Sustainable Urbanisation and Digital Innovations:
Perspectives from ASEM Youth
Acknowledgements

This Publication is an outcome of the 23rd ASEF Summer University (ASEFSU23) on ‘Liveable Cities for a Sustainable Future’, conceptualised and coordinated by the Asia-Europe Foundation (ASEF)’s Education Department in collaboration with several Organising Partners.

First and foremost, we would like to thank the main authors of this Publication who are the Participants of the 23rd ASEF Summer University (ASEFSU23) themselves. This Project across borders and cultures was made possible thanks to their strong dedication to collaboration and knowledge exchange. Their essays presented in this Publication reflect their common aspiration to improve their cities & communities.

We would also like to sincerely thank the Organising Partners of the 23rd ASEF Summer University who made this unique cross-regional project possible. They are listed below in alphabetical order by institution:

From Daffodil International University (DIU), Bangladesh:
- Mr Syed Raihan-Ul-Islam, Senior Assistant Director, International Affairs
- Ms Afsana Jerin Shayer, Administrative Officer, International Affairs

From the Hanns Seidel Foundation (HSF):
- Ms Julia Berger, Resident Representative, the Hanns Seidel Foundation Indonesia
- Dr Steffen Kudella, Resident Representative, the Hanns-Seidel Foundation Pakistan
- Mr Volker Plän, Resident Representative, the Hanns-Seidel Foundation India
- Ms Meher Ghawas, Head of Programme Management, the Hanns-Seidel Foundation Pakistan
- Ms Nila Puspita, Deputy Resident Representative & Senior Program Coordinator, the Hanns Seidel Foundation Indonesia

From Krea University, India:
- Ms Kala Anand, Former Director, Communications, Partnerships and Career Services

From Superior University, Pakistan:
- Mr Asad Ullah Sheikh, Director, Global Engagement
- Mr Hammad Noor Ahmed, Coordinator, International Office

From University College Cork (UCC)/ASEM Education and Research Hub for Lifelong Learning (ASEM LLL Hub), Ireland:
- Prof. Séamus Ó Tuama, Director, Centre for Adult Continuing Education, UCC; Chair, ASEM LLL Hub
- Ms Lindsey El Amoud, Assistant Director, Centre for Adult Continuing Education, UCC
- Dr Patrick Holloway, Project Manager, Centre for Adult Continuing Education, UCC
From the University of Glasgow and the Centre for Sustainable, Healthy and Learning Cities and Neighbourhoods, United Kingdom:
- Prof. Mike Osbourne, Director, Centre for Adult and Lifelong Learning; Director, PASCAL Observatory
- Dr Yulia Nesterova, Research Fellow

We would also like to thank the ASEFSU23 Mentors, Speakers and other resource persons who contributed to the 23rd ASEF Summer University.

We also thank Ms Santra Navas who developed the design & layout of the Publication.

The Publication's content was conceptualised and copyedited by the Youth Team of ASEF's Education Department: Ms Leonie Nagarajan, Ms Freya Chow-Paul and Mr Quentin Fayet.

Lastly, ASEF would like to acknowledge the other members of its Education Department, Mr James Chan, Mr Miguel Pangalangan, Ms Jyoti Rahaman, Ms Angie Toh and Ms Reka Tozsa for their continuous team support and encouragements.
Foreword

The world is struggling to recover from the global pandemic in the first half of 2022 after suffering from two years of disruptions caused by the COVID-19 pandemic. However, we, as evolving human beings, are continuing to innovate and find ways to mitigate the challenges facing us while navigating to improve the quality of life for our fellow human beings. Digital technologies are among those we create and innovate in the past few decades, enabling almost all of us on planet earth to use them for varied functions from entertainment to getting information for decision making, big or small, at personal levels to national and international levels. According to the latest available data from the Global System for Mobile Communications Association (GSMA), the EU had 86% mobile subscriber penetration in the population, with 76% of the subscribers adopted smartphones. In the Asia Pacific, the figures were 60% mobile penetration and 64% of the subscribers adopted smartphones. Internet connectivity for the EU is at 76% of the population and the Asia Pacific internet connectivity is at 42%.

Meanwhile, half of the world’s population lives in urban areas, thus the digital technologies concentrate in the urban areas are obvious, just like the urban challenges including traffic congestion, energy shortage, mobility and transport inefficiency, overwhelmed healthcare, education, and training systems, water and air pollution and others. Using digital technologies in solving urban challenges is a logical and feasible approach. Many pioneering smart and sustainable city projects in Asia and Europe showed positive results of using digital technologies in combination with other technologies and business models to tackle urban challenges effectively. Examples are abundant in urban mobility, environmental monitoring and quality, energy management to remote healthcare and education, which were demonstrated strongly during the global lockdown during the pandemic in 2020-22. Many projects also identify the fact that younger generations, who grow up with digital technologies, have an important role in creating and innovating solutions to help their fellow citizens to deal with urban challenges. Yet, the younger generations, especially the age groups from 18 to 30, are not the best-engaged groups politically, socially, locally, and policy-wise.

By now, most of us are aware that urban challenges can be solved to bring improved quality of life to residents. Many believe, rightly so, in the capabilities of digital technologies. Yet not many appreciate the importance of local knowledge and wisdom that can be derived from bottom-up innovation in the “HOW” of the smart and sustainable city development. The local insights can only be accessed with a strong and early engagement with local citizens and residents, including the youth who have the relevant digital skills and innovative aptitude. Many essays in this publication reflect this understanding and should be an aspiration for leaders, funders, and investors to support the development of smart and sustainable cities in Asia and Europe in the coming years. Let’s support these bottom-up, well engaged and inclusive innovations, especially those led by the youth, together. The right time is NOW!

Dr Long Pham  
Senior Research Coordinator and AI4EU Community Manager  
Insight SFI Research Centre for Data Analytics, University College Cork  
ASEFSU23 Speaker
Table of Contents

Introduction ......................................................................................................................................................... 8
ASEM Youth Perceptions Towards Sustainable Urbanisation .......................................................................... 11
Essays from ASEM Youth on Digital Innovations for Sustainable Urbanisation ........................................... 34

Australia - Ms Hillary PAN .................................................................................................................................. 36
Austria - Mr Thomas GARNIER .......................................................................................................................... 40
Bangladesh - Mr Sainul ABID ............................................................................................................................ 43
Bangladesh - Mr Mushtasin AHMED ................................................................................................................ 45
Bangladesh - Mr Ifat HASAN ............................................................................................................................. 47
Bangladesh - Mr Md Tariqul ISLAM .................................................................................................................. 49
Bangladesh - Mr Jahid JONY ................................................................................................................................ 52
Bangladesh - Mr Md. Sadril KHAN ...................................................................................................................... 53
Bangladesh - Mr M M Zimran KHAN .................................................................................................................. 55
Bangladesh - Ms Samia Anwar RAFA ............................................................................................................... 56
Bangladesh - Ms Tabassum SHAHJAHAN ......................................................................................................... 59
Belgium - Mr Rembert JONCKHEERE ................................................................................................................ 62
Belgium - Ms Ellen VOORRIPS .......................................................................................................................... 64
Brunei Darussalam - Mr Darren YING CHEN YI ............................................................................................... 68
Cambodia - Mr Vannak KHAN .......................................................................................................................... 71
Croatia - Mr Vilim BOROŠA ............................................................................................................................... 73
Croatia - Ms Marina KLANJČIĆ ........................................................................................................................... 75
Croatia - Ms Božena ODOBAŠIĆ ......................................................................................................................... 77
Cyprus - Ms Maria KONSTANTINOU ................................................................................................................... 81
Cyprus - Ms Irene SERGIOU ............................................................................................................................ 83
Czech Republic - Mr Vojtěch LINHART .............................................................................................................. 87
Denmark - Ms Aleksandra MOSTOVJA ............................................................................................................ 90
Denmark - Mr Andreas NIELSEN ...................................................................................................................... 92
Denmark - Ms Diana SANDU ............................................................................................................................ 95
Denmark - Ms Christina STOLZ ......................................................................................................................... 97
France - Ms Kiara TEGBE .................................................................................................................................. 101
Germany - Mr Hans MORBACH ......................................................................................................................... 105
Hungary - Ms Júlia POKOL ................................................................................................................................. 108
Hungary - Ms Worood SHBEIKAT ................................................................................................................... 110
India - Mr Vai GUPTA ....................................................................................................................................... 113
India - Mr Vihang JUMLE .................................................................................................................................. 115
India - Ms Ramya KHARE .................................................................................................................................. 118
India - Ms Parita PATEL ...................................................................................................................................... 120
India - Ms Rushda PATEL .................................................................................................................................. 123
India - Ms Neha RANA ...................................................................................................................................... 126
India - Ms Smriti VENKATRAMAN..........................................................128
Indonesia - Mr Said AHMAD...............................................................132
Indonesia - Mr Valentino JEHAUT.....................................................134
Indonesia - Mr Hendri Surya WIDCAKSANA......................................136
Ireland - Ms Dusara JOHNSTON.........................................................140
Italy - Mr Ferruccio BARAZZUTTI.....................................................144
Italy - Ms Stefania ESCOBAR............................................................146
Japan - Mr Yusuke KAGA.................................................................151
Kazakhstan - Ms Maral BAZHUMINOVA..........................................155
Lao PDR - Mr Yhai PHOMMACHAN...................................................158
Lithuania - Mr Lukas GUDELIS.........................................................161
Malaysia - Ms Wei Lun TEE...............................................................165
Mongolia - Ms Anarmaa OTGONBAYAR...........................................168
Myanmar - Ms Ei Ei KHAING............................................................171
Pakistan - Mr Muhammad Zahid IQBAL..........................................175
Pakistan - Mr Arhum ISHTIAQ...........................................................177
Pakistan - Ms Samna KHAN.............................................................179
Pakistan - Mr Hasan LANEWALA.....................................................182
Pakistan - Mr Anas MUMTAZ...........................................................184
Pakistan - Ms Nimrah PERVEEN......................................................186
Pakistan - Ms Sayeda Shahpara SHAH............................................188
Pakistan - Mr Ahsan Qamer SHEIKH..............................................190
Pakistan - Ms Amna SHOAIB...........................................................192
Pakistan - Ms Shiza TANWEER.......................................................195
Philippines - Mr Jared Lyle ANG.....................................................198
Philippines - Mr Justin Phillip CHAN...............................................200
Philippines - Ms Jadiene Shani TENG..............................................202
Poland - Ms Anna WIERZBICKA......................................................206
Russian Federation - Ms Anastasia BREDIKHINA............................210
Singapore - Ms Ariel CHEN............................................................213
Singapore - Mr Zhebin CHEN..........................................................215
Singapore - Mr Kendrik LIM.............................................................218
Singapore - Ms Su Chen TEH..........................................................220
Slovenia - Ms Katja FRELIH.............................................................224
Spain - Ms Anaëlle BUENO PATIN...................................................228
Sweden - Ms Valeriia TATIANINA..................................................231
Thailand - Ms Patlapa SEREECHAIPORN..........................................235
United Kingdom - Mr Babatunde ONABAJO....................................239
Vietnam - Mr Tri TRAN.................................................................242
Organisers.......................................................................................245
Introduction

The ASEFSU23 Publication is an outcome of the 23rd ASEF Summer University (ASEFSU23), an interdisciplinary Hackathon on “Liveable Cities for a Sustainable Future” for Asian & European young professionals and students from ASEM Countries which took place between September and November 2021. Through the ASEFSU23 Participants’ own writings, the Publication explores these young Asians and Europeans’ perspectives on the urban challenges they face in their cities & communities and how to harness digital innovations to tackle these challenges. The Publication is a unique compilation of innovative ideas for urban experts, policymakers, academics and anyone interested in advancing Sustainable Urbanisation and Sustainable Development Goal 11 (SDG 11) across ASEM countries.

About this Publication

The content of this Publication was entirely written by the young participants from Asia and Europe during the 23rd ASEF Summer University. To introduce the topic, a short study by one Team Leader from the 23rd ASEF Summer University (Ms Amna SHOAIB, Pakistan) provides a general overview of the perception of Youth towards Sustainable Urbanisation and SDG11 across ASEM Countries. Based on the data collected from the Summer University applications from youth across Asia and Europe, the introduction focuses on these youth's vision of a liveable city, their cities' perceived level of sustainability, the key socio-economic challenges affecting them and their opportunities to contribute in their city planning & management. For each dimension, a comparison is drawn between Asian and European respondents, which highlights some interesting differences & commonalities across the two regions.

The main section of the ASEFSU23 Publication is a compilation of 74 selected essays by the ASEFSU23 participants which were written during the Knowledge Building Phase of the programme. Participants were given the task to identify key urban challenges in their cities & communities and discuss how to address them using digital innovations. While most urban challenges identified are linked to the crucial issues of Urban Mobility/Transport and Waste Management, various other themes are also discussed, such as Governance, Pollution, Inequalities or Disaster Risk Reduction. To tackle these different urban challenges, a great diversity of innovative solutions are proposed by the ASEFSU23 participants, ranging from mobile applications for poverty prevention to smart waste management systems and inclusive transportation systems for people with disabilities. Some essays focus on very specific and concrete IT solutions & tools, while other essays focus more on the underlying social and human challenges at stake, reflecting the different educational, professional & cultural backgrounds of their young authors. The diverse approaches and perspectives highlight the wide-ranging potential of digital technologies to drive sustainable innovation and improve our urban environment. Taken together, the innovative ideas of these youth can help envision and shape the liveable cities of tomorrow.

1. The Asia-Europe Meeting (ASEM) is an informal process of dialogue and cooperation bringing together the 27 European Union member states, 3 other European countries, and the European Union with 21 Asian countries and the ASEAN Secretariat.
About the 23rd ASEF Summer University

Implemented as a virtual programme between September and November 2021, the 23rd ASEF Summer University (ASEFSU23) was designed to connect young developers, designers, innovators, urban planners and SDG experts to collaborate & develop urban solutions for challenges in three of the most populated countries in ASEM: Bangladesh, India & Pakistan. The 3-month long virtual programme welcomed 84 young participants from 38 ASEM countries. Participants had to develop digital prototypes to tackle three urban challenges:

1) Bangladesh: Creating Green Cities: Tackling Waste Management in Dhaka
2) India: Creating Healthy Cities: Addressing Obesity among Children in New Delhi
3) Pakistan: Creating Accessible Cities: Enhancing Urban Mobility in Lahore

The comprehensive programme included SDG 11 trainings & country specific workshops, as well as an intensive prototype development phase where participants received experts mentoring on an intellectual & technical level. Following the conclusion of the Hackathon, the Winning Teams were offered further mentorship and software development support to develop and implement market-ready digital solutions.

ASEFSU23 was co-organised by the Asia-Europe Foundation (ASEF), the Hanns Seidel Foundation (HSS), Daffodil International University (DIU) in Bangladesh, Krea University in India, Superior University in Pakistan, the ASEM Education & Research Hub for Lifelong Learning Hub (ASEM LLL Hub), University College Cork (UCC), the Centre for Sustainable, Healthy and Learning Cities and Neighbourhoods (SHLC), and the University of Glasgow.

Visit the project website to learn more about the ASEFSU23 Project & its outcomes, and the 84 young Participants from Asia and Europe.
Summary

The world is urbanising at a rapid pace impacting sustainable development and the quality of life of urban residents. Countries are developing plans and policies at national and local levels to take necessary actions to eliminate the detrimental effects of urbanisation. This research focuses on the perception of young Asians and Europeans on sustainable urbanisation. For this purpose, 617 questionnaires were randomly filled by respondents from Asia and Europe via an online survey embedded in the application form of the 23rd ASEF Summer University. 86% of respondents belonged to Asia and 14% from Europe with 52.3% female respondents. 75% of people were working in the sustainable urbanisation sector and 70% believed that sustainability is an important parameter while selecting a city of residence. 48% and 45% of respondents claimed that their current cities have not achieved air quality and waste management parameters, and 15% emphasised that these two issues have personally affected their lives. Only 30% were of the view that their cities have adequate food supply for every person. Respondents believed that individuals are the most responsible stakeholders to develop sustainable cities and that youth should be involved in city volunteering activities. Singapore was considered the most liveable city in Asia by 50% of respondents. Recommendations include maximising opportunities for youth in city planning & management, awareness-raising in educational institutes for children, providing equitable facilities for all economic groups, as well as efficient strategies for the provision of affordable housing, sustainable waste management, inclusive green spaces, and accessible transport for urban dwellers.

1. Introduction

Urbanisation is increasing at an unprecedented rate. 55% of the current global population resides in urban areas, which will further raise to 68% by 2050 (United Nations, 2018). This drastic increase in urban population is impacting sustainable development and the quality of life in cities for residents at varying levels. Governments and policymakers are developing strategies to enhance resilience and improve liveability in cities for all economic groups (Collins et al., 2019). Both developed and developing countries are coping with the impacts of urbanisation, but developing countries are at more risk due to a lack of
resources and financial stability (Palanivel, 2017). Asian countries are urbanising at a much higher rate with almost 46% of the total population living in urban areas (Shirazi & Kazmi, 2016). Many cities are growing at an uncontrollable growth rate and managing a massive population is a huge challenge for their governments (Sarwar, 2010).

