making process and their corresponding improvement while at the same time should upgrade policies and public governance itself. When on the right track, E-government helps citizens participate, if not all, but most of its aspects (Joshi, S., et al. 2017).

The World Wide Web is a widespread communication link between people. In this way, cities use it to identify citizens' needs and desires and address them most profitably. ICT has the power to strengthen democratic processes, increase opportunities and enable citizens to communicate with the City and government (Joshi, S., et al. 2017).

Nowadays, we realize that the Internet enables more people to participate as they are subject to geographical, mobility restrictions and in the pandemic era traffic restrictions. It also gives direct access to information from people in a potential position and could not receive it because they not included as recipients. Smart

governance is a feature of smart cities based on citizen participation and public-private partnerships, the implementation and creation of smart governance infrastructures that promote services, collaboration, communication and data exchange (Joshi, S., etc. 2017).

Almost everything seems more marketable and attractive once invested in technological "intelligence". The same is true even when it comes to urban development policies-intelligence in cities linked to sustainability and an environmentally friendly approach. Smart urban development is one of the most famous examples of urban development, which causes countries to compete and respectively have expectations about the expected benefits (Gere, La. and Ráhel, C., 2016).

Around the world, governments are spending billions of dollars on smart devices and equipment and hiring skilled professionals to upgrade new systems and infrastructure. To date, smart objects powered by batteries to produce energy for these devices, it is necessary to make batteries. Accordingly, the production of many storms will increase the levels of energy consumption. At the same time, when there is an aggressive increase in the adoption of digital devices for IoT, it is easy to see that energy consumption will skyrocket (Naveen J., 2019). With it, one of the building blocks of smart cities, sustainability, will be lost.

Citizens' participation based on solid and adequate preparation and knowledge forms the basis for developing appropriate skills. Therefore, citizens can have the digital ability, cognitive and analytical determination, business intelligence, and finally, ethics. The above characteristics relate to the capabilities that parts of modern society may possess, sometimes called society 4.0, and have their roots in society's information and knowledge (Kuzior A, Kuzior P., 2020).

In the age of the forthcoming fourth industrial revolution, only through the dissemination and distribution of knowledge and the attainment of proper education can social polarization and any negative manifestations of the separation of individuals into both creators and users of ICT be mitigated. The possible disturbances would prevail in all aspects of community life, such as the economy, individual and social living. Individuals who did not belong to any of the above-described groups of creators or users of technologies due to their relative digital ignorance would potentially socially exclude. However, the most paradoxical is that the technologically illiterate will no longer be threatened by children, part of careless users of both industry 4.0 products and services and IT / ICT and AI technologies. Due to overuse and dependence on technology, children are likely to lose their ability to think for themselves, reflect and perceive reality, and be deprived of their natural creativity. The above factors should therefore be taken

seriously, and we should not focus only on the digital exclusion of social groups but at the same time turn our attention to the education of the new generation, which should be able to converse and create with artificial intelligence (Kuzior A, Kuzior P., 2020).

Policies aimed at improving human life focus on developing cities and communities using various practices that are age-friendly or age-friendly (AFCC). While the design of intelligent cities considers the elderly, at the same time, there is a marginalization of the elderly. From time to time, European social policy focuses on policies to reduce people at risk of exclusion, giving voice to concerns about the social and economic costs of both individuals and communities cut off from the rest of society (Eurostat 2017). Nevertheless, inequalities exist and suggest that policies have not had the appropriate effect on excluding ageing (International Journal of Aging and Later Life 2017). This problem is urgent as accompanied by economic austerity and further widens inequalities in cities (Buffel and Phillipson 2016) (Buffel and Phillipson 2018).

It is common for the elderly excluded from their participation in society due to structural and environmental barriers (De Tavernier & Aartsen 2019) (Wanka et al. 2018). The World Health Organization (WHO 2007) attaches importance to the development of "age-friendly" perspectives. In 2010, this organization launched the Global Network of Age-friendly Cities and Communities (GNAFCC) (Age Platform Europe). Since then, has been an increase in participation, reaching the number of thousands (1000) and more cities by 2020. The participating members are committed to adapting to the needs of their elderly population, adapting their structures to base quality and suitability. Of the services provided (health and transport), the construction of the natural and material environment (dwellings, outdoor spaces) and to deal with the social aspects (policies and social participation) (Rémillard-Boilard, S., et al., 2020).

Collection and Data Processing

This study addresses the concept of social inequality caused by intensive technology use within smart cities. The main aim of the research undertaken was to identify whether factors of age and education affect social quality. Anonymous questionnaires also distributed to a local government organization with more than four hundred fifty (450) people staff and thousands of citizens who visit its structures. The distribution of the questionnaires shared both digitally and manually to consider the opinion of people who do not have digital skills or have access to digital devices. This study took place from January 2021 to May 2021.

Two surveys were carried out. The questionnaire for the first survey had the following form and was answered by 174 individuals.

Your age			
	Yes	No	
Did you know that a smart city is a city that has the appropriate digital technology integrated into all its functions?			
	Disagree	Neutral	Agree
Do you agree with the idea of integrating more digital features into the city you live in?			
Do you agree with the idea of paying the municipal fees depending on the waste you generated?			
Do you agree with the idea of using wearable sensors to facilitate your daily life?			
Do you agree with the idea of further dissemination of electronic transactions?			
	Not important	Neutral	Important
How important do you consider the information about the expected arrival time of public transport?			
How important do you consider your participation in municipal			

decision-making through smart technology?			

The questionnaire for the second survey had the following form and was answered by 153 individuals.

	Primary School	Secondary School	Post-Secondary Technical Education	University Degree	Msc	Phd
What is the level of your education?						

	Yes		No	
Did you know that a smart city is a city that has the appropriate digital technology integrated into all its functions?				

	Disagree	Neutral	Agree
Do you agree with the idea of integrating more digital features into the city you live in?			
Do you agree with the idea of paying the municipal fees depending on the			

waste you generated?			
Do you agree with the idea of using wearable sensors to facilitate your daily life?			
Do you agree with the idea of further dissemination of electronic transactions?			
	Not important	Neutral	Important
How important do you consider the information about the expected arrival time of public transport?			
How important do you consider your participation in municipal decision-making through smart technology?			