The inability to promptly respond to these challenges is creating chaotic urban development in cities with detrimental effects on the economic growth, stability, security, and empowerment of communities. Sustainable urban development should be prioritised to minimise these risks and to serve as powerful engines of innovation, progress, and economic opportunities (Shiraz, 2015). This will ensure that communities can strengthen rural-urban linkages and provide equitable facilities for residents (Fleischmann & Heuser, 2015). Henceforth, countries should work on developing plans and policies at national and local levels to achieve sustainable development, a better quality of life, prosperity, and economic growth through strategic urban planning to increase liveability (Ballas, 2013).

A liveable/smart city utilises its present resources to enhance the quality of life for its residents, increase resource productivity, use innovation to develop an environmentally friendly economy, and to promote a well-developed local democracy (Bosch et al, 2016). Urban quality of life is analysed on different scales from city to neighbourhood levels according to several parameters (Woods et al., 2016). Urban planning has a huge impact on liveability and sustainability in any region. Effective urban planning helps achieve smart sustainable cities by formulating new policies and tools to support liveability (Garau & Pavan, 2018).

The United Nations Sustainable Development Goal 11 (SDG 11) focuses on developing Sustainable Cities and Communities and stresses the need to transform cities into liveable regions to limit the detrimental effects of urbanisation (United Nations, 2021). City development should focus on providing accessible housing, transportation, waste management, air quality, employment, health, and education opportunities to the residents (Bright Cities, 2020). Sustaining urbanisation is a huge challenge that demands a new vision and commitment by governments (European Commission, 2015).

Collaborations between not-for-profit organisations, youth, and private companies should be encouraged to promote capacity building and minimise the potential negative effects of urban development (Shiraz, 2015). The residents and young people should also be encouraged to participate in city development opportunities and play an active role in the future development of their country (Billimoria, 2016).

Young people form the vast majority of the world population and they should be actively involved in sustainable development activities to nurture a sense of belonging and commitment to world development (Khan, 2019). Most of the developed nations are aging whereas developing countries have a younger population (Morris, 2019). Asia and the Pacific are considered the most youthful region of the world where 60% of the world’s young population reside (Bokoyeibo, 2018). More than 1.1 billion people residing in Asia...
and the Pacific belong to the age group of 15-29 which represents more than 25% of the total population (Morris, 2019), whereas 17% of the population in Europe are between 15-29 years (Eurostat, 2020). There are extensive opportunities for governments, policymakers, developmental institutions, and private sector organisations to involve youth and youth-based groups in development outcomes (Gongadze, 2019). Young people can help bring new ideas to mitigate the risks of demographic challenges and develop resilient cities that can sustain rapid and prosperous economic growth (Billimoria, 2016).

Keeping into consideration the importance of sustainable urbanisation and the role of young people in bringing change and new initiatives, this study explores the knowledge and perception of young people living in Asia and Europe about sustainable urbanisation. The study analyses their vision of a liveable city, the level of development of sustainable cities in their country, and the opportunities for young people in city planning.

2. Methodology

The exploratory study was carried out to analyse the perception of young people about sustainable urbanisation. The data was gathered from primary and secondary sources. To evaluate the knowledge and perception of urbanisation among young people, a questionnaire survey was conducted. Youth in the age group 18-30 from ASEM countries were invited to complete the survey as part of the 23rd ASEF Summer University application form. The questionnaire survey was conducted from September 2021 to October 2021 using an online form. The survey link was distributed on various online platforms, educational channels, social media posts, and different virtual opportunity groups in Asia and Europe to reach out to the maximum audience.

The questionnaire included multiple open and close-ended questions to analyse the respondents’ knowledge on sustainable urbanisation. The questions were distributed in three different sections. Section one focused on the personal characteristics of respondents like their region, country, education, field of study, occupation, and involvement in volunteer activities. Section two looked at their knowledge of sustainable urbanisation with questions related to the vision of a sustainable city, their perceived most liveable cities in Asia and Europe, the role of different organisations in sustainable development, and the usage of technology in leveraging sustainable city structure. Section three focused on the sustainability of the respondents’ city, the youth opportunities for sustainable development, and the factors of sustainable development achieved in the selected city.

3. Results and Discussions

A total of 617 responses were received from individuals belonging to ASEM countries. The data obtained from the questionnaire survey were analysed on an individual, as well as collective region basis to generate comparative results. The results are discussed below in details in three sections.
3.1 Socio-demographic Profile of Respondents

3.1.1 Region and Countries

A total of 617 respondents living in different countries of Asia and Europe participated in the survey. The analysis revealed that 87% of respondents belonged to Asia and 13% were from European countries. The individual data of countries showed that participants were from 46 different countries, of which 21 were in Asia and 25 in Europe. The highest number of respondents were from Indonesia (21%). Other prominent countries with a large number of respondents included Bangladesh, India, Pakistan, the Philippines and Vietnam.

3.1.2 Gender of Respondents

The questionnaire was filled by 52.3% female, 47.5% male, and 0.2% who classify themselves as others. The cross-comparison of gender with respondent’s region showed that the gender ratio between Asian respondents was relatively equal, however there were more female European respondents than male European respondents.

3.1.3 Occupation and Professional Industry

The majority of respondents (46%) were currently studying their undergraduate degree, whereas 17% had postgraduate degrees as shown in Figure I. Almost twice as many European respondents were currently pursuing a graduate degree (31.25%) compared to their Asian respondents (14.53%). On the contrary, almost half of Asian respondents (49.16%) were currently pursuing an undergraduate degree, compared to their European peers (26.25%). The major field of study of 32% of respondents was engineering and technology, followed by social sciences (22.8%) and business studies & management (15.8%). 30.9% of respondents, who identified themselves as young professionals, belonged to the business sector, 22.7% were working in non-governmental organisations and 21.8% people were associated with public sector organisations.

3.1.4 Volunteer Work

Volunteer activities play a key role in the welfare and development of their countries. Respondents were inquired about their volunteer activities, showing that 66% of them were actively involved in volunteer work. Female respondents tended to be slightly more involved in volunteer activities as 209 out of 409 active respondents were female, constituting 51% of the total representation. Moreover, analysing the participation in volunteer work with the respondent’s region showed that 86% of these active volunteers were from Asian countries.
3.1.5 Work Association with Sustainable Urbanisation

The respondents were asked whether their work or studies contribute to or have any connection with the Sustainable Development Goals and/or specifically Sustainable Urbanisation. 75% of respondents answered positively. More female respondents worked or studied in connection with the SDGs than male respondents (53% compared to 47%).

3.2 Knowledge and Perception about Sustainable Urbanisation

The respondents were asked various questions on their level of knowledge and perception about sustainable urbanisation and liveable cities.

3.2.1 Significance of Sustainability in Selecting Residence City

The respondents were asked about the importance of sustainability in selecting a city to live in. 70% of respondents stated that sustainability is a ‘highly important’ parameter, whereas 27% believed it is ‘important to some extent’ when choosing a city to live in (Figure I). 99% of female respondents perceive it to be ‘important to some extent’ to ‘highly important’ compared to 96% of male respondents.
3.2.2 Vision of Liveable City

All the respondents were requested to share their vision of a liveable city in a short statement. The vision of a sustainable and liveable city greatly varied from one respondent to another. The majority of respondents perceived that a liveable city should have accessible public transportation and provide excellent health and education facilities for everyone. The city should also have ample spaces for entertainment and social interactions to engage residents in healthy activities. Some respondents shared the following:

Vannak Khan, ASEFSU23 Participant from Cambodia

“A liveable city is a city that has many green spaces such as the public park, gardens and protects its own historical sites. The city government prioritizes cycling and walking. Moreover, the city must welcome its diversity of people, independent of race, age or income. This will bring a strong community spirit and narrow the social segregation.”

Hans Jakob Morbach, ASEFSU23 Participant from Germany

“My vision of sustainable cities is largely based around the idea of urban commons. Since capitalist developments have largely shaped our cities towards less liveable spaces there are many spaces that could be reclaimed and reused. With the act of commoning as a social practice enacted in commonly used spaces and goods, we could build a city based on the social needs of its population. The ideas of urban green spaces (collectively managed parks, community gardens and allotment areas) could help us battle climate change while at the same time establishing a feeling of community in our cities battling the ever-increasing problem of loneliness in our cities.”

Valeriia Tatianina, ASEFSU23 Participant from the Russian Federation

“I believe that a liveable city should be, first of all, a place of social and environmental justice. This is achievable through governing, space design and structural economic changes. Our cities need to be recognised as a great driving force for change and influence on local and global environments. An important mission is to increase environmental awareness among its in citizens. A sustainable future is impossible without people who are aware of global challenges.”

Summarising the diverse responses, a well-visioned and sustainable city focuses on pro-equity and democratic governance, inclusive and participative planning, systematic and affordable healthcare systems, people-friendly and disaster-resilient infrastructures, sustainable waste management plans and resource conservation, clean and efficient energy, safe and open green spaces for pedestrians, interconnected citizens and smart facilities, and integrated urban transportation systems. A liveable city should have a safe environment with equal access to all facilities within walking distance for every resident. The city should have robust neighbourhoods with a sustainable transport system and vibrant public spaces. Safety and security are two essential elements which allow citizens to enjoy urban life. These elements have the potential to develop sustainable and resilient communities for the future.
3.2.3  Liveable City in Asia and Europe

Respondents were further asked to select one Asian and one European city which they perceive as the most liveable. 313 respondents (50.6%) selected Singapore as the most liveable city in Asia. For Europe, 81 respondents (out of 617, i.e., 13%) selected Copenhagen as the most sustainable city. Table III shows the list of cities perceived as the most liveable by the respondents (most frequently mentioned). To a large extent, the respondents’ selected cities reflect the various rankings of liveability (i.e. Mercer Quality of Living Index, Monocle Most Liveable City Index, Global Liveability Ranking by Economic Intelligence Unit, Numbeo Quality of Life Index and Global Liveable and Smart Cities Index).

Table I: Most Liveable Cities in Asia and Europe

<table>
<thead>
<tr>
<th>ASIAN CITIES</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hong Kong</td>
<td>35</td>
<td>5.6%</td>
</tr>
<tr>
<td>Islamabad</td>
<td>27</td>
<td>4.3%</td>
</tr>
<tr>
<td>Seoul</td>
<td>27</td>
<td>4.3%</td>
</tr>
<tr>
<td>Singapore</td>
<td>313</td>
<td>50.6%</td>
</tr>
<tr>
<td>Tokyo</td>
<td>63</td>
<td>10.1%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EUROPEAN CITIES</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amsterdam</td>
<td>49</td>
<td>7.9%</td>
</tr>
<tr>
<td>Copenhagen</td>
<td>81</td>
<td>13.1%</td>
</tr>
<tr>
<td>London</td>
<td>44</td>
<td>7.1%</td>
</tr>
<tr>
<td>Oslo</td>
<td>22</td>
<td>3.5%</td>
</tr>
<tr>
<td>Paris</td>
<td>27</td>
<td>4.3%</td>
</tr>
<tr>
<td>Stockholm</td>
<td>51</td>
<td>8.2%</td>
</tr>
<tr>
<td>Vienna</td>
<td>16</td>
<td>2.5%</td>
</tr>
<tr>
<td>Zurich</td>
<td>27</td>
<td>4.3%</td>
</tr>
</tbody>
</table>

3.2.4  Three Important Factors For a City to Be Sustainable

Sustainable Development Goal 11 (SDG 11) envisions Sustainable Cities and Communities which focus on providing affordable housing, sustainable transportation, protected cultural and natural heritage, safe air quality, effective waste management, inclusive green public spaces, effective digital infrastructure, adequate food supply, and active citizens engagement (United Nations, 2021). The respondents were asked to select the three most important factors for a city to be sustainable. As shown in Figure II, the highest percentage of respondents believe that ‘effective and sustainable waste management’, ‘safe, inclusive, and accessible green public spaces’ and ‘safe, affordable, accessible, and sustainable transport’ are the most important parameters for sustainable communities. The responses did not significantly differ between Asian and European respondents, with the exception of effective digital infrastructure: Asian respondents believed it to be more important than European respondents (11% compared to 5%). European respondents indicated ‘safe housing’, ‘waste management’, ‘accessible transport’ and ‘green spaces’ slightly higher than their Asian counterparts.
Figure II: Important factors for a city to be sustainable

Asia

Europe

- Strong cultural & social communities
- Safe, inclusive and accessible, green and public spaces
- Safe, affordable, accessible and sustainable transport systems for all
- Engagement of citizens in city planning
- Efficient and sustainable waste management
- Effective digital infrastructure
- Adequate, safe and affordable housing for all
- Adequate and accessible food supply
- Accessible public services/resources

Other
3.2.5 Actors Responsible for Developing Sustainable Cities

City development planning involves the active participation of different sectors of society. Respondents were asked to rank the level of responsibility of different actors in developing sustainable cities (individuals, civil society, private sector, local/regional government, national government, and bilateral or multilateral arrangement). As shown in Figure III, 30.6% of respondents believed that individuals are the most responsible actors to develop sustainable cities, 29.3% of respondents believed that local/regional governments are the most responsible actors, while 26.7% viewed national governments as the most responsible. 46% of respondents believed bilateral or multilateral arrangements are the least responsible. This is consistent between both Asian and European respondents. While 32% of Asian respondents believed individuals to be the most responsible, 31% of Europeans believed individuals to be the least responsible. Europeans believed local/regional governments to be the most responsible.

Figure III: Actors Responsible for Developing Sustainable Cities
3.2.6 Leverage Technology for Liveable cities

With technological advancement, it is now easier to monitor the movement in cities to develop safe and sustainable communities. The use of Information Communication Technology (ICT) in transit, traffic, safety alerts, health services, and community activities helps promote smart cities. Technological data also helps to make better decisions and promote a better quality of life in cities. Multiple city development software like Geographic Information System (GIS) helps in assessing land use cover and change in spatial/temporal data to analyse changes in the development patterns of cities. Hence the integration of technology with smart planning techniques can play a vital role in developing liveable cities of the future. Respondents were asked to share their perspectives about the use of technology in developing liveable cities.

Ferruccio Barazzutti, ASEFSU23 Participant from Italy

"Technology offers by far the most interesting and important tools to have a macro vision of the city ecosystems. Various innovative practices, such as remote satellite monitoring made unimaginable progresses in tackling sustainability challenges as well as made visible the areas where there is the potential to make great improvements."

Jadiene Shani Yu Teng, ASEFSU23 Participant from the Philippines

"Technology can be used to improve infrastructure, buildings, transportation, and other products and services, for example in the area of waste management and healthcare, to be more eco-friendly, efficient, and accessible. These improvements can eventually lead to “smart cities”- using data gathered from all these to create services that can improve people’s lives. During the COVID-19 pandemic, a lot of areas have increased reliance of technology: shopping, logistics, finance, etc; however, this abrupt shift has caused some to lag behind, especially sectors without or limited access to technology. Thus, in order to build liveable cities, it is important to consider the impact of technology to the lives of different sectors, to ensure that no one gets left behind. This can be done by incorporating human-centered design and user experience principles in ideating tech-based solutions."
Vilim Marijan Boroša, ASEFSU23 Participant from Croatia

“We are facing a surge of new technological solutions for old problems, such as how to build completely safe buildings in environmental disasters? How to achieve a perfect mix of privacy and connectivity so that every citizen can be safe and be enabled to achieve what they want while having full authority over the use of their personal information?, How to create a circular economy in which no one is below the lines of poverty? All these questions can be answered by simple solutions such as developing a city-wide platform to ensure the fast and safe communication & exchange of ideas between the government and the citizens, and citizens with registered companies within the city (to be used in business matters) to develop relevant policies and to then follow up on their implementation.”

Anas Mumtaz, ASEFSU23 Participant from Pakistan

“Smart cities use data produced by internet-connected devices to derive insights and improve quality of life for residents. It can be measured by health, work-life balance, education facilities, social connections, personal security, community engagement, and governance.”

Technology has an immense potential to inform citizens and help them plan their communities, while facilitating their participation in policymaking. Different online and social media platforms can be used to inform residents about updates and obtain feedback about city development strategies. Data Science, Machine Learning and Artificial Intelligence can be extremely helpful in shaping liveable cities by predicting certain outcomes and selecting the most suitable ideas to implement in the city.
3.3 Assessing Liveability in Respondents’ Country

3.3.1 Country’s Progress on Developing Sustainable Cities

It is important to gather information about how residents perceive the progress and commitment of their countries towards sustainable development. Respondents were inquired whether their country is working effectively to plan sustainable cities. The analysis revealed that only 20% of respondents believed that their country is ‘definitely’ working effectively towards creating sustainable cities and 25% that their country was working towards it ‘a bit’.

Slightly more Europeans (48%) than Asians (45%) believe their country is ‘definitely’ working towards or working towards creating sustainable cities ‘a bit’. However, the highest proportion of both Asian (26%) and European (33%) respondents think their countries are ‘not really’ working towards developing sustainable cities.

Figure VIII: Countries’ Efforts to Plan Sustainable Cities

![Figure VIII: Countries’ Efforts to Plan Sustainable Cities](image-url)
3.3.2 Status of Sustainability Factors in Selected City

To assess the sustainability of a city, we selected nine factors derived from key SDG 11 targets and other analyses of sustainable cities (ASEAN Secretariat, 2021; Höjer & Wangel, 2015; Silva, Khan & Han, 2018; Thinyane, 2018):

- Adequate, safe and affordable housing for all
- Safe, affordable, accessible and sustainable transport systems for all
- Protect and safeguard cultural and natural heritage
- Safe air quality
- Safe, inclusive and accessible green and public spaces
- Effective and sustainable waste management
- Effective digital infrastructure
- Adequate and accessible food supply
- Adequate way to engage citizens in community development

Respondents were asked to rank the progress of these factors in their selected city. The three categories to rank these nine factors included ‘has achieved’, ‘in the progress to achieving’ or ‘has not achieved’. The results shown in Figure IX show that housing, transport, green spaces, digital infrastructure, food supply, and citizen involvement are in the process to achieving for more than 50% of respondents’ cities. Only 30% of the respondents believed that their selected city has achieved adequate food supply for all citizens whereas 48% and 45% viewed that the selected city has not achieved waste management and air quality.

Overall, European respondents indicated more factors (24%) as achieved compared to Asians (17%). More Asian respondents believe their cities have achieved adequate housing (11%) and adequate engagement of citizens (17%) compared to Europeans, however more European respondents indicated all other indicators as achieved. Interestingly, protecting heritage is perceived to be achieved at a higher percentage than other factors in both Asian (30%) and European (34%) cities, as does adequate food supply – Asian (30%) and European (36%). The largest differences, however, are between green spaces (Asian 18% achieved, European 35% achieved) and air quality (Asian 16% achieved, European 30% achieved). Regarding factors that have not been achieved, Europeans indicated housing as the least achieved (50%) whereas Asians indicate waste management as the least achieved (50%).
Figure IX: Status of Sustainability Factors in the Selected City

Asia

Europe

1 - Has not achieved  2 - In progress to achieving  3 - Has achieved
3.3.3 Factors Affecting Respondents Personally in the Selected City

Participants were further enquired about the factors that have personally affected them. The analysis revealed that 15% of respondents were impacted by air pollution and the lack of effective waste management, around 12% by the lack of transportation facilities and another 11% shared that unavailable green spaces had personally affected them while living in their selected city (Figure X). Interestingly, both Asian and European respondents considered air pollution (69% and 54% respectively) and the lack of effective waste management (69% and 53% respectively) as the factors affecting them the most. Asian respondents are more significantly affected by the lack of green public spaces (53% compared to Europeans 30%). More Europeans feel personally affected by the lack of adequate, safe and affordable housing than Asian respondents (49% Europeans compared to 43% Asians). Overall, Asian respondents are more affected by the different parameters – with even the lowest number for Asian respondents affected by a parameter being 32% (lack of protection of cultural and natural heritage), compared to 16% for European respondents for the same and equally lowest parameter.

Figure X: Factors Affecting Respondents Personally in the Selected City
3.3.4 Impact of Socio-Economic Challenges in Developing Sustainable Cities

Overpopulation, extreme weather conditions, inequity, insecure energy supply, water scarcity, insecure food supply, insufficient digitalisation, political apathy, unemployment, and unequal educational opportunities are the most prominent socio-economic challenges faced by cities. Respondents were asked to assess the impact of these socio-economic parameters in developing sustainable cities in their country. The results are illustrated in Figure XI which depicts that 54% ranked overpopulation, 49% chose unemployment and unequal educational opportunities, 42% selected political apathy and water scarcity, 38% inequity, 33% insecure energy, and 32% extreme weather, as the most prominent socio-economic challenges which have a lot of impact on cities’ sustainable development. The differences between Asian and European respondents are notable. Asian respondents believe Overpopulation (79% ‘some’ or ‘a lot’ effect), Unemployment (79% ‘some’ or ‘a lot’) and Unequal education opportunities (77% ‘some’ or ‘a lot’) to be the biggest challenges to the development of sustainable cities, whereas European respondents believe Inequity (76% ‘some’ or ‘a lot’), Unemployment (73% ‘some’ or ‘a lot’) and Extreme weather conditions (70% ‘some’ or ‘a lot’) to be the biggest challenges. The largest differences are between Overpopulation (Asian respondents, 79%, European respondents 53%), Water scarcity (Asian respondents, 71%, European respondents, 53%) and Unequal education opportunities (Asian respondents, 77%, European respondents 61%). Interestingly, European respondents believe Extreme weather and Inequity to have more effect on the development of sustainable cities than Asian respondents. Equally, Asian and European respondents do not think that Insecure food supply chains is a challenge for the development of sustainable cities - with the highest number of respondents from both regions indicating ‘not at all’ or ‘not very’ (18% for Asians and 33% for Europeans).

Figure XI: Impact of Socio-Economic Challenges in the Development of Sustainable Cities
3.3.5 Available Youth Opportunities in City Planning

It is very important to provide ample opportunities to youth in city development and management. The respondents were questioned about the available opportunities in the urban development sector. As shown in Figure XII, 20% of respondents claimed that no opportunities are available in their countries, whereas 50% believed that youth can be involved in local city volunteering for active participation. Interestingly, more respondents from Asia (18%) claim that youth are directly involved in decision-making/policy-making compared to European respondents (11%). Similarly, more Asian respondents (52%) claim that youth can be involved in local city volunteering compared to European respondents (38%). Significantly more European respondents (29%) were not aware of any opportunities than Asians (8%).
4. Conclusion

Rapid urbanisation is impacting the development of cities, causing multiple impacts on the provision of basic facilities and the residents’ quality of life. Planning sustainable and resilient communities requires commitment from all actors of society including individuals, governments, policymakers, non-governmental organisations, and private companies. 60% of the global young population resides in the Asia-Pacific region, where the rapid urbanisation trend is most visible. It is the need of the hour to familiarise young people with sustainable and inclusive urban development strategies and involve them in decision-making to develop future liveable cities.

This study explored the perspective of young Asians and Europeans between the age of 18-30 years about sustainable urbanisation. 70% of the respondents believed that sustainability principles are highly important in selecting the city of residence, and 75% of them were familiar with the key dimensions of sustainable urbanisation. Respondents thought that affordable housing, accessible public transport, inclusive green spaces, and proper waste management are the most important parameters to sustain urban life. In addition, they also believed that all the basic facilities should be equally accessible to all residents of urban areas. However, only 20% of the respondents believed that the governments of their countries are currently working on developing sustainable cities. 15% of respondents were personally impacted by air pollution and the lack of effective waste management in their city.
The vision of a sustainable city revolves around accessibility, equity and inclusivity for all, with the principle of no one being left behind. Singapore was considered the most liveable city by 50.6% of respondents. 30.6% believed that individuals are the most responsible actors to develop sustainable cities, whereas 29.3% assumed it is the role of local/regional governments, and 26.7% believed national governments to be responsible. Technology usage in urban development has the potential to leverage growth and digital infrastructure in city planning with the effective implementation of rules and regulations. More than 50% of respondents claimed that their city of residence is in progress of achieving housing, transport, green spaces, digital infrastructure, food supply, and citizen involvement. 50% are hopeful that youth can be involved in local city volunteering for further active participation and better urban planning.

Henceforth, the study pinpoints that young people can play a constructive role in sustainably managing urbanisation. Youth involvement in different sectors of society can help implement creative solutions for the existing issues and can also encourage them in taking ownership of their cities (Joseph, 2018). Youth opportunities should be maximised in city development strategies to encourage citizen involvement. Keeping in view the findings of this study, the following recommendations are suggested to increase youth involvement:

- Awareness-raising seminars and workshops in educational institutes on sustainable urbanisation.
- Familiarising children at a young age about the importance and knowledge of individual activities and their impact on urban development patterns.
- Empowering youth-based not-for-profit organisations in sustainable development practices.
- Incentives at the national and local level to include young people in the decision-making process.
References

ASEAN Secretariat. (2021, June). The Road to Sustainable Cities. The ASEAN.


Essays from ASEM Youth on Digital Innovations for Sustainable Urbanisation
Sydney, Australia
In the city of Sydney, Australia, there is a notable lack of frequent, well-maintained public transport services in certain areas, particularly the ones that are low in socioeconomic status and situated far from key industrial and business districts. Disparities can include:

- Lack of public transport routes in these areas.
- Low frequency and/or poor reliability of services.
- Exclusionary costs of public transport. Fees are calculated based on distance travelled. Often, areas of low socioeconomic status are located far from central business districts, resulting in higher fees to use public transport.

Several issues arise from this situation. From an environmental and air quality perspective, the over-reliance on personal vehicles leads to high particulate matter concentration in the air in these areas, disproportionately affecting residents living in them. From an inclusivity perspective, these individuals experience significantly higher travel times to work, which leads to a lower quality of life.

Here, the key issue is with the public transport system. This can be addressed using technology, including a mix of autonomous vehicles (such as metro trains and buses) and mobile-phone apps.

Autonomous vehicles would allow for more services to be added to the timetable, and also allow for better control over the network. Accidents could easily be managed by diverting the routes of other services. Automated rail vehicles could operate on denser timetables, such as one service every few minutes. If tools such as artificial intelligence are used, scheduling difficulties could be well-managed. Autonomous buses are also a highly effective solution, as they are not restricted to rails and could use existing road networks. Together, these solutions would allow for greater reach to areas currently not well served by public transport. This is particularly true if the capacity of each autonomous unit is
reduced, for example to a capacity of 10 commuters at any given time. These units would then become more mobile, and their capacity would be more likely to be fully utilised at any given time. This is further discussed below.

There is the potential to use on-demand services, whereby individuals request a service via an app, and an autonomous vehicle arrives. Using artificial intelligence, this service could then be diverted (within a set range) to pick up other commuters who are travelling similar routes. By ensuring that each unit has a smaller capacity than typical road-based public transport vehicles, the service ensures that any unit is far more efficient and less likely to have empty-seats during any given trip. Using technology in this manner would lead to an efficient and reliable public transport system, which is often the deciding factor in whether a commuter chooses to use public transport or a personal vehicle. Efficiency would be ensured by reducing road congestion (due to the reduction in personal vehicles). Reliability would be ensured by using technology to connect commuters with the required services. Ultimately, commuters would be more likely to take public transport, thus leading to improved sustainability and city inclusivity outcomes.
“Autonomous vehicles would allow for more services to be added to the timetable, and also allow for better control over the network. Accidents could easily be managed by diverting the routes of other services.”

Hillary PAN, Australia
Vienna, Austria
I am from France, but I am currently living in Vienna, Austria. Vienna is a city that has fully understood the stakes and mission of the UN SDGs for 2030. It has embarked on a fast journey to transition to a more sustainable urban area where its multicultural communities could thrive. However, all the transformations it has started, more specifically the ones requiring physical construction work (new metro lines, buildings getting renovated, other new infrastructure etc.), generate new kinds of pollution for the local population:

- Noise pollution, making it a struggle to work from home in a global pandemic and to simply enjoy one's home.
- Vibration pollution, usually starting at 6 am on weekdays.
- Dust pollution, due to the necessary tools and materials used by construction workers.
- Visual pollution.
- Mental charge pollution, for current homeowners and renters who face constant uncertainty as to when pollution will start or cease.

**Digital Solution Proposal**

At the moment, there is no centralisation of information, timelines, and schedules related to public and private construction work in Vienna. That means no one can easily know whether the street they are living in or plan to move to will be affected by the kinds of pollution cited earlier. Sure, Vienna is committing and acting quite strongly on several target indicators of SDG 11, but its social dimension, ‘and communities’, will only be achieved by removing barriers to access to information about the ‘sustainabilisation’ and its associated nuisances that citizens suffer from. Technology could prove a remedy to this situation.
Let us imagine a database – visualisable through a map changing based on a selected period of time – where construction works of different types would appear. Rather than a distinct app, it would be much easier to integrate such a digital solution into the current city’s app, widely adopted already. Independent apps launched by local authorities usually fail to reach broad adoption, as inhabitants much prefer one central hub of information, instead of having to download multiple apps every now and then. Citizens who have noticed an un-reported construction site could also send submissions to the database, either by sending a picture of the announcement to the city’s Twitter account, which would get in touch with the right service and add the missing information to the map, or by sending it to the app itself. An update to the app, in line with the kinds of pollution explained above, would show these construction sites according to type and severeness, as well as comparison anchors, e.g. “this construction site will generate as much noise as a dog barking non-stop, or a rave party”.

One question arises: why does this solution not exist already? What are the factors preventing Vienna to develop such solution?
Dhaka, Bangladesh
I am from India, but I would like to focus on the city of Dhaka, Bangladesh. In Dhaka, the generation of municipal solid waste is ominously increasing due to the rapid growth of population coupled with the increasing scale of economic activity, i.e. urbanisation, industrialisation, and improved living standards. Urban local bodies across the world are struggling with the serious problems of municipal waste management, particularly in disposal of waste. Based on estimates, two Dhaka city corporations collectively generate about 1.6 million tons of municipal waste each year and emit approximately 1 million tons of greenhouse gases. Space within urban areas is differentially allocated among the rich and the poor; existence for the poor becomes tenuous within conditions of environment degradation. Many migrants to the city are faced with uncertainties in their rural origins and opt for better opportunities in the city. However, in the city, their activities are remunerated but meagre and without adequate provision for safety and health in times of climate-induced inundation. Urban management in this city is unsatisfactory but theories conjecture an informality-organising culture rather than lack of coordination and weak implementation. This article addresses solid waste management problems and its solutions in behavioural and technical perspective

**Solid waste management problem**

Around 3000 to 4000 tons of waste are generated by households every day in Dhaka, a city with an estimated 15 million inhabitants. The only formal organisation responsible for waste management, “The Dhaka City Corporation (DCC)”, collects less than half of the waste. Out of the waste collected, 40-50 percent is disposed in the landfills. The rest stays behind unattended on roadsides and in open drains. Since Methane gas, which is twenty-one times more damaging than carbon dioxide, is released by municipal waste, this has a harmful impact on the city’s environment, as well as on the global climate. Dhaka city has only one official landfill site and is short of appropriate vacant land for disposal of waste. Possible solutions to the existing problems of solid waste management in Dhaka city:
AIoT-based Smart waste and energy management solution

Following the literature review, problem analysis and review of some existing solutions, I suggest a smart solution for the waste management issue and the economical long-term plan for Dhaka, Bangladesh. 30-40 tons capacity biogas plants can be established across the city. Gas or diesel internal combustion engines can be used to convert the biogas to electricity. Gas turbines can generate 1MW-50MW mechanical power to the shaft of the electrical generator. The electricity can be transmitted through the public electricity distribution system. So, all the generators would be part of the electrical grid system. The remaining gas can be transmitted to the biogas pipeline underground network to fill up the commercial gas cylinders in the distribution points for vehicles and to provide cooking gas to the kitchens of urban areas. The plant operation temperature, pressure, optimisation of energy production and safety of pipe lining can be managed by Artificial Intelligence-based IoT cloud services. The slurry outlet of the plant will provide biofertilisers for crops. This slurry can also be transported to fertilising units, where it can be made into grocery bags. These bags can be distributed to the people for cultivating the vegetables in the city itself.

Community and individual reward policy for city dwellers

The city dwellers of Dhaka may be used to the bad conditions of the city. They might not be adapted to the new cultural change. Bangladesh is one of the poorest countries in the world, and people may be easily attracted to money. I suggest the Dhaka City Corporation issue biometric authentication cards – a unique identity card (like the Aadhar card in India) that is connected to individuals’ bank accounts. As the segregated waste reaches the collection point, the dry waste would be weighed and the account would be credited with money. The categorised waste can be exchanged to get more rewards: metal scraps get maximum money, plastic and bio waste can be rewarded accordingly. This waste is transported to the smart grid system that I mentioned earlier. This collection system can be implemented using public-private partnerships as part of the commercialisation of biogas, electricity, fertiliser-making and crop production industries. Young entrepreneurs can be invited to be the part of this system. Short term technical courses can also be provided to the youth to ensure decent jobs in this waste management system. Producing young technical persons in different sectors may help to eradicate extreme poverty in Dhaka.
Bangladesh is rapidly progressing towards being a developed country. Through this journey lots of problems are emerging due to its large population. Dhaka is the capital and the largest city, as well as the place where I live. In Dhaka, around 23,234 people live per square kilometre. The majority of inhabitants cannot afford a personal vehicle for transportation and face two key problems: access to public transport and safety issues. Besides, the usage of diesel fuel, as well as the increased fuel consumption of defective bus engines, are harming the environment. In addition to that, the sound generated by vehicles is affecting over 5 million people.

Most of the industries and economic zones are separated from the residential places. As a result, the employees need to commute a long distance to reach their workspace. As most of the people cannot afford personal vehicles, the usage of public transport causes major challenges. This problem could be solved by the rapid production of buses and a higher frequency of bus stops, for example within 500m distance of important places. However, this would raise the traffic congestion and also pollute the air. As the air quality (the Air Quality Index value is often at the unhealthy level of 176) is getting worse day by day due to the excessive usage of diesel fuel, it would not be a sustainable solution. To provide more convenient access to public transport, metro rails and platforms should be made available at major places to provide a safer journey to the passengers. In addition to that, electric bicycles and a narrow travel lane could be introduced.

People could use the electric bicycles to reach the nearby stations. Installing ultrasonic sensors on these bicycles would prevent accidents. The entire public transport infrastructure should be under surveillance by CCTV cameras for ensuring safety. Amidst the current COVID-19 pandemic, an automatic fare system with face detection models could be used by linking them with payment gateways with the bank in order to enable touchless payment. To solve the problem of fuel overconsumption, latest technologies should be used. The most efficient way would be to use an IoT burger technology on
old vehicles due to its low cost. Through this, we could detect any suspicious fuel overconsumption by the engine and immediately take steps to fix that engine. The increase of public transport modes would lead to higher noise pollution which is a curse for the city dwellers. This could cause severe physical and psychological effects. To address this challenge, the vehicles’ system could be powered by artificial intelligence using existing GPS to prevent the use of horns around hospitals, schools, and other important places.