We did not incorporate both age and education level in the same questionnaire because we later decided to examine the factor of education level. In the following figures, the results are presented.

From a brief review of the figures, it appears that age is a factor related to inequality. The term "smart city" is known among the youngest people but not among the elderly (figure 1). Moreover, in contrast to the elderly, the youngest people are willing to live in smarter cities (figure 2). Examining several aspects of a smart city we can observe that the youngest people support more the "pay as you through" strategy (figure 3), are more familiar with wearable sensors (figure 4) and electronic transaction (figure 5). Most respondents, irrespectively of age, consider the improvement in arrival information significant (figure 6). Finally, very young people do not care about participatory decision making (figure 7). In summary, age seems to be an essential factor in causing inequalities concerning smart cities.

On the other hand, the same cannot be said for the education level factor. Figures 8-14 show some correlation between education level and assimilation of the concepts associated with smart cities, but further research is needed.
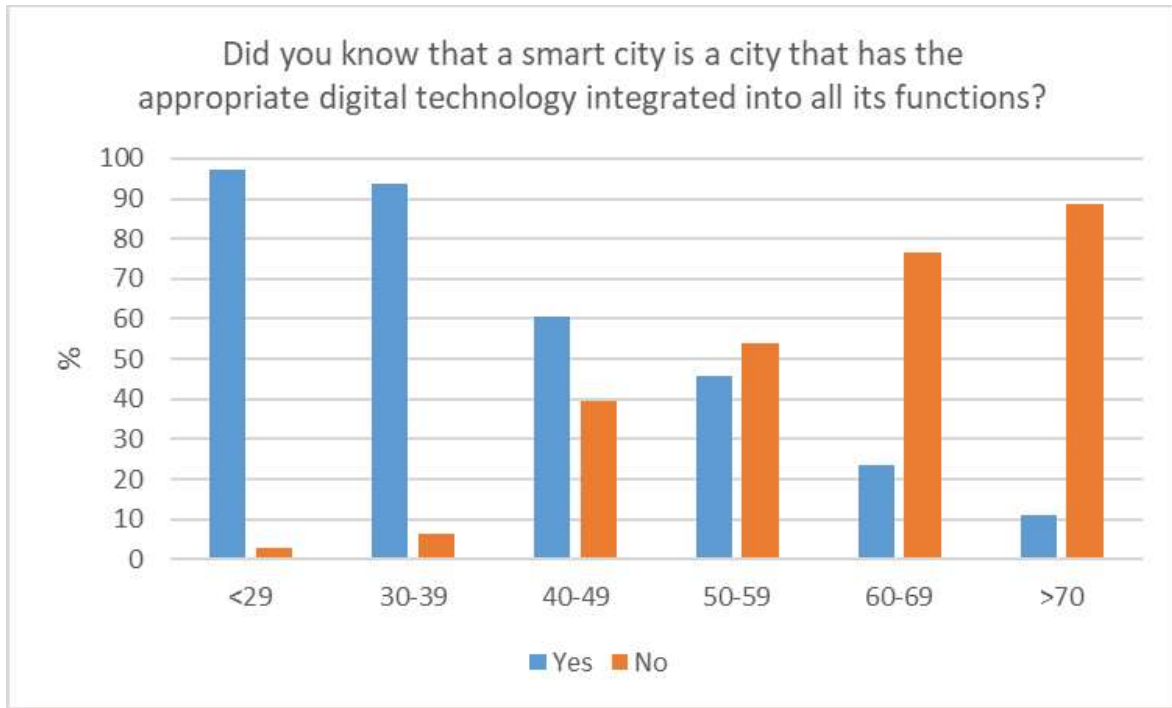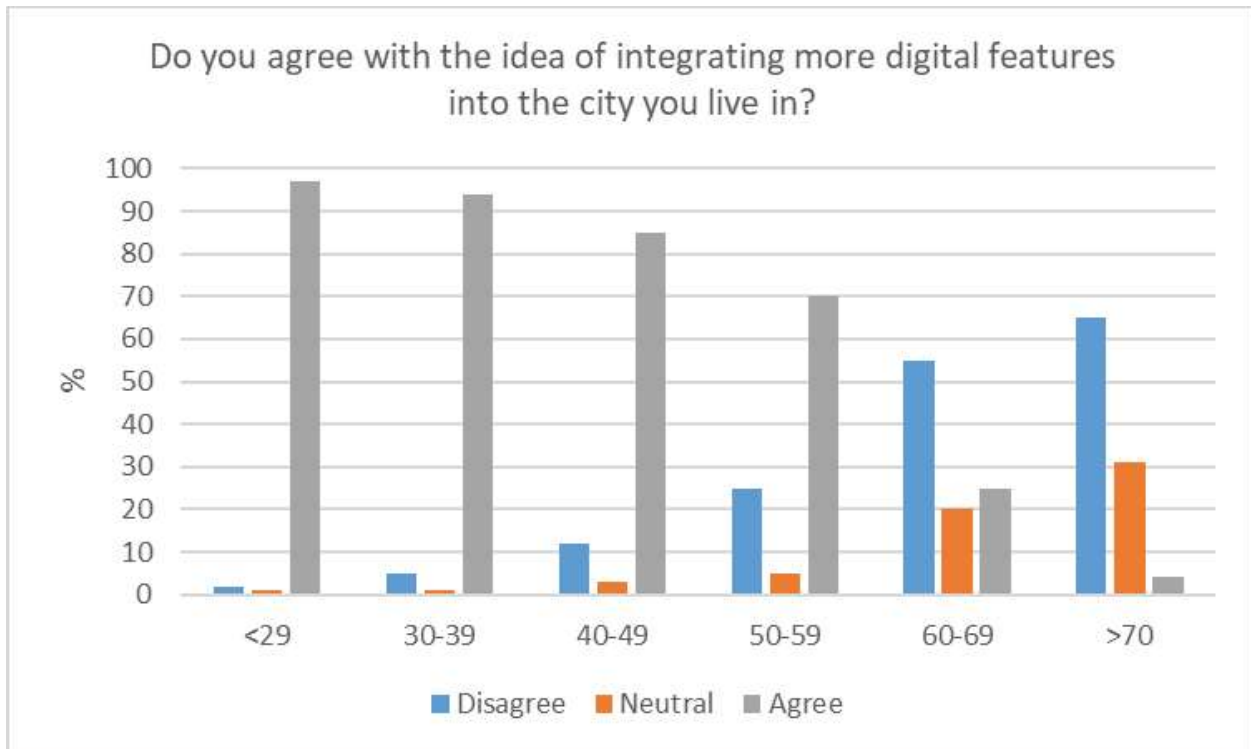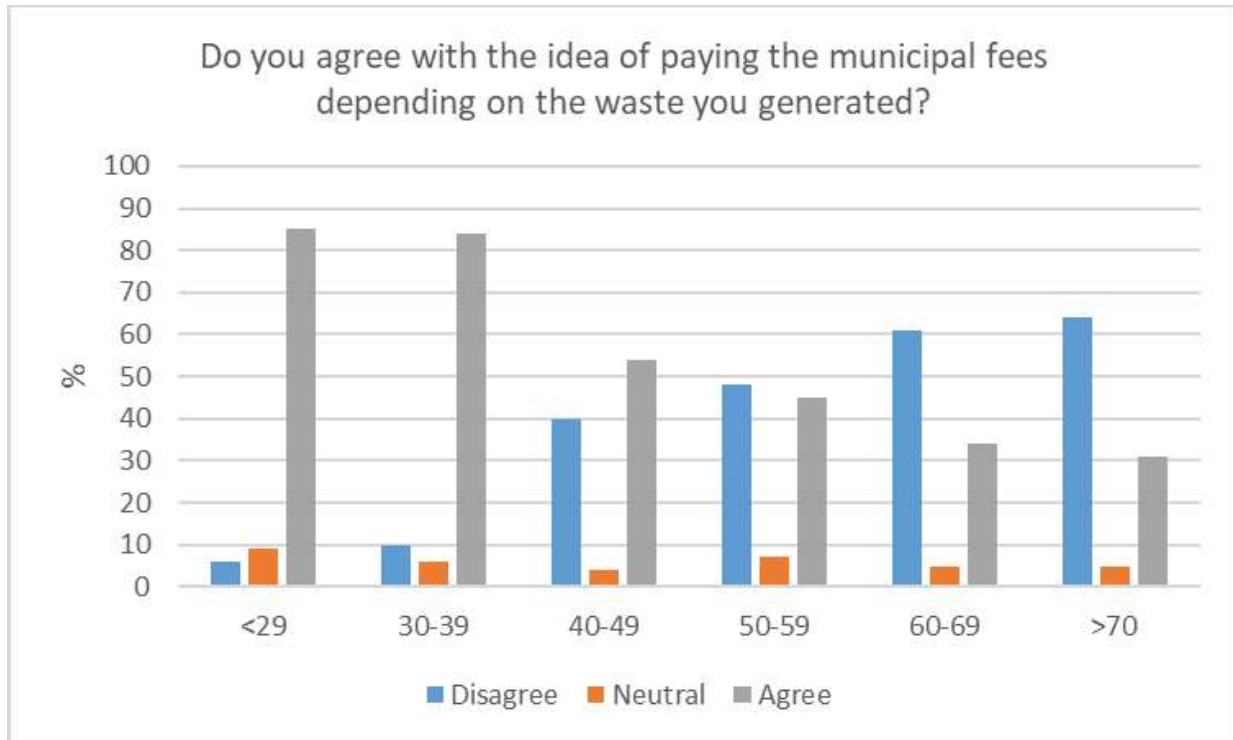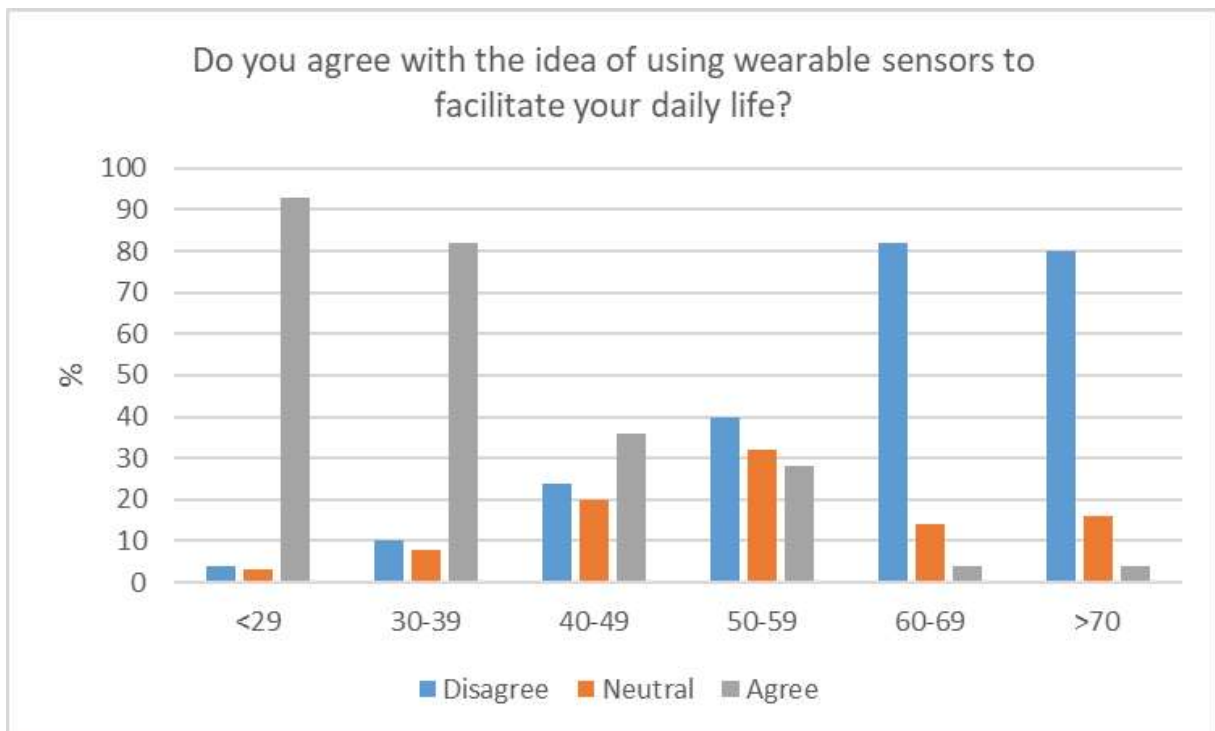

Figure 1

Figure 2

Do you agree with the idea of paying the municipal fees depending on the waste you generated?