References


IQAir. (2021). Dhaka Air Quality Index [Data Set]. https://www.iqair.com/bangladesh/dhaka
Dhaka, Bangladesh is my city. It is one of the world's most densely populated cities. Dhaka is dealing with a slew of issues due to overpopulation. Key challenges include the lack of sufficient and sanitary living space for all and limited social awareness about family planning. The rapidly expanding population has significant consequences for the city's future development.

In Bangladesh, most women marry early and finish childbearing in their mid-twenties. It is probable that (justifiable) fears about the low quality of care and apprehension about surgical procedures are at the root of many people's reluctance to use long-term or permanent contraception. There has been a lot of talk about it, but there has not been much progress.

Overpopulation is a difficult problem to solve in the short term. It is difficult to raise public awareness about social issues, including the uncontrollable expansion of human birth. Overpopulation causes housing scarcity and the number of homeless persons is continuously growing. Is there a way how technology can help and address these challenges?

Some possible solutions could be the following:

**Women must be empowered:** women who have access to reproductive health care are more likely to work, and those who work are more likely to take birth control measures. Employing mobile applications that send short messages on social awareness could be a simple and adaptable solution.

**Encourage family planning:** According to a recent study, 62% of adults in my city use smartphones. As a result, I believe that using mobile technology to raise awareness about family planning in this Megacity is the most promising option.
‘Child tax and one child policy’ are another approach for reducing population development in underdeveloped cities like Dhaka. And, in order to disseminate this information, we would employ an SMS system that sends messages in indigenous languages. Anyone who has a mobile phone (smartphone or not) will receive a social alert once a week on their phone.

Making education more accessible to all: In a megacity like Dhaka, many people live in slums and lack appropriate educational understanding. Because, in their minds and experiences, education is prohibitively expensive and difficult to pursue, they choose child labour over education. As a result, the greatest option would be the opportunity to enrol in an online school where individuals can learn and be nurtured with educational knowledge from the comfort of their own homes. Smart mobile school apps must be developed for this reason. This could be a way to educate individuals who believe schooling is too rigorous.

References


One of the main problems related to SDG 11 in my city / community is transportation, which has a severe impact on both physical and mental health. Dhaka is the capital city of Bangladesh and, according to a report by the Metropolitan Chamber of Commerce and Industry published in 2010, about 3.2 million working hours are being lost daily due to traffic jams (MCCI and CMLT, 2010). Traffic jams have a big impact on mental health and are affecting human behaviour. Issues ranging from paralysis in accidents to social interactions are being affected by traffic jams.

Another major reason for traffic jams is that every day in the city, roadworks occur on both sides of the road in the name of unregulated building of factories and the negative impacts of this have to be acknowledged.

How can traffic jams be dealt with through technology? Modern technology can help reduce the ‘curse’ of urban life. A city is beautiful and liveable when it is clean, noise-free and green. Dhaka is becoming inhabitable because of the traffic which is causing death. In the development of the country, and in order to protect the image of the country, initiatives have to be taken at the government level. The government has to solve this problem as a priority so that the people can get relief from this problem. A few proposals can be made to solve this problem.

The number of private cars in the capital has to be controlled. The proliferation of private cars is considered to be one of the major causes of traffic congestion. We can use bicycles to decrease our traffic jams. A large number of private cars are generating high rates of CO2 by burning the fuel. Combustible fuel, octane, petrol, diesel and other harmful substances in cars should be limited. Instead, auto rechargeable battery-powered bikes/ cars should be encouraged.

We can use IoT based digital devices to control traffic signals in the capital. With the help of
technology and IoT based digital devices, we can formulate policies to control the demand for parking, stop free parking and impose fines for illegal parking, charge parking fees according to the place and time everywhere, spend the money received from parking to improve the quality of public transport and more surveillance on traffic signals. Artificial intelligence can also be used for this purpose.

On the other hand, if the river that surrounds Dhaka is used, the pressure on the road can be reduced. If the water launch service can be implemented on this waterway, then a large part of the city dwellers can use it to move from one place to another. This has been done in Thailand. This will keep the city’s water bodies clean and reduce waterborne diseases. Next, building bridges over intersections will largely reduce traffic congestion. The driver of the vehicles has to comply with traffic laws.

In the end, if we want to make all these things possible, we have to make these solutions technically feasible. These solutions can only work with the cooperation of technology and our own commitment to bring about change. Even with partial work on these issues, the traffic congestion can be reduced a lot.

References

“With the help of technology and IoT based digital devices, we can formulate policies to control the demand for parking (...) to improve the quality of public transport.”

Md Tariqul ISLAM, Bangladesh
In Dhaka, Bangladesh, the public has to be stuck in traffic jams every day. There are many private cars here. Many of the rich, starting from the middle class, have their own private cars. Private cars with small occupancy of 1 to 2 people take a large part of the road, especially during office hours or during school hours, resulting in traffic congestion. The head offices of almost all governments, private or semi-government companies are in Dhaka, Bangladesh. There are also garment factories, public and private universities. Dhaka is a busy city. During peak hours, there are traffic jams on the roads.

Being stuck on the road due to traffic jams is a big problem. Although Bangladesh is a developing country, the modes of transportation are improving day by day. A metrorail has been launched recently. However, the traffic congestion problem is not decreasing.

Bikes have become toys for teenagers in Bangladesh! It seems that the traffic problem is getting worse due to irregular driving, and car accidents are constantly increasing. To stop this, we need to be a little more digital. One suggestion is that more people could work from home, such as during the COVID-19 pandemic. Even reducing the regular commuting by half or changing peak hours, would help. There are many more online tools like Google Meet, Zoom, etc. that can be used to carry out office or meeting activities.

There are also some digital apps to find out what’s happening on other people’s computer screens in real time. If offices have a digital platform where all these things can be combined, employees can be active on the platform and the boss can monitor them. Employers could schedule hybrid work schedules - one day some people would have online office while others would have offline office. As a result, I think the traffic jams in Dhaka city can be reduced, even if it is a little bit.
Bangladesh has a population of over 170 million. People generate waste every day as a part of their regular life. Because of the large population, a significant amount of food is needed. Therefore, cooking or processing is required. The usual foods are rice, meat, vegetables, eggs, fish and pulses. However, it is assumed that a great amount of kitchen waste is generated. And people in this country are usually dependent on their own cooking, rather than deliveries. But restaurants also generate a lot of kitchen waste. Home deliveries are getting more popular in urban areas via Food Panda. The problem rises there. Firstly, the waste is not being discarded in a proper way. For instance, it would be better to recycle the waste, which is instead being sent directly to landfills. In that case, we are losing some resources. So, waste-to-energy solutions in a digitalised way are the way forward.

Waste can be converted to energy in many ways, mainly by biological and thermal treatment methods. However, anaerobic digestion is recommended. Biological treatment methods include anaerobic and aerobic digestion. Anaerobic digestion is a very popular method for waste management all around the world. We can get biogas by the microbial degradation of bio wastes. Firstly, biogas plants need to be established. For a community or society, particular plants should be established, for example for 5,000 people, one plant. The regularly generated kitchen waste will be picked and taken to the plant. Methane can be produced by which we can generate electricity. An app could be developed, similarly to Uber, when we need a car we hire, so when we generate waste that is collected to be taken to the plant, we earn credits to hire a car.

In the meantime, waste can be contained somewhere in a closed place. So, after the company generates biogas and electricity, they can import the electricity and earn money. Some shares of that money would be shared with the waste generators. Here is how the app would basically work: people who would be contributing more towards supplying waste to the plant would get more benefits. The app would measure and keep track of it. This would create extra income opportunities for the people. They would be more careful...
to handle the waste, as they could now turn them into economic resources. The app could have features like ‘Call people’, ‘Collected Waste’, ‘Generated Electricity’, ‘Accumulated Revenue’, ‘Claim Reward’, etc. IT people could have the opportunity to collaborate with environmental scientists. Knowledge building and training would be needed as well. Different apps can be developed for different communities and pilot projects can be run first. After successful prototyping in urban areas, the model could be expanded to rural areas. Both public and private participation is necessary.
According to citizens, Dhaka is an unclean city. This is a reality. From the extensive research that has been made, a few causes are highlighted as the culprit here. Firstly, due to massive and rapid urbanisation, it is hard to keep track of all the people living in Dhaka. Their environmental and economic impact remains unknown but is very visible in the form of unhandled waste and poverty. Secondly, people lack the incentive to follow the current protocols regarding waste management. Their priority is not waste management due to their chaotic daily realities.

One solution is to create a mobile app that will unite all residents of Dhaka to manage the waste issue. The ‘N0 waste!’ is a people-centred digital solution. Both identified problems could hardly be efficiently tackled by just a legislative or a technical solution due to the social inertia arising during the implementation of such ideas. That is why the focus is not just on how to clean Dhaka, but also on how to change the lifestyle of its residents to ensure that the root of the problem itself is being tackled. The proposed solution could create value for people with eco-friendly behaviour, by giving them opportunities and benefits tailored to their needs. Although the core purpose of this solution is to make Dhaka greener, it also creates an efficient communication system between the government and residents, between those who provide and those who receive.

To create a new & fun way to guide people towards a more sustainable and happy city, the application will contain features such as a map of the waste collection points, community lists and chat rooms, the list of rewards, penalties and their status, the personal information profile of the user, individual and community ranking, as well as the newsletter. This gamified platform which tracks waste collection and segregation, at an individual and community level, ranking and rewarding users accordingly, aims to connect the people of Dhaka and create a circular flow of waste by using the power of the people.
Among many urban problems that engulf Dhaka city, the most pressing one is traffic congestion. The city’s transportation system has not been able to keep up with the pace of city development. A deficit of the public transportation system leading to a dependence on private vehicles and a lack of city planning are the two major factors contributing to this problem (Khan, 2021). Daily, Dhaka’s traffic congestion eats up almost 3.2 million work hours from people’s lives (Rosen, 2016). Its average transport speed is 7 kph, which is projected to fall to 4 kph, as slow as a person’s walking speed, by 2035 (Haider, 2018). Ignorance of traffic rules and driving alone will add to the problem. People’s stories of hardship as a result of the gridlock encapsulate their daily lives. This problem, which has become an inextricable element of daily life, has begun to define Dhaka.

Technology has the potential to play a significant role in addressing Dhaka’s traffic congestion. Although city people utilise Google traffic maps to acquire real-time traffic data, technology is yet to reach additional dimensions in tackling this problem. Some self-initiated social media groups function as crowdsourced platforms where people post real-time traffic updates, accidents, and congestion to make others aware. Several apps have also been developed by the government and other organisations in recent years to tackle this problem, but their outreach has never been satisfactory. Dhaka must act on information generated by the city itself in order to tackle the city’s traffic problem. Monitoring devices can assist in the generation of big data sets. People who have access to this information can use it to plan their movements. The city’s traffic lights are nearly obsolete, increasing the reliance on traffic police and the manual hand signal system. This often causes confusion, and because the traffic police do not have information on all areas of the city, they are forced to act on their own. Controlling the city’s traffic signals and providing traffic police with a device at every intersection to keep an eye on the big picture could help control the situation. Surveillance and enforcement of traffic rules can also be aided by technology. Many unregistered and unsuitable automobiles move, aggravating traffic congestion. A unified database of all types of vehicle registrations and fitness data...
could assist in the identification of these cars. A platform with information about the city’s public transportation system could also encourage individuals to use public transportation instead of driving their own cars. People can be guided by a real-time map of available parking spots in the city. The traffic data generated by mapping people’s movements can also aid city planners in making their decisions. Dhaka can become more responsive with real-time big data, and policymakers would be able to respond more quickly to the city’s needs.

Finally, technology can be used to create awareness about the dos and don’ts to overcome the city’s traffic congestion problem. When every individual in this city has access to technology, using technology of different kinds to solve this problem can result in significant changes.

References


“The traffic data generated by mapping people’s movements can aid city planners in making their decisions. Dhaka can become more responsive with real-time big data, and policymakers would be able to respond more quickly to the city’s needs.”

Samia RAFA, Bangladesh
The way we view and describe cities is radically being transformed as new approaches and means are introduced. As such, SDG 11 contributes to the empowerment and development of sustainable cities by providing the inhabitants with a better standard of living. With a population of around 164 million (as of 2020), Bangladesh strives to provide safe and accessible transportation to its huge population. However, pedestrians are prone to frequent accidents. Approximately 1.3 million people die every year in Bangladesh and more than 3,300 die on the roads (Pervaz et al., 2020). Besides road accidents, traffic jams are also a big hassle. They pose negative externalities on society and also constitute a threat to the economy. Technological integration can help reduce accidents by providing safer roads.

Our smart phones can be linked to automobile vehicles using dashboards to reduce driver distractions. This would enable drivers to make phone calls, answer them, send and receive messages and also search Google maps without their eyes being diverted. In addition, the entire systems should be able to recognise speech.

Most of the road accidents that occur are due to drivers’ lack of awareness and negligence. They are often too drowsy, drunk or tired to drive, which leads to huge loss of life. To prevent this from happening, a technology sensor can be developed that would monitor the drivers’ behaviour and set off alarms if unusual behaviour such as drowsiness or sleepiness is observed. Moreover, the system would also alarm drivers if an obstacle were very close to them.

Lastly, road accidents are also occurring due to the false claims of drivers. According to Dhaka Tribune, the number of vehicles in Bangladesh is around 3.3 million, and about only 2 million vehicle drivers have drivers’ licenses. Ride-sharing services often do not check for validation of licenses due to time consumption, which increases the number of unlicensed drivers. To avoid this issue, we can create an automatic system to verify valid drivers’ licenses and skills and check on drivers’ backgrounds to verify that they have
no past record of accidents. The system can use frontier technologies such as Artificial Intelligence, Computer Vision, etc. to give a quick, reliable response.

In conclusion, Bangladesh is a country prone to road accidents, which hinders its efforts to attain SDG 11. Even after so many years, this problem has not entirely been taken care of, which leaves us with an uncertain and unsafe transportation system. However, with the use of technology, even if the problem is not totally eradicated, we can at least minimise its effects and help build sustainable and liveable cities for the citizens.

References


In Brussels people are using more and more different types of transport. Next to classical ways of transport (car, public transport, biking and walking), there has been a diversification of other types, which often involve sharing transport. For each different type, there is an app where users can select their transport.

For example, there is Uber as a taxi service. There are Cambio, Zen-Car, Drive-Now and Poppy, four companies that rent out cars and have already had a large impact on public infrastructure. There are different carpooling apps (e.g. Blablacar), where drivers can share rides with other people. There are several possibilities to rent a bike (Villo!, Bluebike, Swapfiets, Cozywheels, etc.) or an e-scooter (Lima, Dott, Bird, Voi, etc.).

This explosion of alternative means of transportation adds to the already complex situation of public transportation in Brussels, with three companies for busses and trams (MIVB/STIP, De Lijn and TEC), the Belgian Train company (NMBS) and international train companies (Eurostar, Thalys, ICE & TGV).

Because there are many different mobility tools associated with each type of transportation, it is not possible to be completely aware of all the possibilities, let alone investigate the most efficient way of transport. In order to tackle this challenge, a new digital system of the type MaaS (Mobility as a Tool), which can entail a complete mobility offering with the integration of these new types of transportation, has been developed. Many European cities (e.g. Helsinki, Birmingham, London) and Belgian cities (Antwerp and Ghent) are developing a MaaS system. The system places the user at the centre and proposes personalised mobility solutions according to their individual needs. It brings together all the different means of transportation in a unique mobility service that is accessible upon request.
Finally, it makes it possible for the users to use one single app or interface to consult timetables, outline their route, determine multimodal options, reserve the means of transportation when needed and execute the necessary payments.

References


I am from the Netherlands, but I am currently residing in Leuven, Belgium. Although many SDG 11 targets are being addressed — e.g. affordable housing, sustainable transportation and protecting cultural heritage — there is still room for improvement. One issue regards waste management and recycling in Leuven. Recycling is being organised by having particular days for certain types of trash (e.g. Tuesday is plastic and Wednesday is paper, etc.) which a household puts out on the street in the evening, after which the trash is picked up the following morning. To promote households to do so, the trash bags for separated trash are cheap, whereas the general waste trash bags are quite expensive. Although this does support recycling trash and is definitely a good first step in the right direction, additional problems come up. As trash is put outside during the night it attracts pests, especially in the summer. Moreover, during paper pick-up days, the paper gets blown away by the wind, causing pollution as well.

To solve issues like this, I propose the use of smart bins as an alternative method for waste collection. Instead of picking up trash with big trucks — which, besides the issues described above, also cause pollution, noise and unpleasant smells — the city could construct smart ‘trash stations’, to which household bring their trash and throw it in big underground bins. The bins could track the collections of trash, making for an efficient tracking of trash accumulation. There could be an interface showing how full the bins currently are and which bins need to be emptied soon. By extrapolating the data, you could predict how fast each bin fills up. This would allow the possibility to outline the most efficient routes for trash pickup trucks, which has the positive effects of reducing noise and air pollution, as well as tackling the original problem: nightly lingering of trash around the city. As the trash is collected in underground containers, they are virtually odour-free, and even if rodents succeed in reaching the underground compartments, they will not be close to houses, as would be the case if you put your trash bags directly outside of your front door. To make a full circle in terms of sustainability, these smart stations would ideally have a small solar panel attached to them, which would be able to generate sufficient energy to allow for the system to communicate properly.
As a potential add-on to the proposed system, you could work with personal cards so people have to check-in to make use of a smart garbage bin. This would ensure that illegal trash dumping becomes more difficult. Moreover, the smart bins would not just track the total amount of garbage, but also the type of garbage, whether the bins are used properly, and the amount of trash discarded per person. By using personalised cards, you could charge households differently according to their disposal behaviour. Households that discard mostly general waste rather than separating waste into different bins could be charged a higher amount to promote proper recycling behaviour.

References


“I propose the use of smart bins as an alternative method for waste collection. (...) The smart bins would not just track the total amount of garbage, but also the type of garbage, whether the bins are used properly, and the amount of trash discarded per person.”

Ellen VOORRIPS, Netherlands
Bandar Seri Begawan, Brunei Darussalam
Brunei Darussalam is remarkably meeting indicators of the Sustainable Development Goals (SDGs) by ranking consistently, even well above average in terms of annual gross domestic product and areas such as housing accessibility, literacy levels overall and across genders to name a few (Global Nutrition Report, 2020; Hassan & Yong, 2020; Ministry of Finance & Economy, 2020). However, the small sultanate has one ever growing issue: obesity. The monarchy notoriously topped in both childhood and adult obesity rates among the South-East Asian region (Othman, 2021; The Scoop, 2018).

Malnutrition hinders the nation’s efforts to achieve SDG Goal 11 (Sustainable Cities and Communities) in that residents would be susceptible to shorter lifespans via non-communicable diseases (Grosso et al., 2020), leading to stunted economic contributions as they will not be able to perform and deliver their best (Ralston et al., 2021; Steiner et al., 2019). This leaves the city with a less active population to maximise future development plans while resorting to managing lifelong threatening conditions and a rift of emotional abuse from body shaming (World Obesity, n.d.).

The solutions to be proposed in the following paragraphs all have a shared basis of technology but the term here will be taken in its generalised state to encompass both digital and non-digital forms to fully explore their advantage. To start off, some existing effective weight loss aids that have somehow lost relevance with increasing technological advancements or the public perspective have shifted (Fitzgerald & Nagarjune, 2021).

The first one is video games, specifically those built around existing sports such as Fitness Boxing or Just Dance which require the attention and involvement of the audience. A popular misconception is that the pastime of videogames directly contributes to the obesity affliction by promoting sedentary lifestyles, when in fact these games motivate, help track workouts for people while still having fun (Forman et al, 2016). Furthermore, pushing the need to cycle more often and providing electric bikes, such as in the
Netherlands, would not only reduce the sultanate’s carbon footprint but also alleviate the burden of being overdependent and stockpiling on cars (Bocking, 2021; Ibrahim, 2019; Pucher & Buehler, 2010) which are perceived as luxurious items and associated with social prestige. Besides, the local public transport system of purple buses is of low quality in which routes are limited, daily operations last only until 6pm and the schedules are not centrally computerised (Cheong et al, 2016). Lastly, a localised, specialised tracking webpage or digital equivalent to bring the obesity pandemic to the forefront. Indeed, countless applications exist on the market that can help track one’s diet, calory intake or workout routines but these are general applications. However, these applications do not take into account Brunei’s subsidised economy, welfare system or even general practitioners’ attitudes towards treating obese patients which could be specific only to the sultanate and exacerbate the matter (Han & Bandial, 2021; Hayat, 2020; Ng, 2020; Saedon & Naing, 2015).

It is worth noting these COVID-19-stricken times certainly have not made things easier in curbing the problem with stress-eating, isolation and restricted outdoor activity. But this should not be any excuse as obesity was already a big deal for Brunei since the early 2000s and has been on the rise annually (Asia Times Staff, 2018). That said, with technological interventions with a focus on educating and instilling healthy mindsets, Brunei may stand a chance after all (Bocking, 2021; Florida, 2018).

References


Phnom Penh is the capital city of Cambodia. It is one of the fastest-growing cities in Southeast Asia. The expansion of the city has brought some important urban challenges. As the city gets bigger and bigger and people’s living standards improve, a lot of vehicles are imported, particularly as public transport does not work well in the city. On the other hand, land prices have skyrocketed in the urban areas. At the same time, companies, public facilities, and other public service providers have not built enough parking lots for their employees.

Solving this problem is not as difficult as it may seem. Technology can play an important role in addressing the challenge. A Smart Parking system is the best solution. It is a very basic system that any country can adopt as long as it has built enough parking lots. The system can tell drivers about the locations near their cars. It suggests the nearest parking lot to them so the drivers can choose by themselves.

In addition, when drivers enter the parking lot, the system will alert them about available spots through their phone or other platforms. Everything is automatic. The drivers just connect their phones to the system or install the application. Moreover, they can connect this system with their cars (provided that the cars are recent enough to support this technology).

To build this system, there are some important factors that we should know about. All parking lots must install all the necessary equipment that the system needs. Internet connection such as broadband needs to be fast and convenient enough. Communication infrastructure needs to be built in different areas.

This is a good solution if every city has the capabilities to build and adopt such technology.
Zagreb, the capital of Croatia, has a massive problem with corruption and the flow of city funds. This is evident from yearly economic reports of the Zagreb city leadership that Zagreb, although a city with great potential in tourism, winter sports and similar domains, turns a perpetual loss year to year with seemingly no great investments visible to explain such losses. In the past, there were multiple controversies and trials regarding corruption in the city of Zagreb, but the problem is that it is not just a few people committing these crimes – there is an entire network involved in corruption and fraud at the very base of every operation involving the city leadership. It is a public secret and there are thousands of people benefiting from corruption (while all other citizens suffer losses due to such a system in a city with almost a million residents).

A digital solution is a spotless and logical type of solution for this specific problem. By using an already existing trend, the digitalisation of state reports and services, an online platform could be developed, with the main functionality being a clear and concise overview of all transactions done with the monetary resources from the city funds. With all transactions conducted using public money being publicly visible, a new level of transparency would be achieved, lessening the possibility of someone within the city leadership committing any form of fraud or corruption. Integration of such a platform would be very easy due to Croatia already having an online citizen platform, enabling a simple log-in interface with no need for any form of registration, meaning this new platform would provide an overview of the use of public funds and would merely be an addition to the already existing universal state platform.

As one of the additional uses, a democratic approach could be used for city investments, meaning citizens could vote on which of the investments proposed by the city council would be pursued, and in which manner. When it comes to potential cases, there was a controversy recently with every member in the inner circle of Zagreb's mayor receiving incredibly expensive cars funded by taxpayer money. In a world with the proposed platform, such transactions would be impossible, because they would not be able...
to push such a transaction when all planned transactions are clearly visible to the public, and secondly, because the public could simply vote not in favour of such unnecessary and corrupt investments. Also, due to the Croatian judiciary system being famously inert and complicated, preventing corruption crimes and not just trying to punish them would help relieve Croatia in general of its unbeatable burden: corruption.

In a nutshell, this proposed digital solution would enable full transparency on how public money is used while enforcing the democratic power of the people to intervene if some malicious or corrupt expense has still been proposed even when all expenses are transparent to the public. With this new level of transparency and democracy, corrupt behaviour would finally be brought under control.

References


Transparency International Hrvatska. (2021, April 1). KORUPCIJA U OŽUJKU 2021. GODINE. https://transparency.hr/hr/novost/korupcija-u-ozujku-2021.-godine-855


One of the SDG 11-related problems of my hometown Zagreb is the waste management system, which is still based on landfilling, with a rather low recycling rate. Zagreb achieved less than 5 kg waste recycling per capita for different waste fractions in the year 2016, compared with an average of 108 kg for other European capitals (European Commission, 2019). Apart from low recycling rates, illegal landfilling also remains a major problem. There have been efforts to change this in the last couple of years, but there is still a lot of work to do - not only by the city officials in terms of policy, but also by the inhabitants in terms of their own habits.

Why?

The problem of high landfilling and low recycling rates cannot be solved only by quality systems, without citizen cooperation. That’s why I think there should be a bottom-up approach towards solving waste management problems in Zagreb. It is necessary to educate people not only about the Reduce – Reuse – Recycle principle, but also about proper waste disposal - as the final option - instead of the first one.

How?

This could be done with an educational and fun mobile/web app, “thREe”, oriented to all age groups, starting from the youngest to older adults. The app could collect data on the current habits of different age groups in different areas of the city. For inspiration, I took the example of the Duolingo language learning app.

“thREe” would be an app available in Croatian and English, adjusted to one’s age. This means that based on the user’s declared age during the registration process, different features of the app will be available. For each generation (Baby Boomers, Gen X, Gen Y, Gen Z and Gen Alpha), the app will be adjusted to their learning preferences through
different games and quizzes with adjusted vocabulary and an entertaining approach. The app will also offer an option to play games with other users/friends and have a scoreboard on who reduces/reuses/recycles more in a given moment (day/week/month/year). Each user will be able to create competitions among his friends/other users or users in the same area and offer different awards to the winners.

After the registration, the app would offer 3 “modules”:

1. REduce - module focused on teaching the reduction of waste production for each individual. It starts from analysing the current waste production of an individual and it makes the user aware of their own habits. After the analysis, the app fills the knowledge gap through games/quizzes/contests and other entertaining learning methods.

2. REuse - module focused on showing the ways products/items can be reused, even for a completely different purpose. Also, this module starts with an initial analysis of current reuse habits of the user, after which some different ways of reusing products are shown. Here we also use various entertaining learning methods.

3. REcycle - module focused on educating on the proper separate waste collection and recycling of products. Here too, we start with an analysis of current recycling knowledge of the user as well as recycling habits. Afterwards, the user can dive into different games/quizzes to improve his/her recycling rates.

Based on the initial knowledge and habits of a user, the app will generate personal challenges or group challenges to be reached within a certain period (daily/weekly/monthly/yearly). Based on user’s location, the user will also get recommendations of nearby recycling centres and reuse markets/shops/associations.

References


The capital of Croatia, Zagreb, is a city with 800,000 citizens. As most global urban areas, it has attracted citizens from rural areas, with the promise of more opportunities and a better quality of life for all. Among Croatia’s plague political corruption over the decades, several problems have made themselves known: waste management issues, substandard water treatment facilities, lack of infrastructure development and upkeep, heightened air pollution, lack of support for veterans, lack of social housing, etc. With a recent change in the local government, one of these problems has been a topic more than others, and that is waste management. As a clear marker for the health of the city itself, an increase of uncollected household waste, and unemptied waste containers, have indicated to the general public that there is some kind of deficit in this area. Therefore, I would like to suggest a possible digital solution to this problem.

There are many aspects of the waste management system. Starting from the consumer that disposes of a product or food, the path this waste follows is predetermined by the system put in place by the local government. Zagreb has segregated waste for households: biowaste (uncooked food products), paper, plastic and metal, glass and general waste. Specialised ‘recycling yards’ which will take textiles, large cardboard waste, batteries, chemicals, styrofoam and other waste that cannot be put away with household waste. Citizens are given special plastic and metal, and bio waste bags directly from the local government, and according to the number of people in the household, expected to not produce more than allocated; if they do so, they have to pay extra per kg of waste produced. Several aspects of the system need to be addressed, including the issue of taking the waste away.

On the one hand, this is due to the breaking of an external contract for managing certain parts of waste, as those who take care of it are private companies. However, I would put forth that a part of the problem is the logistics of the waste collecting. There is a timetable for the collection of each waste type, some waste are collected daily, some weekly, and some are collected every other week. My proposed digital solution would be a monitoring
of individual waste bins as it pertains to their filled volume. This data would be fed into a central system that would collect all the volumes of waste bins, and a waste collection route would be generated for the workers that pick them up. This way, real-time data would showcase how each container is doing, and routes could be optimised so as to not go into areas where collection is not necessary. This would be for large containers such as multi-story buildings, where there is a central waste deposit, as opposed to houses, which have smaller individual waste bins. All of this data could be collected to produce predictive models on waste generation and the system could improve itself by locating areas that may be put together to optimise the waste collecting system.
“My proposed digital solution would be a monitoring system of individual waste bins as it pertains to their filled volume. This data would be fed into a central system that would collect all the volumes of waste bins, and a waste collection route would be generated for the workers that pick them up.”

Božena ODOBAŠIĆ, Croatia
Ms Maria KONSTANTINOU
Cyprus
Undergraduate Student
University of Cyprus

I would like to discuss “Disaster Risk Reduction (DRR)”. To begin, I want to emphasise that it is an intrinsic part of social and economic development, as well as a vital component of long-term development.

Problems with water and human settlements are two subcategories of DRR, as seen in several communities in the suburbs of my hometown of Paphos. Pissouri and Limnes are two of these villages. The soil in these places was harmed by a slow-moving landslide, which destroyed several homes. According to geologists, the communities were revealed to be in a ‘geologically difficult location’.

SDG 11 (Sustainable Cities and Communities) includes a focus on disaster risk reduction and resilience building. Reverse stability assessments must be undertaken to check the general conditions of slopes and compute the boundary conditions parameters of shear strength of the slip surface. The analyses can be done by using specific software to run continuous simulations of geological data.

Prediction is the holy grail of landslide risk management. Patterns of motion that change over time and eventually become synchronised are the first signs of a landslide. The typical measurement technique entails dispatching a surveyor to the field each day to use theodolites to measure land movement, which is a time-consuming and costly process.

Large landslides and sluggish slope changes could be detected and monitored using fibre-optic sensors buried in shallow holes within hillsides. We can circumvent some of the limitations of standard inclinometers by using fibre-optic sensors, which have no moving parts and can endure larger soil deformations. These sensors can be used to detect slope failures or early deformations over wide areas. The wires can detect a change in length of one centimetre over one kilometre and identify spots where anything unusual occurs with a precision of a few meters. Furthermore, the changes can be investigated from afar without requiring inspection of the monitored object.
Lidar is a laser-based innovation that permits geologists to unequivocally and precisely locate landslides, as well as uncover information on their causes and appearance. It is practically equivalent to noticing an impression on wet seashore sand. The next stage is to utilise Artificial Intelligence to connect the occasions in the information base with precipitation and other nearby conditions to attempt to anticipate what will occur immediately. The exceptionally high spatial precision permits overlaying the occasions with other data like that on soil surface and rise and understanding the main reasons why landslides occur in one region and not another, or why yesterday and not the other day.
Being requested to address urbanisation issues that my city is facing, I had to recall images I have from growing up. Car ownership in Cyprus is very common, and so is the obvious traffic jams on the streets. Defining transportation as a service for the individual and a system that is part of the city, road vehicles and railways now make up a layer of how cities function. An important dimension of SDG 11 (Sustainable Cities and Communities), transportation is an essential need for the citizens to commute to their daily responsibilities.

The amount of population and traffic congestion are inherently linked. The higher number of citizens, the higher the demand to get to places. This leads into automobiles lining up and eventually getting stuck in traffic. As most Cypriot citizens are vehicle owners as soon as they become licensed drivers, automobiles are prevailing over any other transportation means. In addition, the inadequate infrastructural planning does not encourage alternative ways of travelling. The city pattern is too scattered and other options (trams or underground trains) are lacking, making it very difficult to cycle – let alone the fact that Cyprus has one of the warmest climates. Moreover, the bus system operates daily and on rotation, however not with the most efficient stops’ locations and frequencies. Public transportation is still avoided by locals since it unfortunately gives the impression of a lower status and limits the personal independence offered by a private car.

Using examples of common platforms in other places as inspiration, a mobile application could be the digital answer to tackle the problem. Based on existing GPS technologies, a system of automobile tracking could be proposed. Its features could include user accounts with personal information (e.g., location of home place and workplace, hours of usual mobility, mostly followed routes, car brand and model, driving license and plate numbers). The app would offer the best possible route, according to the demand, time left, possible accidents that may happen, etc.

Through a combination of data analysis and sensors tracking vehicles’ speed on the streets, the application could be programmed to collect useful data, mark the congested
areas on live maps, and suggest alternative routes to the users and bring them to their destination conveniently.

Citizens would then be provided with different routes options weekly, based on the data collected by relevant authorities. The device would also be programmed to evaluate users' activities by identifying the sounds of the radio, and detecting car’s movement based on light change, as well as the inaction stage of the screen. The app will be able to track the kilometres while riding. A trial of eliminating the use of automobiles and encouraging alternative modes is enabled. The vehicle registration annual payment would be of extra charge if extended use is noticed. The e-bikes of the city will also be linked to the app as an alternative means. When using them, bonuses will be collected, piling up for awards like discounted fines, deletion of points, etc.

In conclusion, technology is only one part of the solution for making cities sustainable. The combination of innovation by citizens and governance could be fruitful in facing the problem. The wheel will not be reinvented, it just gets updated in response to the era’s requirements.