Figure 3

Do you agree with the idea of using wearable sensors to facilitate your daily life?
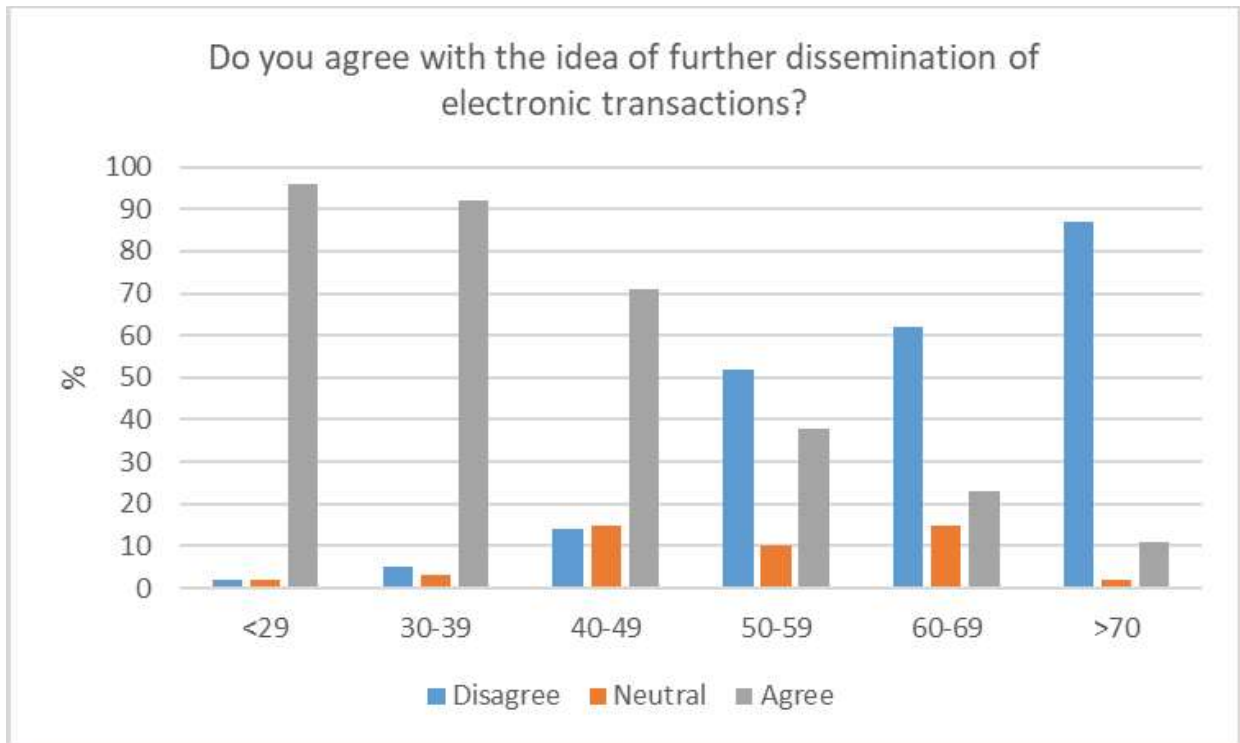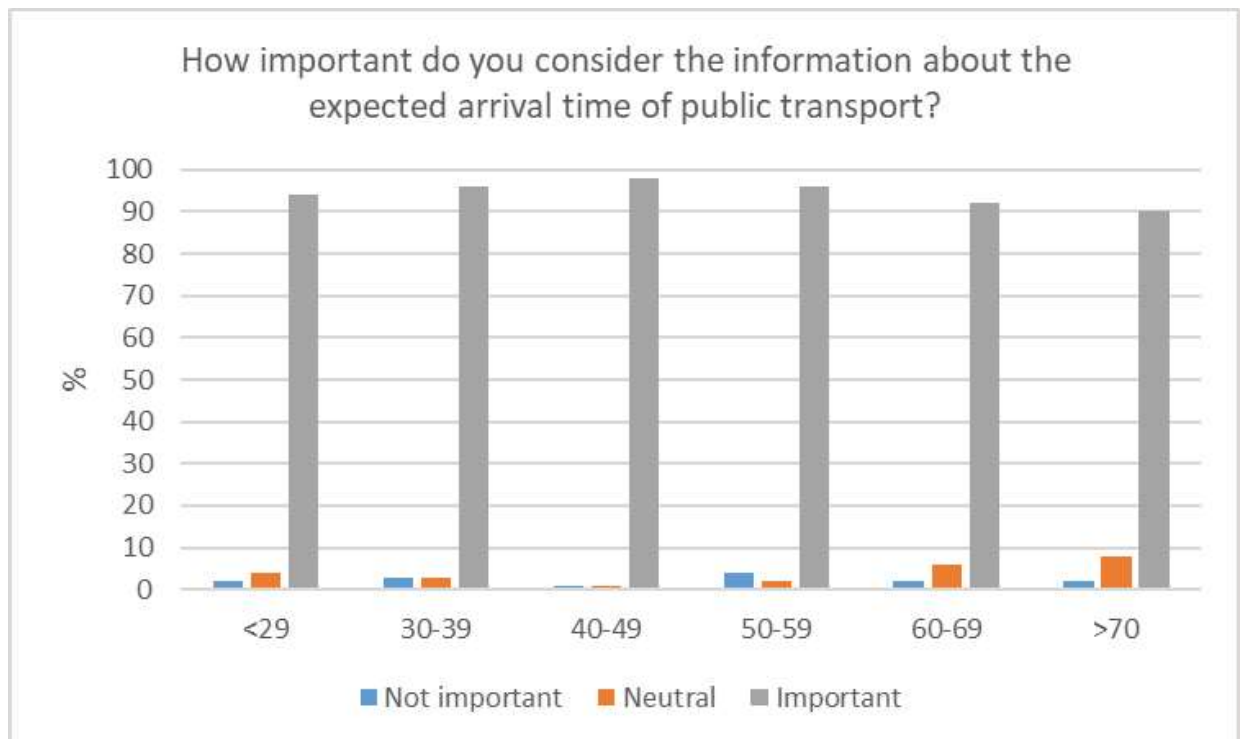
Figure 4

Figure 5

Figure 6
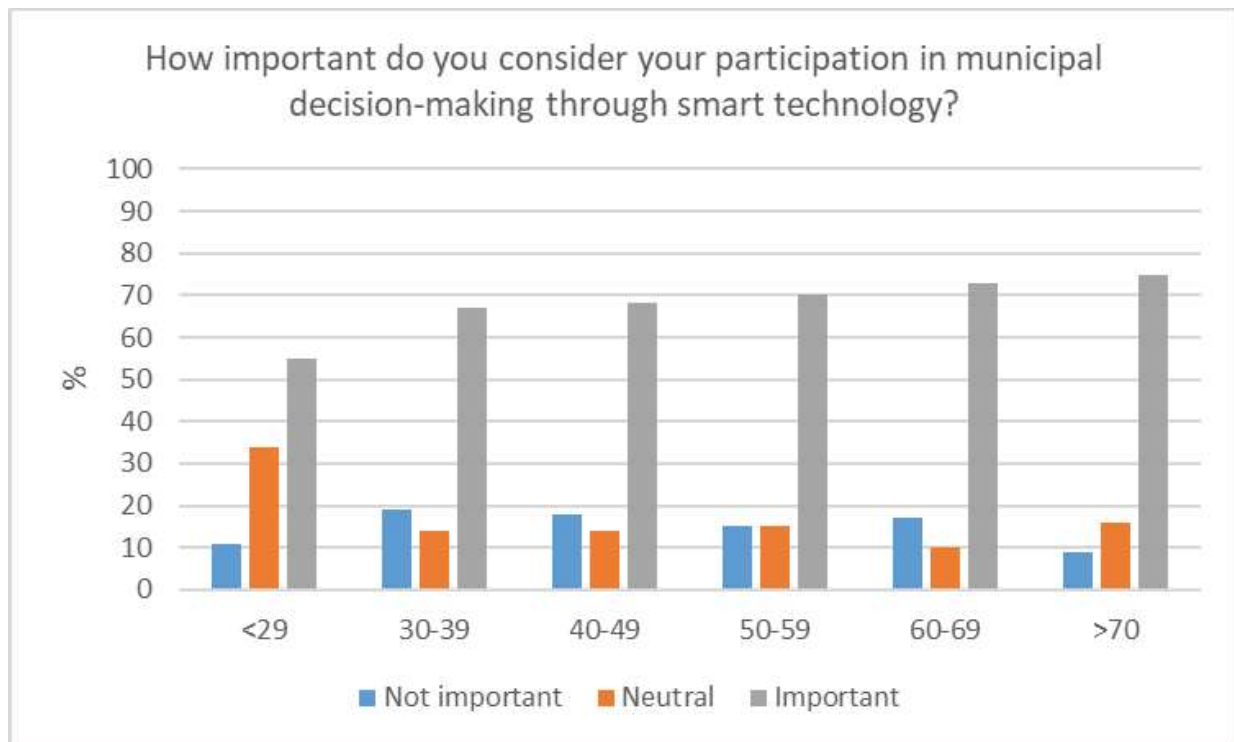
Figure 7
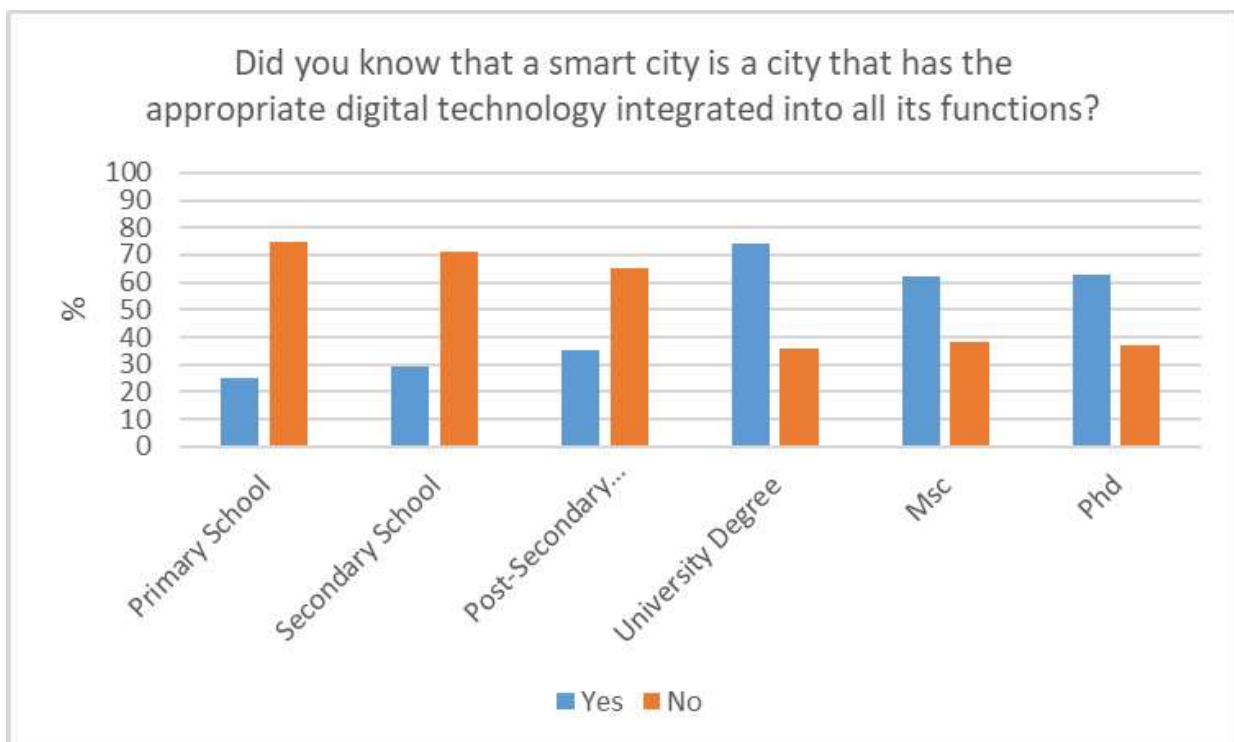
Figure 8
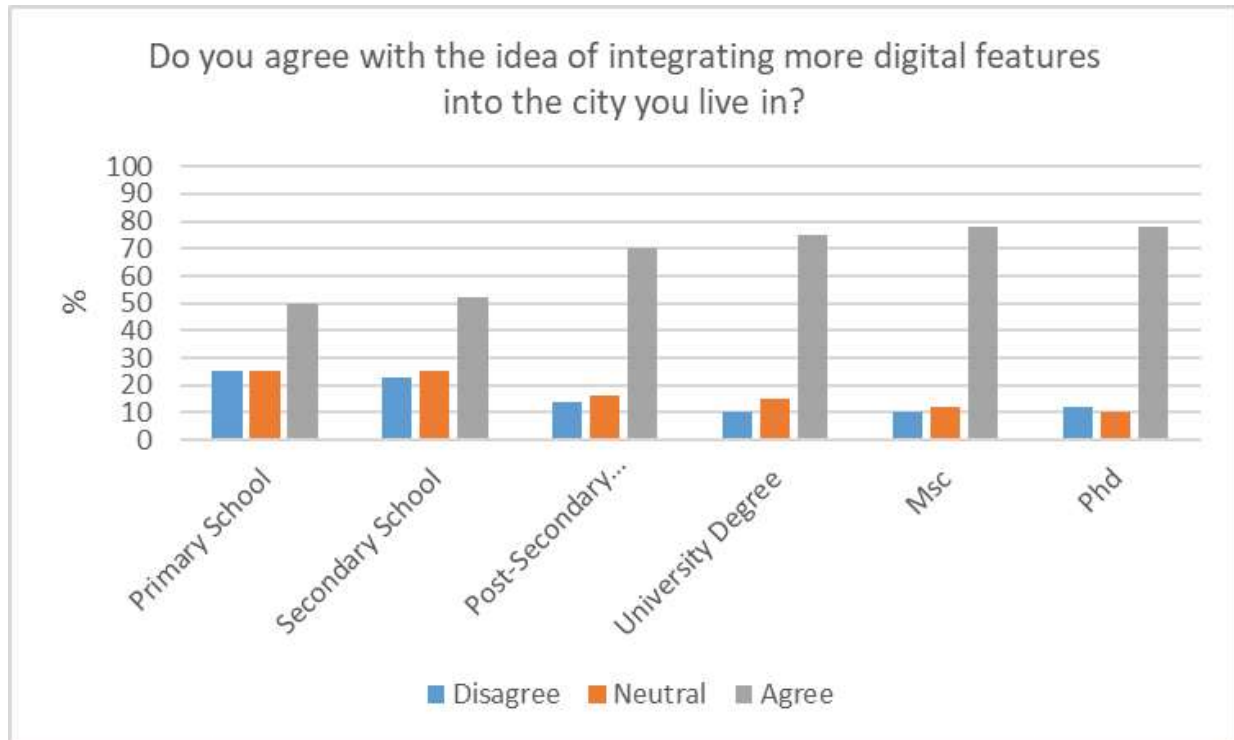
Figure 9
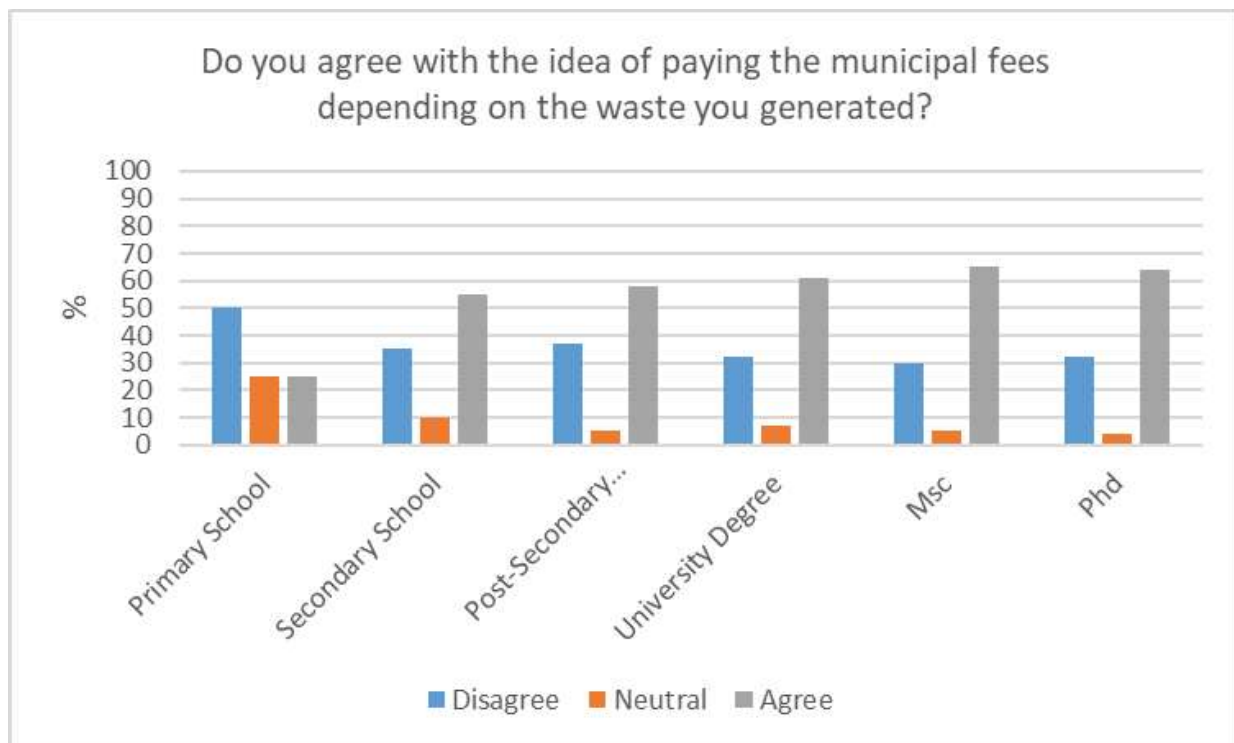
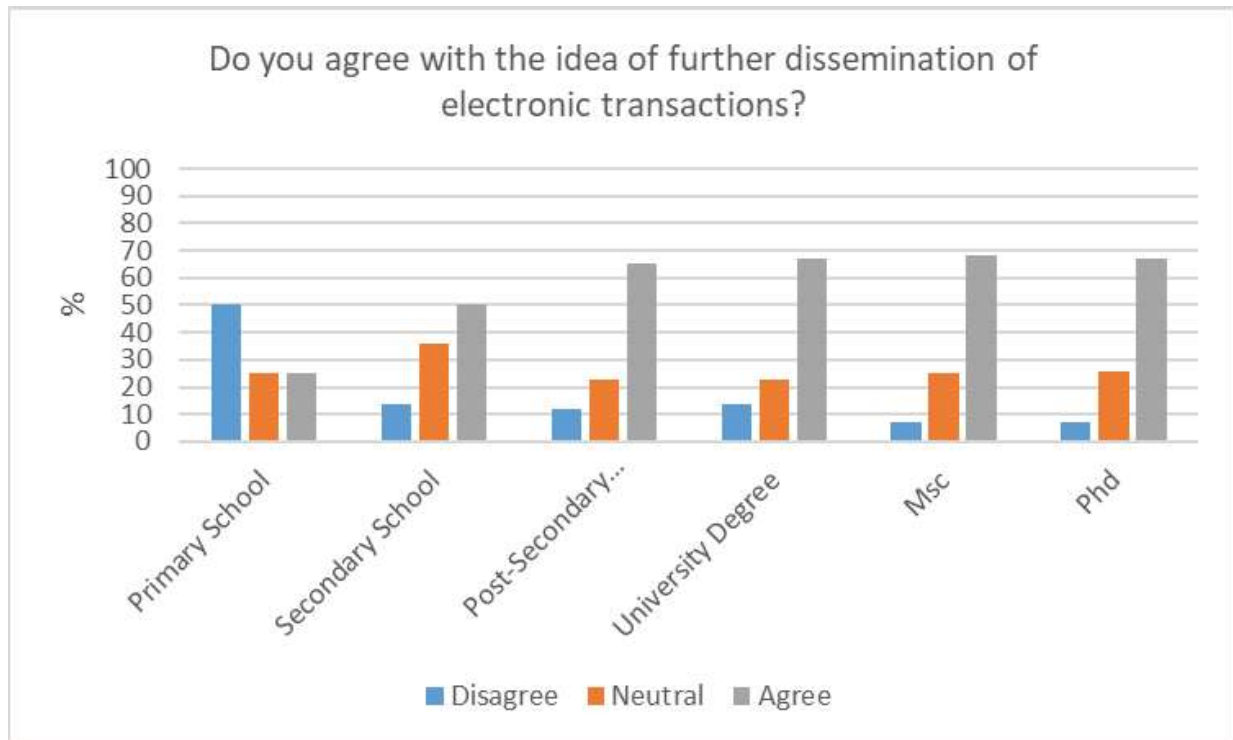*Figure 10*