References


“Through a combination of data analysis and sensors tracking vehicles’ speed on the streets, the application could be programmed to collect useful data, mark the congested areas on live maps, and suggest alternative routes to the users to bring them to their destination conveniently. ”

Irene SERGIOU, Cyprus
The city of Olomouc in the eastern part of the Czech Republic has been in the process of adopting digital solutions for a few years now. It is a mid-sized city for the region with its roughly 100,000 inhabitants. There are experiments with a smart garbage disposal system, citizen feedback application and public transport digital tickets. I will focus on the city’s efforts on public transport.

In the last 15 years (since the Czech Republic joined the EU), the city progressively renewed the vehicle fleet to make it more accessible (low flooring, blind people accommodating), adding buses and trams, building a new tram line, and getting the physical infrastructure in order. More extensions of the public transport system are currently being built, but a move towards a more sustainable fleet does not seem to be on the menu yet. From the point of view of encouraging use, the city managed to integrate fares with the regional railroad, enabled SMS purchases and installed vending machines for tickets at some stops. Also, waiting times are now displayed live at most stops. However, integration of all these positive steps into an accessible app has failed at least 3 times.

Presently, citizens would like more tools for keeping their cars as a primary mode of transport and maintaining car access into the city. Secondly, when organisations advocate for dedicated public transport lanes, data collection for such purposes is also quite tricky. Solutions to both problems are found in a city that I moved to recently – Malmö, Sweden. The city of Malmö adopted all-digital public transport fares via a region-encompassing app, that searches for the public transport connection, enables in-app purchase of 4 types of tickets and checks the tickets via a QR code reader in the vehicle, which would be crucial for the city of Olomouc. Therefore, the transport agency has real-time data on vehicle occupation and dynamic use of particular lanes. The real-time data was used very well during the COVID-19 pandemic to indicate to users the occupancy level on their route, so that the public could make informed decisions about the acceptable level of risk. With a similar option available in Olomouc, the city would not have to resort to lockdown as hard as it did.
Long-term positives would arise from the usage of data, because nowadays the city regularly tries new lines for free to test if the residents would be interested. In-person counting of travellers is also a regular occurrence. I would advocate for stronger tools for the local government to illustrate for citizens the positives of higher public transport usage and to be able to more flexibly react to real-time demand. I can imagine the discussion about the transformation of parking spaces into a tram lane to be more factual in such a situation.
Copenhagen, Denmark
I am from Latvia, but I am currently living in Copenhagen, Denmark. Copenhagen falls into the category of cities that others choose as more sustainable compared to other places. There are bike lanes, recycling of bottles and lots of green areas for recreational purposes. Yet, no city is perfect. In the last 20 years, the prices of housing in the capital have skyrocketed. This means that a lot of people are being excluded from owning their own place. Instead, many people with the means often buy several houses to rent out at a higher price. This is not inclusive and only creates further inequality. By not owning one’s own place, lower and even middle-income families and individuals have a lower sense of stability and only higher rent. It also means that they are more likely to have to borrow money from the bank and live in housing with less space. Furthermore, there is a lack of student accommodation. Many students then either need to borrow money to live closer to their university or live very far. This will be at the expense of diversity in the city and less economic prominence in the smaller cities, as well as more intense traffic jams for those who live in the capital, causing higher pollution rates. This is also seen in statistics where about 35% of the world’s urban population face inadequate or unaffordable housing.

Technology has to be included in the solutions if we want to tackle these problems that arise from unaffordable housing. This technology has to be citizen-centred and collaborative to build technology that the people can use, because it has often been the case that project designers have a limited understanding of the core users, and when the project goes online, adoption rates are subsequently low.

To combat this, I propose to use technology to improve smaller places and make them more liveable. For example, if there is a couple who are going to live in a small apartment, one could ask them, before they move in, if they would be willing to have sensors monitor their movements around the house for a week. This information can be used in understanding how people use their smaller spaces and how they can be improved after this one week passes. At the end of the week the people would answer a questionnaire on
how their experience was and what they want to be improved. Based on this information, the apartment can be changed with better layout and more flexible furniture, and even the design of future apartments can be amended. The sensors can also monitor air quality and energy consumption for more sustainable living.

This technology ensures that we have an understanding of the core users, as well as their needs. Not only could this technology be used for couples or families, but it is also a great aid for the elderly in providing better health services and understanding to their caretakers. The information can be stored in the cloud and thereafter analysed using machine learning algorithms for a more effective process.

References


The housing situation in Copenhagen is increasingly becoming a big problem. Even though the local authorities and contractors are building all over the city and the larger Copenhagen area, the problem does not seem to be improving. There are many factors which cause this housing problem, turning slowly into a real crisis. For example, existing small flats are built together into bigger ones, the prices are raising and there are long waiting lists for ‘public housing’, dorms and rental flats. All of this has made the housing market in and around Copenhagen very lucrative for foreign investors. At the same time, it has made it much harder for local citizens and regular expats to find a place to live in the city. Copenhagen’s inner city and the neighbouring districts are largely populated by more and more elitist citizens, whereas poorer citizens have been forced to look for housing further away from the inner districts. While many buildings are being built in Copenhagen, fewer flats are available, resulting in bigger inequalities between the different neighbourhoods in Copenhagen.

I would propose creating a digital platform for all housing types, with a focus on the three types where waiting lists are already existing: rental, public and dorm housing. Gathering all the data from these could help the public and the state gain an overview of the housing situation in a centralised location and might even help getting a grip on the situation at large. Showing the ownership of the different flats might discourage getting housing from foreign investors and prevent them from artificially increasing the renting conditions in the city. These foreign investors have also been and still are a problem in other metropolitan cities in Europe. They aim to gain economic benefits and inflate prices, thereby increasing the city average. This will cause a snowball effect and only accelerates the severity of the problem.

Centralising and creating an overview of the waiting lists might help spread the immigration pressure of new Copenhageners to move to other areas of the city, as people might choose a shorter waiting list compared to their first choice of housing. This could also help newcomers gain knowledge of other neighbourhoods and areas of the city which they
might not have known or considered before as a possibility. All the data from this platform might also give a better insight in moving patterns and preferences of people and give the municipality indications as to where to focus its attention on to increase the safety and inclusiveness of less popular neighbourhoods.
“I would propose creating a digital platform for all housing types, with a focus on the three types where waiting lists are already existing: rental, public and dorm housing. Gathering all the data from these could help the public and the state gain an overview of the housing situation in a centralised location and might even help getting a grip on the situation at large.”

Andreas NIELSEN, Denmark
I am from Romania, but I live in Kolding, a town in Southern Denmark with approximately 60,000 inhabitants. Denmark has adopted a new policy that forces each municipality to sort their waste in ten fractions. At the moment, Kolding municipality collects combustible waste and food waste from around 43,000 households through private companies. Each household receives, from the municipality, a small container for organic waste together with special green trash bags that contain chemicals which help the food to compost. The organic waste is used as fertiliser for farms. In Kolding we have five drive in recycling stations where people can dispose of their waste. These recycling centres are facilities where you can take your household waste that is not food waste or residual waste. These facilities are accessible by vehicles and have multiple large containers available for waste disposal (Vidzus, 2021). Some of them have a particular container where citizens can drop items that have the potential to be directly reused. Moreover, citizens are allowed to collect reusable items from selected waste types which they can bring home free of charge.

Even though Kolding has a good waste infrastructure, we still face a major challenge in sorting waste properly. Not everyone has a car and not everyone is open to driving to one of the recycling centres. So not having recycling stations close to the households contributes to people not sorting their waste. The facilities should be accessible to everyone by walking and in close proximity to the residential areas.

Thinking about how this problem can be fixed through technology in the present context, without building more sorting facilities around the town, I consider that an app that would connect the locals with each other and with the municipality on the topic of sorting waste could have a positive impact. The app can act as a social platform where people can communicate and help each other. Similar to a carpooling app, where X goes from A to B at 8:00, this can work as a waste pooling app, where those with cars who go to one of the five recycling centres in Kolding can post the time and date and set a meeting for one or two persons who could bring their waste. It can be paid or not, depending on the municipality’s willingness to support such app. The municipality can also have some cars that would collect the trash in 10 fractions. The municipality drivers could post the time and date...
and set a meeting for one or two persons who could bring their waste. The municipality can also have some cars that would collect the trash in 10 fractions. The municipality drivers could post the time when people can go to this mobile station and dispose their sorted trash (just like on Uber, the locals could interact with the driver, see the location and find out when the waste management car will be in their proximity). With such system, all the trash from an area would be collected and disposed in one of the five recycling stations without people having to lose time or money and without building more facilities.

The app could also offer insights into how people can sort their trash efficiently, including tips and tricks, and could offer a chat option with other members of the platform and municipality representatives. The app could also integrate games or rankings that would make the sorting more fun and motivating, including neighbourhood competitions, badges for 'Waste Heroes' or other similar initiatives. The idea of the app is to offer information, connect stakeholders with each other and promote sustainable behaviours such as waste sorting through gamification.

References

I am from Germany but I am currently living in Copenhagen, Denmark. Denmark is a worldwide leader in sustainable development with a strong universal health care system, education system, low crime rate, personal freedom, and clean and efficient energy production. However, even though the capital, Copenhagen, does justice to its reputation as a sustainable city - even proclaimed as the world’s most sustainable city - it still has areas it needs to work on. This particularly includes green spaces, recycling, and equal opportunities (United Nations, 2021).

The Danish state centres on welfare, which strongly promotes equal opportunities: universities have very low tuition rates, students receive money to support them during their studies and the state gives out generous unemployment benefits. Nevertheless, whilst this does show good progress, vulnerable groups are still subject to discrimination and are less able or even unable to participate in society. This includes growing rates of poverty that have affected vulnerable groups such as single mothers, families composed of refugees and immigrants, as well as unregistered and homeless migrants in Copenhagen in general (Ortiz, 2020). A factor of their plight is the cost of housing, which has been increasing over recent years due to high rates of gentrification, with apartments being mainly privately owned. This situation leaves space to improve progress in the area of inclusive and sustainable urbanisation.

Denmark is one of the most digitally advanced societies, and hence a technological solution would complement and contribute greatly to combatting such a social problem. Technology could be used twofold to address the housing issue: on the one hand this is how we consume, finance and regulate housing, and on the other hand it is making housing cheaper in general (Badger, 2019). The former can be done through various initiatives that reduce construction cost, for example 3D printers and light gauge steel construction. The housing industry is behind in digitalisation, so by even addressing basics, such as AI technologies to make better planning decisions, would already contribute to efficiency and
cost. An example of this would be a programme that can assess the development viability of land (Charles Towers-Clark, 2020). The policy side presents a tougher challenge though, as this involves changing our approaches to housing. Here a platform business would be able to contribute. This would, for instance, include creating or expanding on businesses such as Airbnb. This would, for example, allow homeowners to rent out spare rooms.

Looking at SDG 11 indicator 11.3.2 (‘proportion of cities with a direct participation structure of civil society in urban planning and management that operate regularly and democratically’) (United Nations, 2021), an important means of ensuring inclusive and sustainable urbanisation is dialogue. Hence, a digital platform would be an open way to facilitate such dialogue through technology and bringing everyone into the discussion. The platform would facilitate the creation of a network of sustainable urban start-ups, architects and to store & share data on housing development. The platform would be used to notify users of communal events, archive interviews held with all participants of society, as well as to inform and connect those in need of housing with the city’s cheap and sustainable housing projects. Ultimately, this would result in fully informed inhabitants (spanning the entire population including marginalised groups) and able to participate in urban planning directly and regularly.

References


“An important means of ensuring inclusive and sustainable urbanisation is dialogue. Hence, a digital platform would be an open way to facilitate such dialogue through technology and bringing everyone into the discussion. The platform would facilitate the creation of a network of sustainable urban start-ups, architects and to store & share data on housing development.”

Christina STOLZ, Germany
Paris, France
According to the French National institute of Statistics and Economic Studies, in 2012 approximately 29,000 individuals were homeless in the Paris metropolitan area and around 8,000 were sleeping on the streets of Paris (Chausse & Labrador, 2014). This number would represent more than an 84% increase in a decade. I believe that this number does not totally reflect the reality given the recent migration and refugee crisis in Europe. Taking these ‘hidden’ populations and the difficulty to estimate their number (legal and illegal migrations) into account, the estimation would probably be higher.

The biggest challenge to solve the issue of homelessness is, I believe, localising and knowing how many individuals are in the target population. Indeed, without any of this information, it would be nearly impossible to implement effective and sustainable measures to fight homelessness. Individuals living in these conditions are exposed to several dangers. Whether it is related to education (for children and homeless families), health and access to sanitation or a greater exposure to abuse (especially for women), the challenge here is to integrate these vulnerable populations into society.

The first solutions using data, technology and AI I thought of were apps tracking low-rent housing opportunities in the city or enabling an easy access to available services, such as primary health, which is essential given that these populations are overexposed to addictive tendencies and mental health related issues. Technology could be used as a leverage for the target population to know more about their rights and programmes they can enrol in to reintegrate their cities and societies. These approaches are rather top-down: organisations and/or institutions reaching out to homeless persons.

One of the most important parameters necessary for the development of such initiatives is data availability, accessibility and data quality. This leads us to one of the biggest limitations I could identify so far for the development of such technological innovations: in order for these programmes to work, homeless individuals need to have access to a device,
data and internet connection.

However, the study of Neale and Stevenson examining the engagement of homeless individuals with communication and information technologies in Britain reflects the following generalised reality: there is definitely a lack of access to technologies in these populations, as well as a lack of ability to afford mobile data and a lack of general knowledge on the usage of phones and/or the internet. These represent many barriers to bottom-up approaches to the issue of homelessness using technology and innovation.

There are a few human-centred technology solutions implemented by independent organisations using technology and innovation as a leverage to better the living conditions of homeless people. For example, a small Singaporean non-profit, billionBricks, created WeatherHYE, a reversible tent for homeless communities of South and South-East Asia. The particularity of this tent is its reversibility. Indeed, one side has been created to keep out extremely cold temperatures while the other, equipped with reflective panels, works toward keeping out extreme heat. This innovation aims to be accessible and affordable for all in order to enable adaptation to temperature changes, to various urban environments, but also to offer individuals privacy.

As individuals use more digital means of payments and less often carry physical cash on them, it has become more difficult to give in solidarity to homeless people. Hence, the company N=5 in Amsterdam created a jacket enabling wireless payment transferred to official homeless shelters (the Helping Heart Jacket).

While such human-centred technology solutions make homeless people’s everyday lives easier, the issue of homelessness in cities such as Paris is a systemic problem and I believe that there is a need for a strong collaboration between actors of technological innovations and policy makers. It seems to be the only way through which this issue would be solved with a sustainable long-term perspective.

References


“The issue of homelessness in cities such as Paris is a systemic problem and I believe that there is a need for a strong collaboration between actors of technological innovation and policy makers.”

Kiara TEGBE, France
Berlin, Germany
One great mobility challenge in Marburg (Hessen, Germany) is the strong prioritisation of traffic towards individual car-based traffic. Other means of transport, like public transportation and bicycles often lack in infrastructure. This makes them less favourable modes of transportation for many people even though they are much more accessible, affordable and sustainable (see SDG Target 11.2). A better infrastructure for these transportation modes would incentivise their use and trigger a feedback loop where they would be used to a greater extent and ultimately stimulate even more construction of even better infrastructure.

One specific problem when it comes to traffic direction is the heavy use of traffic lights that can be switched on demand. A noticeably high amount of pelican crossings, automated traffic lights (app controlled) and inductive loops can be found throughout the comparably large and not very densely populated city (76,401 inhabitants; density: 610/km²). The latter type of traffic detection is only activated by vehicles that have the approximate weight of a car and therefore will not detect bicycles or even motorbikes. Since they are used in many places around the city, those traffic participants have to either wait for a car to activate the inductive coil for them or violate traffic laws thereby endangering themselves. Although there are alternative ways for detecting stopped traffic at a specific position, newer models of inductive loops could also be calibrated to detect lighter vehicles like bicycles. But since the calibration of those loops is very sensitive, it may go off unwanted if it is programmed to detect lighter vehicles. Other viable alternatives to the inductive loop are push buttons, similar to the ones used at pelican crossings, video sensors, app-based location tracking and thermal imaging.

Push buttons, though very reliant and sturdy, have the issue that a specific utility pole has to be built just in reach of the cyclist/motorist, who then still has to stop to activate the traffic light. Video sensors have the disadvantage that the digital technology is prone to mistakes. During winter, snow and sludge can accumulate on the lens. The visibility at
night is low and the lens can fog up in winter and highly decrease the accuracy of detection. An app-based location tracking is already implemented as a test phase but suffers from very low adoption rate. Thermal imaging on the other hand has a pretty high accuracy, requires little technology, and data does not need to be stored since the processing can be done directly at the installation site with even an analog hardware system. It can be implemented fairly cheap on existing utility poles. Another advantage is that, unlike a button, a thermal imaging camera can anticipate traffic coming in and switch the light even before the road user reaches the traffic light, also providing a green wave for other traffic participants.

References


In the case of my hometown, Budapest, there are many aspects to be improved to fully satisfy the requirements of SDG 11. However, there is one aspect that is particularly urgent: the inclusive infrastructure for persons with disabilities. It does not have to be a wheelchair you are travelling by, even a walking frame does not really fit on our streets, nor public transportation or even homes. Budapest still has many bus lines and trains that can only be accessed by a staircase at the doors, the same applies to tenement houses and public institutions.