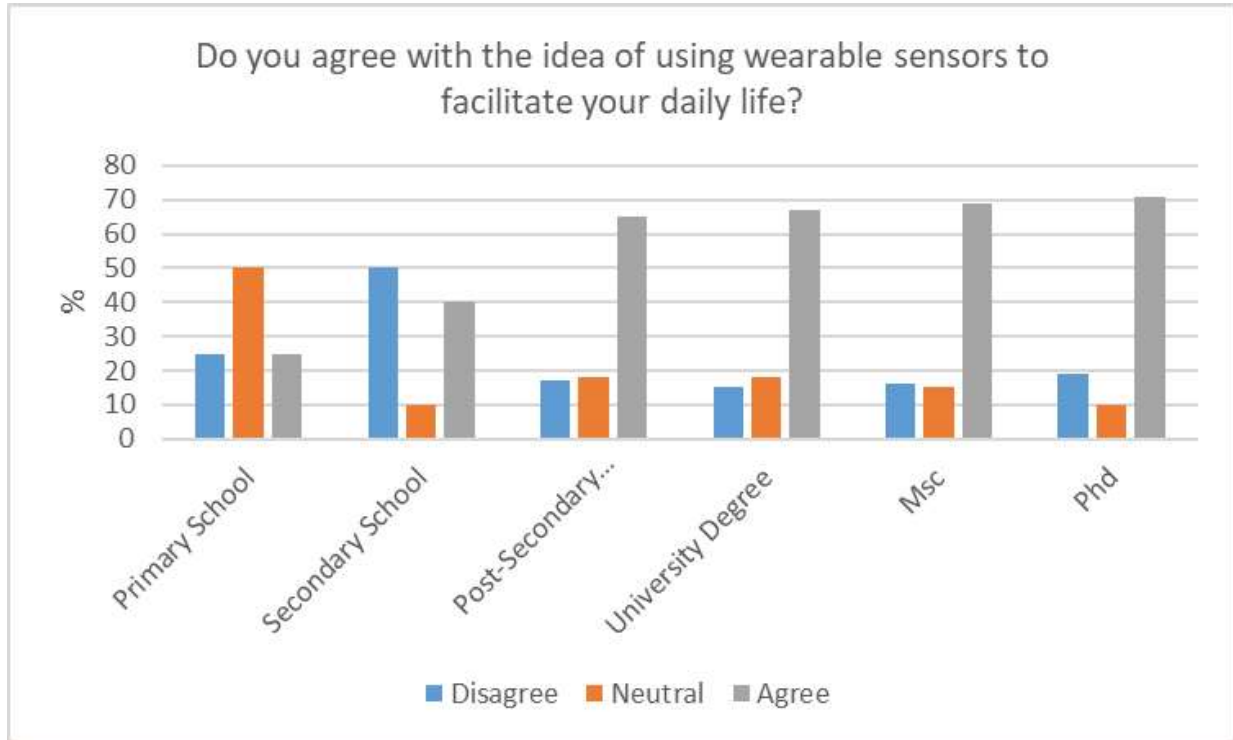
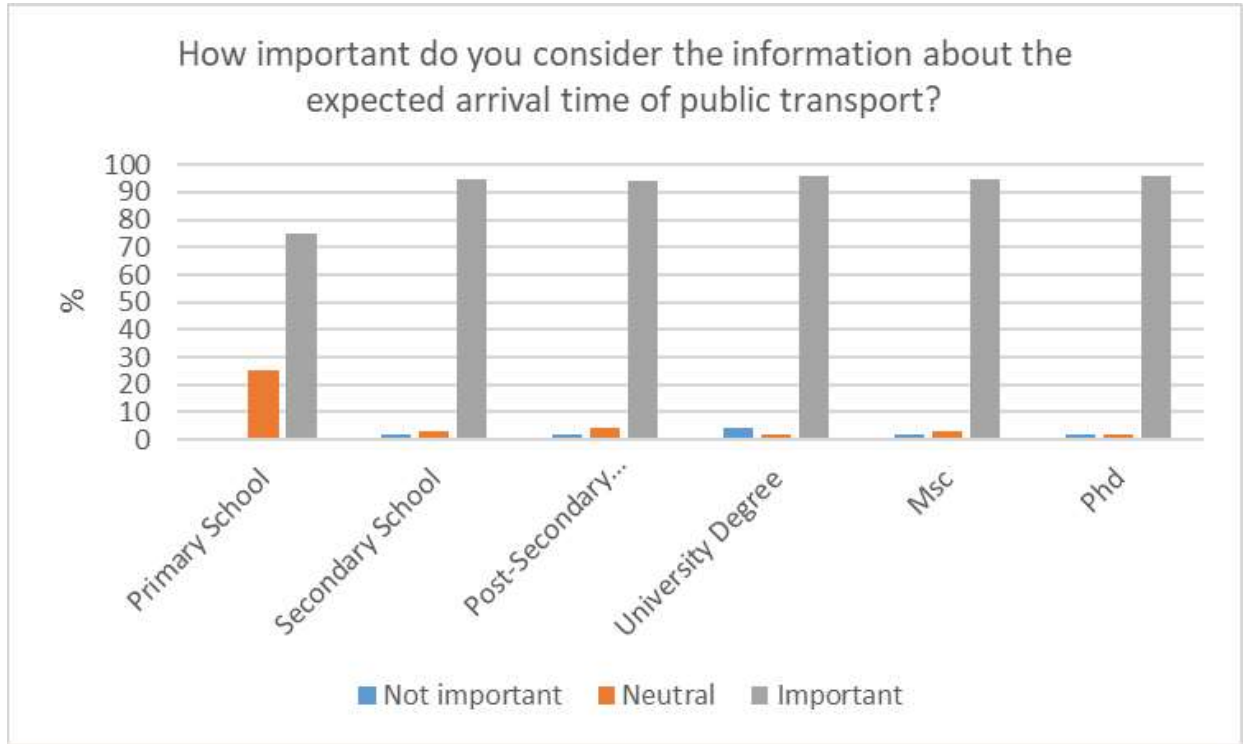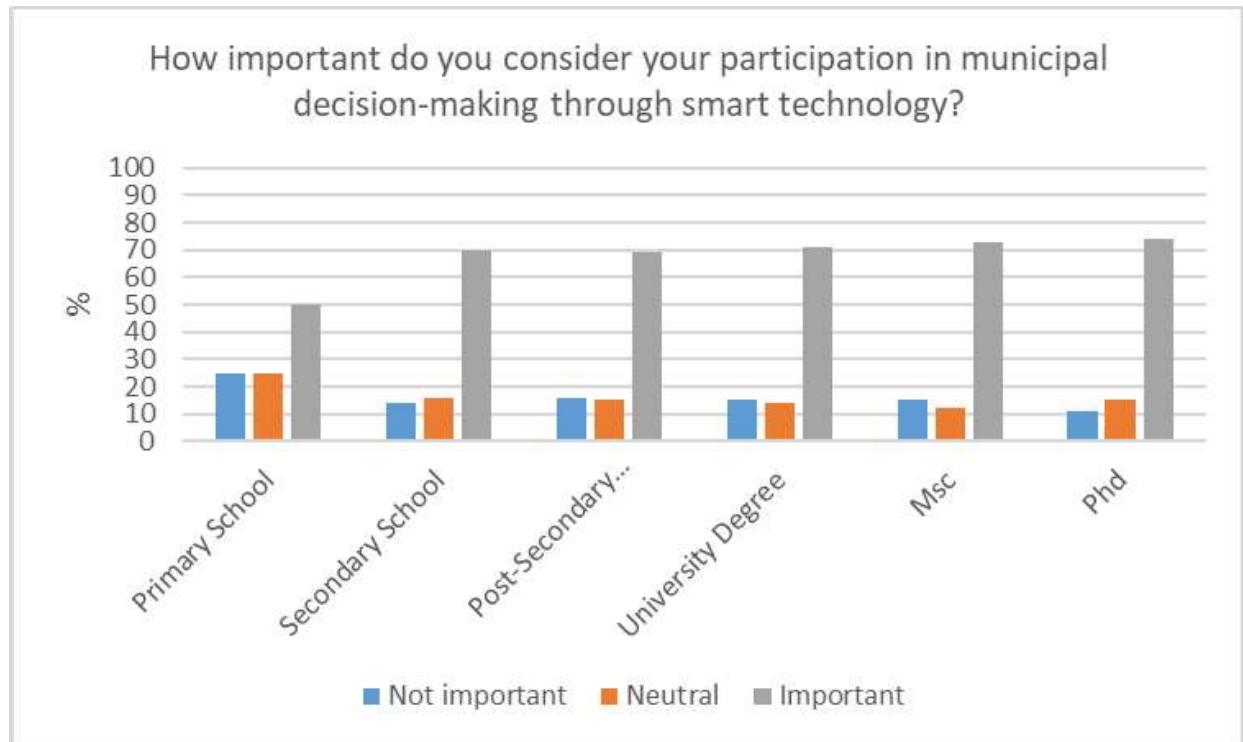*Figure 11*

Figure 12

Figure 13

Figure 14

Conclusions

In the present study, we investigated the influence of age and education in creating social inequalities within smart cities. The results are, to some extent, expected concerning the age factor. However, they are not so clear concerning the effect of the level of education. In future work, we intend to investigate the deeper causes of the above results and to apply autoregression analysis to investigate the correlation between age and education level and each of the several components of smart city in detail.

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