According to data given by the Central Office of Statistics (KSH) and Habitat for Humanity Hungary, two-thirds of disabled citizens live at home with their families, because they are not able to live independently. This makes up 5% of Hungarian population, half of which – around 235,000 people – are physically challenged (Kovács, 2020). Most of the disabled population live in the capital, apart from the elderly, who can easily become part of this group given that over a certain age they become restricted in their physical possibilities. It is not just about transportation and everyday commute, housing is a major problem for this group: there is a tighter range of options which are accessibility-friendly. Many houses lack elevators, and in most cases tenement houses have mezzanine floors with a staircase right inside the entrance.

A possible way to solve this situation aided by contemporary technology could be an application which shows the safest possible routes for disabled persons, and which also contains a database of accessible houses and offices. This app could be a helpful tool for everyday life, giving suggestions on where to live, work, how to move about and accessible locations to go to in their free time. Currently there is only one website which provides a search engine for certified accessible spots in the city, but the amount of places in the list is unfortunately very limited: the webpage lists only four restaurants in the capital.

Furthermore, this system could also give warning signs to the local authorities and the public services. The users should be able to report on cases where they had difficulty
accessing a vehicle, entering a building or using the common services around the city. It should also include a rating system for institutions, schools, restaurants and leisure spots which evaluates the level of comfort for disabled users. Until we reach a point when the city infrastructure is transformed to be more inclusive and accessible, this solution could give suggestions to the concerned group of citizens, and the rating system could raise awareness of the issue.

References


Challenges

Budapest is the capital of Hungary, located on the Danube, with a population of 1.7 million. The city has been facing environmental challenges resulting from a temperature increase. This leads to problems related to air pollution and the urban heat island effect. Moreover, new investments catch the eye of stakeholders and private companies, who invest more in real-estate near the river because of the green areas. The lack of and underrated care towards green spaces in the city and impact of issues mentioned above leads to a sealing of the soil level in Budapest, as well as vacant urban spaces in the area, with high density neighbourhoods and a lack of green areas, leading to social tensions and isolation. Budapest now has 5m² of green area per capita, which is less than the average city in the European Union (Oppla, n.d.).

Solution

The creation of pocket parks is one of the best ongoing solutions in the city. Most of the buildings within districts have internal courtyards that can be turned into pocket parks, which help in water retention and air quality and improve the health and wellbeing of the community. In addition, residents can get involved in gardening and creating food production areas. 17 community gardens are spread across Budapest, making for a great solution to such a problem. Nowadays, a digital software is being developed by the government that creates models of districts and allows for a green and sustainable retrofitting of urban areas (European Commission, n.d.). Investors, stakeholders, urban planners, and municipal authorities can use the software to have a view of where the best energy retrofitting spaces are, based on data simulation. The software also takes into account economic variation, meaning that investors and stakeholders can see which districts provide more opportunities for the development of new business and accordingly decide where to scale up.
References


One of the most prevalent problems in my city, Delhi, India, is air pollution, especially from vehicles. This is a problem of an extreme level, as bad air quality not only results in diseases and other health problems for the current community but will also have a huge impact on the upcoming generation of people. It is approximated that about 3000 metric tons of air pollutants are emitted every day in Delhi, with a major contribution from vehicular pollution (67%), followed by coal-based thermal power plants (12%) (Rizwan, Nongkynrih & Gupta, 2013). The prevalence of hypertension is 36% in Delhi compared to 9.5% in other areas, which has been found to have a positive correlation with the level of respirable suspended particulate matter (PM10) in the air. Delhi has seen significantly higher levels of chronic headaches, eye irritation, and skin irritation (Rizwan, Nongkynrih & Gupta, 2013). Other studies have also found a correlation between the particulate matter in ambient air and ADHD (attention-deficit hyperactivity disorder) in children (Siddique et al., 2011).

With urban areas such as Delhi witnessing an increase in air pollution levels, adequate air quality forecasting is a critical challenge, as concerns are raised about the population’s health. In recent years, there has been a significant change in the growth patterns of cities, with cities seeking to embrace sustainable practices through ICT and other relevant smart solutions (Myeong & Shahzad, 2021). Air pollution is a fundamental environmental issue in various places, not just Delhi. With the emergence of the concept of sustainable cities.smart cities, appropriate solutions to control society’s exposure to pollutants have become part of urban development policy. Cities increasingly rely on specialised digital technologies to solve different types of societal problems. This evolving idea reinforces the possibility of using Big Data via the Internet of Things (IoT). Big Data processing through Artificial Intelligence (AI) can greatly contribute to the urban landscape, sustainability of cities, and quality of living (Alvear et al., 2018). The data age and the current period of digital technologies has resulted in big datasets inside communities. Real-time air pollution data is extremely important in regulation of air pollution for sustainability (Allam & Dhunny, 2019).
**Artificial Intelligence (AI)**

The high level of complexity of smart city technologies includes specialists, market internationalisation, globalisation strategies, professional information, and more. However, the information within organisations is handled, the latest innovative knowledge management frameworks and transparent approaches are called for, particularly for new revolutionary technology in the IoT domain to promote information flow. This research introduces a data-based surveillance programme that incorporates IoT and environmental surveillance strategies to capture long term environmental parameters and measure the levels of pollution in a smart city (Di Vaio et al., 2020).

**Internet of Things (IoT)**

Sustainable enterprises are becoming a significant sub-discipline of the research on entrepreneurship by increasing the call for greener and more sustainable enterprises. By custom, environmental regulatory costs have concentrated on static cost impacts, disregarding any lowering of efficiency benefits from innovation (Batty, 2018). As a result, the smart city has received significant interest as an initiative to enhance urban growth. Findings from the study by Porter and Linde or Nicolas et al. show that two aspects, including the process variables of a smart city and the expansion of data-based monitoring, should be regulated at the same time if e-government managers want to pursue better pollution control approaches for smart cities.

**References**


Easy access and convenient use of public transport is amongst the most pressing needs for a mega-city like Mumbai. The city has one of the oldest and highly branched networks of public transport, but its use is severely restricted by its unreliability. Take, for instance, the network of buses that manage to reach each corner of the city, however, they are often not relied upon by the working class since the buses simply do not run on time, nor is there a convenient way to know the arrival and departure times of buses in real time (Mahale, 2020). This causes the working class to either hail cabs or move around in their personal vehicles which increases vehicular traffic, congestion and also pollution – especially around peak commuting hours in the morning and evening.

The fundamental shift needed in this situation is to increase the reliability of public buses and make information on their arrival and departure transparent and easily accessible. A solution to this problem is to create a mobile application that can constantly share the live location of buses running on the route and provide a best estimate of their arrival at a certain stop. If the bus agencies find it difficult to create a new app, a new interface or a bot can also be created by integrating WhatsApp location sharing and Google maps’ traffic data, which can collectively provide estimates of buses’ arrival and live location. The bus locations could either be shared by installing GPS trackers or by simply lending each bus driver a mobile handset with location-sharing features. Additionally, the app or the interface could also allow riding users the ability to report on the availability of seats or crowding inside buses. Riders can be incentivised (by reward points that could allow them a free ride over a period of time, for example) to voluntarily report the crowding levels inside buses. This additional piece of information can help upcoming users decide much in advance about their travel and conform to using public buses. Having these three bits of information – current location, estimated arrival times and crowding levels – will likely be sufficient in motivating users, especially the working class, to rely more on public buses than venturing out in their own cars, thereby reducing vehicular congestion on streets and overall pollution. Less people out on the road with cars will in turn cause
public buses to run on time and further increase the users’ reliability. On the other side, a high number of warnings of crowding inside buses by the riders can also help bus agencies better plan their bus frequencies and meet rider demand efficiently. The alerts on crowding can also be useful for agencies to monitor and ensure social distancing inside buses (Sen, 2020). Similar crowdsourcing features in the app may also help bus agencies better grasp the demand of users in parts of the city that are cut off and plan new buses on routes to cater to the needs of further branched-out riders in the city (Rao, 2021). A highly reliable bus system may also attract new riders – such as those from metros – and help in evenly distributing rider crowd and alleviating the pressure of different components of the city’s public transportation network.

In a previous conversation with bus authorities in Mumbai where I had proposed the above-mentioned system, I was informed that they were already in the process of creating a similar application. However, I am not sure if it has been rolled out yet.

References


“The fundamental shift needed is to increase the reliability of public buses and make information on their arrival and departure transparent and easily accessible. A solution to this problem is to create a mobile application that can constantly share the live location of buses running on the route and provide a best estimate of their arrival at a certain stop.”

Vihang JUMLE, India
Ms Ramya KHARE
India
Associate Fellow
Delhi Assembly Research Centre

The constitutional Status of National Capital Territory (NCT) of Delhi is Limited Statehood, meaning it has power to legislate on all matters in the State List except Land, Police and Public Order. What this means for urban management is a governance muddle with respect to division of powers between Union & State Government. I believe a crucial challenge that plagues urban systems within Delhi is a lack of collaboration between different agencies, which often results in poor planning and duplication of work in projects ranging from road construction to laying of sewer networks to stormwater management, hindering effective tackling of several issues (e.g. traffic, urban flooding due to waterlogging, etc.) Much of it is because of the multiplicity of agencies which have jurisdiction over adjacent areas, e.g. a road could be owned by the Central Public Works Department (CPWD), by one of the five Municipal Corporations, by the Delhi Urban Shelter Improvement Board (DUSIB), the Delhi Development Authority (DDA) or the Delhi State Industrial and Infrastructure Development Cooperation (DSIIDC).

Having realised the need of integrated, well-phased-out plans and their effective implementation, my proposed intervention is to operationalise e-governance through geotagging-based centralised control rooms facilitating inter-agency collaboration across the urban service delivery ecosystem through the following steps:

• Using Geo Spatial Delhi Limited (GSDL) data of Plan Dig Monitoring system (PGMS) as base map, all current/upcoming projects being undertaken/planned by different agencies to be mapped.

• Setting up zone-wise collaboration teams for periodic follow-up from different departments regarding work status. Upskilling of people & entities to be taken up at this stage for operating this portal with the data. This is to avoid scenarios where, for example, digging for sewerage and road repair is often followed by digging again for telecommunication network laying within the course of a month.

• Integration of data from existing inter-agency Steering Committees/ M&E bodies like
the State Action Plan on Climate Change (SAPCC), Drainage Master Plan and removal of implementation hurdles faced by them.

- **Hotspot Marking** – sensor-based systems with CCTV and alert systems at hotspots, e.g., locations which are flooded every monsoon can keep the situation in check before it becomes life-threatening.

- **Knowledge Management** – Civil Societies, Industry & Academia to integrate their resources in projects according to core competencies. Technologies, Resources, Frameworks & Solutions which are compiled from these sources can be effectively mapped out and simulations can help us in management of traffic.

- **Citizen Access** – The last step in realising the vision of citizen-centric e-governance can only be reached by first streamlining at inter-agency level. Then we could have citizen involvement, not just for flagging grievances and gaining information, but also to bring forth their inclusion as stakeholders in a way that they can participate in the urban planning and development process.

Although there are often challenges in the uptake of tech-dependent initiatives, I have witnessed the galvanisation of disparate parts of government machinery during the pandemic in overcoming these and other hurdles caused by multiplicity of agencies. For development of resilient city-wide networks, a monitoring and evaluation control centre at citywide level performing inter-agency facilitation and collaboration is imperative. Effective management of urban development works, thereby streamlining on-the-ground data maintained by different agencies can thus be harnessed to produce integrated plans to solve developmental issues.

Although it is difficult to get disparate parts of a government machinery as muddled as Delhi’s to coordinate, I think that attempts like the Unified Traffic and Transportation Infrastructure Planning & Engineering Centre (UTTIPEC) to solve inter-departmental coordination issues have been really effective. Technology offers us the opportunity to solve the multiplicity of agencies in the city for effective urban management of day-to-day service delivery snags, ensuring their speedy redressal and laying the groundwork for an efficient capital city.
I live in Anand, Gujarat, India. It is a small town with a population of 209,410 according to the 2011 census (Census Organization of India, 2011). Recently, there has been tremendous infrastructure development in Anand, which has come at the cost of vegetation, and increased air pollution and water pollution. There is increasing water scarcity, yet the mismanagement of water during rainfall and poor drainage systems have led to frequently water-logged streets during the monsoon. Sewage overflows are common and since the major source of water is groundwater, its contamination can cause an outbreak of many diseases in the city. This essay tries to solve the problem of water management and proper sewage treatment & drainage by using technology.

In the past few years, Anand has seen infrastructure development at an incredible pace. Trees have been chopped down and open spaces on the outskirts of the town have been converted into sprawling shopping malls. The development does not seem to have taken into consideration the drainage systems which were in place. It has become common to see modern buildings and sewage water overflowing on the roads even if it has not rained. For example, a lake near my home was converted to a park. The drainage system of our area was built years back, taking into consideration the presence of the lake and the open spaces. With the creation of the park, the existing drainage system was not changed, so we have water-logging almost every monsoon. The electricity meters are in the area that is filled with water, so they have to be switched off. In high-rise buildings where a motor is used to pump water to the higher levels, the residents have to go without water and electricity until the water in the streets goes down and the power can be turned back on. Yet, cities in India are going to face water shortage crises in the future.

A solution to this problem is a smart water management system with the following functionalities:

- Predictive analysis based on which adequate storage facilities are constructed
- Diversion of water from places which receive heavy rainfall to places which do not
- Automated water quality monitoring
- Automated sewage cleaning system to prevent sewage overflow
There are two ways machine learning can be used. To tackle the problem of water storage and utilisation, a predictive machine learning algorithm can be trained using the data of rainfall patterns across the region in the past couple of years. It could predict the rainfall and area with a good precision, which can help in the construction of water storage systems wherever required, according to the quantity of water they are expected to store. Another algorithm can be developed that predicts the quantity of water used for various purposes by the population, so the municipality can either divert excess water to other regions that need it or accept water from other towns. In India, there is a lot of rainfall during the monsoon season, but it is unevenly distributed, leading to flooding in one region and drought in others.

This water management system can be constructed using the Internet of Things (IoT), which is connected to the machine learning algorithm. Sensors and actuators placed at strategic locations can automate the process; by opening the valves and closing them whenever required, they can divert the water wherever necessary. Another aspect of the problem which can be tackled through IoT is monitoring the quality of water. Most people in Anand district are dependent upon groundwater for their water needs. The affluent households use Reverse Osmosis (RO) systems to purify their water, but the poorer families suffer from many diseases due to groundwater contamination. Artificial Intelligence-based IoT devices can automatically detect if water is safe for consumption, irrigation and other purposes and bring it to the attention of relevant authorities. The city officials can install IoT devices across different water sources and monitor the quality and contamination levels in real time.

To tackle the problem of sewage overflow and blocking, some cities in India use the Bandicoot robot for automatic cleaning of manholes. It was developed by a start-up in Kerala. That is a very useful component which can be added to the smart water management system as it reduces the risk to labourers.

References


“To tackle the problem of water storage and utilisation, a predictive machine learning algorithm can be trained using the data of rainfall patterns across the region in the past couple of years. It could predict the rainfall and area with a good precision, which can help in the construction of water storage systems wherever required, according to the quantity of water they are expected to store.”

Parita PATEL, India
Pune (formerly Poona) is a city that was once known as the ‘pensioner’s paradise’. It has transformed into a bustling city due to rapid growth and urbanisation over the past three decades.

Pune has witnessed exponential growth in the recent past. It is now the largest city in Maharashtra and has a population of 3.13 million as per the 2011 Census. Pune has witnessed mass incoming migration due to economic opportunities, education and a better overall quality of life compared to other cities in Maharashtra. However, growth has outrun planning, which has led to the city facing a plethora of problems like waste management, inadequate water supply, traffic congestion, etc. Once a green and clean paradise, the city now smells like rotting rubbish and sounds like noise. The major problems that the city currently faces include a steady increase in traffic congestion and air pollution.

Over the past few years, Pune has seen a tremendous surge in traffic congestion, which has also led to increased air and noise pollution. It was ranked 16th in the world in global traffic congestion according to the TomTom Global Traffic Index. In April 2018, it was reported that the total number of vehicles had surpassed the human population in Pune. Some factors that contribute to traffic congestion are:

- Inefficient road network
- Underdeveloped public transport system
- Poor traffic management
- Lack of awareness and practice of traffic rules & regulations
- Violations of traffic rules & regulations
- Increasing vehicle population
- Improper city planning
- Improper lane management

Solutions to the problem include the following:
Improving public transport's connectivity and access

The city’s public transport can be improved to reduce the number of vehicles on roads. The buses have poor connectivity and users have less information about new routes, stops, etc. An app that can give users information about bus timings, routes, stops, number of people in a bus and execute online ticketing would encourage citizens to use public transport. Security and safety in buses can be enhanced by real-time monitoring, analytics and a platform to raise complaints.

Digital Monitoring and IoT

Technology can help in giving users real-time traffic feedback, which can help them choose the best route. Smart traffic lights and streetlights on the city roads can capture real-time data about traffic, vehicle speed and roads, to update users about bottlenecks and congestion along with apps that provide them alternate routes to reach their destination. Traffic lights and sensors along the roads can also help monitor drivers' behaviour and accident-prone roads.
Finding a parking spot is a problem that people face in Pune, choosing to park their bikes or cars on the sides of the road. Many areas in Pune have narrow roads and this has only aggravated traffic congestion on roads. An app that gives real-time data about available parking spots would help in solving this problem. Drones can also be used to monitor roads and provide on-road alerts in case of emergencies.

Increasing awareness and encouraging practice of traffic rules & regulations

Traffic rules in India have been created to guarantee safety of commuters. However, there is a general lack of practice and ignorance of these rules by commuters. This ignorance and violation of rules has led to improper lane management, which results in traffic congestion. Commuters can be taught these rules and their importance with the help of technology. People who are in the process of learning how to drive or ride a vehicle can be taught to follow these rules through virtual reality-based solutions, which can help making their learning process more impactful.

References


“Technology can help in giving users real-time traffic feedback, which can help them choose the best route. Smart traffic lights and streetlights on the city roads can capture real-time data about traffic, vehicle speed and roads to update users about bottlenecks and congestion along with apps that provide them alternate routes to reach their destination.”

Rushda PATEL, India
India is confronting a significant waste management crisis as a result of rising urbanisation. Over 377 million people reside in 7,935 cities, producing 62 million tonnes of municipal solid trash each year. Only 43 million tonnes of garbage are collected, 11.9 million tonnes are handled, and 31 million tonnes are thrown in landfills. Households and institutions must separate their garbage at the source in order for it to be handled as a resource. In 20 major cities, the public administration works to eliminate landfills, but there is no available area for dumping rubbish in other cities, and those that exist are in catastrophic condition. There is a lack of a well-defined waste management system in the village of Kosri. It is a common issue prevalent in most northern villages of the country. Mixed biodegradable and inert waste are often dumped, with open burning being a common practice.

Waste dumps have negative environmental and public health consequences. Under anaerobic circumstances, methane is released from open landfills when biodegradable garbage decomposes. Methane is a key contributor to global warming and causes flames and explosions. Odour is a major issue, especially during the summer, when temperatures in India can reach 45°C. The dumps allow mosquitos to breed and spread illnesses like malaria and dengue fever. Fine particles released by uncontrolled rubbish burning at dump sites are a major source of respiratory illness and pollution. Soil pollution from dumping waste in the land pit is another problem.

In the village of Kosri, the waste generated includes biodegradable waste such as food and vegetable peels, as well as dry waste such as waste involving packaging (PET bottles, wrappers from packaged foods), newspapers and cartons, glass bottles, plastic bottles, broken utensils, appliances, etc. The food waste is handled in one of the following ways: land pit dumping. Currently, food waste is dumped directly on unused land by residents of the village, composting. Only a few are involved in composting biodegradable waste along with cow dung or by cattle owners who generally feed their food waste to their cattle. The non-biodegradable waste is usually dealt with by burning the waste in open land or backyards or stored for pickup by rag pickers.
The key to effective waste management is to guarantee correct waste segregation at the source and ensure that the garbage passes through various recycling and resource recovery streams: a waste management solution that is village-friendly and streamlines the collection and disposal process. For waste collection, there could be segregated waste collection centres, consisting of waste bins on the municipal land that could be sorted as recyclable (paper, plastic and glass), non-recyclable waste (small plastic wrappers, packaging material) and food waste. The food waste bin could dispense food waste that could be used by a group of cattle owners or landowners as cattle feed or compost. The best way to treat organic waste is through compost pits which could be built in every community. Installing waste-to-compost and bio-methanation facilities would minimise the amount of garbage that goes to landfills. Whenever there is sufficient quantity ready to be picked up, a notification could be sent to people who can use it for various purposes. The recyclable waste & non-recyclable waste are handled by a waste collection system that could process the waste when notified when the waste is ready for pickup.

Participation by the community has a direct impact on waste management efficiency. Low motivation and a lack of environmental knowledge have stifled innovation and the adoption of innovative technology that may improve waste management in India. In India, public attitudes around waste are also a key impediment to developing a system for solid waste management. Waste management that is both sustainable and economically successful must enable maximum resource extraction from garbage, while also ensuring the safe disposal of residual waste through the creation of designated landfills and waste-to-energy plants.

India confronts several issues in the waste management industry, including waste legislation, waste technology selection, and the availability of adequately qualified workers. Improvements in waste management in India will create jobs, improve public health and increase tourism. In order to pursue sustainable urbanisation, until these fundamental requirements are met, India would suffer from poor waste management and the associated impacts on public health and the environment.
Living in a city gives greater hope to people who aim to improve their standard of living in rural areas. In India, 70% of the population resides in rural areas or the countryside. Since there is little to no growth in the rural areas, people migrate to the cities in search of better opportunities. Internal displacement and migration to urban areas are widespread amid the rapid urbanisation that is taking place in Indian cities. Due to this shift in population from rural to urban areas, slums are growing in size. Dharavi is a slum dwelling in the city of Mumbai whose residents come to Mumbai in search of better job opportunities and living facilities but end up discarded and pushed aside, only to take up menial jobs. There is a serious lack of basic amenities and infrastructure, with 2-3 families sharing one house. They are not only vulnerable to sudden onsets of tsunamis or hurricanes but also diseases like COVID-19. The location of this slum is also close to the Bandra Kurla Complex, one of Asia’s richest business districts and India’s richest. The divide in a metropolitan city like Mumbai between rural migrants and urban citizens is phenomenal. Therefore, it is important to analyse and understand the demographic trends in a country like India that is expected to undergo rapid urbanisation.

To understand these demographic trends and provide these areas with the basic amenities that they lack, a digitised solution addressing basic issues would allow us to tackle this issue. Since the living conditions of migrants in cities are increasingly cramped and not improving, one way to enhance their living conditions is to create an app that allows them to access adequate, safe and affordable housing amenities from the government and track the schemes they are eligible to apply for and access. Additionally, the app could be linked to Aadhar or ration cards, allowing them to get the rations they are entitled to receive and help them meet their needs. This could technologically upgrade the lives of many people in the slums, with wider and more equitable access. Another solution could be creating an app that provides information and helpline numbers for healthcare services and NGOs they could reach out to in times of emergencies. Through this, people who have no connection to any healthcare services will be able to access the nearest facilities for their treatments and receive the necessary medical attention.
In the end, the digital solution must meet the needs of the people by providing them with digital access to various types of services. This would serve as a one-stop solution to most of their problems and facilitate their personal development and lifestyle improvements.
“Since the living conditions of migrants in cities are increasingly cramped and not improving, one way to enhance their living conditions is to create an app that allows them to access adequate, safe and affordable housing amenities from the government and track the schemes they are eligible to apply for and access.”

Smriti VENKATRAMAN, India
Batang is a small city in Indonesia that has a poor waste management system. All urban waste generated by the city is collected in one landfill. As of October 7, 2021, the Head of the Environmental Service reported that the landfill has been overloaded and predicted that it can only operate for 2 or 3 more months.

One factor that affects this condition is the people’s habit of not sorting the waste, especially in traditional markets. The mixture of organic and inorganic waste becomes difficult to handle and it ends up in a pile of waste in the landfill. Even though some residents have tried to sort their waste and throw it into a different group of containers, it ends up getting mixed and brought to the landfill by public waste management officers. There is a need for integration between resident and waste-handling parties for distributing waste to the right places.

A potential solution for this problem is using digital technology to connect the supply and demand of specific waste to maximise the reduction of final disposal into the landfill. Such digital solution could include different features, including supply-demand waste information, a marketplace to buy and sell wastes, and an educational section. This technology could provide information about recycling centers near the users and reciprocally provide the waste supply information from users for waste-handling businesses. It would leverage the role of waste-recycling private businesses, as well as organic waste-processing parties. Additionally, this solution would encourage residents to increase their responsibility to preserve their environment by sorting their waste.

In the long term, this technology can be supported by the existence of an IoT-based waste container that can send information on whether it is already full of waste and ready to be picked up. It will provide information on which public waste container is open or closed. In agreement with waste-handling businesses, it will provide a system that can maximise the effective and efficient waste distribution process. However, to implement such a solution, awareness of waste segregation should be built up first.
Another part of the problem that is difficult to deal with is the existence of a huge amount of mixed waste that fills up the landfill. Sophisticated technology that can completely segregate mixed waste would be an excellent solution. With the support of waste recycling parties, this could lead the city to become a zero-waste city.

In conclusion, ineffective waste management is a global problem that occurs even in a small city such as Batang. Technological solutions supported by good cooperation between residents and the public and private sector will be the best way to tackle this problem.

References


One of the issues in my city is waste management. I reside in Gianyar, Bali. Here, we do have a waste management system, but it is not effective because it is mostly operated by private firms rather than the local government. We already have our own waste management system that uses traditional methods, such as turning some rubbish into pig food and green manure by planting it in rice fields or on dry land/gardens, while other rubbish is burned. However, due to a rapidly growing population, lower efficiency, and a shift away from cultural values marked by the spirit of community cooperation, the trash distribution shifted from mostly organic trash to inorganic trash which cannot be disposed of using traditional methods. As a result, our present waste management system struggles to keep up with demand, which is an issue because some people continue to toss rubbish into rivers, making them unclean and polluted.

So, one of the problems is that we do not have a centralised waste management system and the current system is quite inefficient. I would like to propose a mobile app (since most people here already use smartphones) which allows users to send their garbage on demand to a particular site, eliminating the waiting time for garbage trucks to pick up users’ garbage. The app would also be the central app for the local waste management system (with the help of the government) in order to make it easier for users to send their trash straight to the local trash collection facility instantaneously, instead of relying on private trash collectors which can take quite long to pick up the trash and whose services are relatively expensive. The main process involves segregating the user’s waste, which would be picked up at home and then weighed digitally and accurately. Moreover, the process would be in real time. Another main feature of the app is that it would also provide tips and tricks on how to reduce the need to use non-recyclable materials, how to reuse existing items instead of buying the same items again, how to repurpose existing items to give them new functions, and finally, how to recycle. This app would also give information to its users on which materials and items are considered harmful and safe to reuse and recycle. This feature aims for users to know better about what is good and what is not within their garbage since there is still quite a lot of people here who lack informative, interesting, and complete information about their own garbage. Another of its features, the
Waste Calculator, would allow users to calculate their waste by figuring out the volume of waste that their building, whether commercial or residential, generates. This feature aims to give users some “heads-up”, allowing them to rethink, and also to help them save money and reduce their waste output.

References


Jakarta is currently serving as Indonesia’s financial hub and administrative capital. This city also tries to deal with population growth and urbanisation in a sustainable manner, which entails balancing environmental protection with economic development. In a developing country, like Indonesia, economic development is obviously a top priority. However, doing so at the expense of the environment can result in higher long-term expenses and an inability to sustain. Flooding and landslides are among Jakarta’s major urban issues. The city is sinking, and severe storms are wreaking havoc, triggering significant flooding and landslides. According to Berlinger and Lee (2020), since early 2020, Jakarta has experienced some of its worst thunderstorms in years. 66 people died as a result of the flooding in January 2020. Flooding and landslides have forced some 150,000 people to flee their homes.

To address these urban challenges in Jakarta, the implementation of technology becomes a big deal to tackle them, and to enhance the urban resilience in every community in Jakarta. Several stakeholders, including Jakarta Government Agency, Regional Disaster Management Board, Jakarta Smart City, and other partners, have developed disaster management frameworks using mobile applications and social media.

When faced with a natural disaster, smart cities can leverage advanced ICT infrastructure and analytical capabilities to improve and coordinate information flows across numerous governmental agencies, including transportation authorities, emergency services, and energy providers, as well as people. A city municipality can reach the majority of its population quickly using mobile networks. Governments at all levels are increasingly using social media for a variety of goals, including giving factual information to citizens, allowing them to participate in policy creation, and improving internal communications. In 2012, Magro examined the role of social media in e-government, and identified key themes including crisis management, strategy and policy, citizen trust and involvement, and the digital divide.
There are three key aspects of disaster resilience, such as Emergency Management, Disaster Risk Reduction, and Community Development in Jakarta disaster management. The Regional Disaster Management Agency (BPBD) manages the Jakarta Disaster Management function, which is divided into four divisions: a) preparedness, b) emergency and logistic, c) rehabilitation and reconstruction, and d) data and information. In DKI Jakarta Province, BPBD is responsible for leading, facilitating, and commanding effective and efficient disaster management services. Several efforts are being carried out by the private sector, universities, and non-governmental organisations to assist BPBD in upgrading its disaster management services.

First, Fujitsu’s Disaster Information Management System (DIMS) intends to consolidate all disaster-related data into a single system. Second, in partnership with Twitter, Peta Jakarta (now known as Peta Bencana) was developed by Wollongong University with the goal of harvesting social media data and providing real-time flood maps. World Vision International and the Humanitarian Openstreetmap Team developed the third Rapid Needs Assessment. Fourth, the Jakarta Smart City unit developed Android-based applications Geo Data Collect (GDC), Pantau Banjir (Flood Monitoring), and CROP, as well as Qlue, an open application for citizen reporting and feedback. All of the information provided by these applications is real-time and can be used for catastrophe preparation, response, decision-making, and evaluation, particularly in flood management.

The use of technology has become one of the right decisions for solving urban challenges, including floods and landslide problems in Jakarta, Indonesia. This can improve the planning, response, decision making, and evaluation of the disaster responses especially in flood management. However, responsibilities are shared by every stakeholder to take part in solving problems and creating better urban management in every city globally.

References


“When faced with a natural disaster, smart cities can leverage advanced ICT infrastructure and analytical capabilities to improve and coordinate information flows across numerous governmental agencies, including transportation authorities, emergency services, and energy providers, as well as people.”

Hendri Surya WIDCAKSANA, Indonesia
By 2030, we should provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons. For this challenge, the focus is on Dublin, Ireland, the biggest city in the country with approximately 1.4 million residents. The current transport links are the Dublin bus, the Dublin Area Rapid Transit (DART) and the tram known as the Luas. There is a travel card system in place, which you can top up and use on all public transport. For those who are able, it is a very walkable city as it is compact and the terrain is flat. There is also a very affordable public bicycle rental scheme called Dublin Bikes, which is available in the inner city. It has its own app and 44 stations to pick up and return the bikes. This is a great initiative for residents and tourists to use but Dublin has not been designed for cyclists and there is limited space on the roads.

We should prioritise public transport, cyclists and pedestrian lanes over cars on the roads. Since widening roads would not be feasible, more incentives are required for people to take public transport, bike or walk. One idea to make public transport more accessible, consistent and reliable is to utilise machine learning. It would involve transport drivers and passengers helping to collect information to figure out more accurate and relevant bus schedules. It would also upgrade the existing transport app to something more sophisticated which would indicate busy times and when to avoid certain routes if possible. Regarding the Dublin Bikes, an application which would be much appreciated is one that would be able to tell which stations have available bikes and which have places for bikes to be returned. This would save time and energy of the individual and make Dublin Bikes more appealing. It would also help the company in moving the bikes to areas of high demand during peak hours.

Education in accessibility designs and needs is another aspect to consider, particularly for the operators of public transport. The last group of people who seem to be considered are the physically disabled or impaired, the public transport systems do bear in mind the elderly but do not consider those unable to walk long distances or are unable to take stairs
to the second level of the buses. If people are willing, gathering this information would be necessary to find out how to best serve this vulnerable group.

Digital technology will be a key tool in helping people navigate and utilise public transport to its potential, but it is only a tool. Change and solutions come from people and collective behaviour. While, there is the caveat that not everyone has access to digital technology such as smartphones to use apps, even with access, know-how is also vital.

References


“Digital technology will be a key tool in helping people navigate and utilise public transport to its full potential, but it is only a tool. Change and solutions come from people and collective behaviour.”

Dusara JOHNSON, Ireland
Rome, Italy
In August 2021 out of the 7,362 citizens’ complaints that were filed to local authorities in Rome, 3,965 were about Waste Management and Urban Cleaning (Comune di Roma, 2021). Waste management is not only an issue of sustainability; in the case of Rome, it integrates all key elements of the SDG 11. In order to better understand our objectives in line with SDG 11, a thorough analysis of how waste management issues hinder the achievement of this goal and its targets will be examined.

**Resilience:** In August 2021, Rome asked neighbouring cities to support its waste management system to dispose of 150 tonnes of waste per day (Roma Today, 2021).

**Proposed Solution:** The weight-scale on collection vehicles should be used to retrieve data that, through AI, could forecast the saturation of landfills and sorting areas. This will increase resilience by strengthening prevention and early-warning systems.

**Safety:** In August 2021, 150 news articles were written about fires in landfills and trash cans all over the city and in the countryside (Monaco, 2021).

**Proposed Solution:** Environmental data should be harnessed: CCTV imagery associated with AI technologies can be used to identify garbage that is not properly disposed of. At the same time, data on air contaminants can contribute to identifying areas most frequently affected by waste fires.

**Inclusivity:** The data on complaints allows us to observe two main population discriminants in the servicing of districts (Comune di Roma, 2019): income and nationality, with centre-to-periphery relations being a major overarching issue (La Popolazione di Roma, 2016).

**Proposed Solution:** Citizens’ complaint data, coupled with AI, should trace the backbone of the new waste collection and management system. Particularly, in the first months of the implementation, levelling services provided to all municipalities of the city is core to creating inclusive services and laying strong foundations for further improvements.

In order to monitor the achievement of SDG 11 Targets, we need to look at its waste-related indicators (11.1; 11.6.1; 11.6.2) and see how, through the introduction of new technologies, it is
possible to implement a monitoring process.

By using technology to integrate air quality in the waste management system, we can monitor the portion of the population living in areas affected by air contaminants (indicator 11.1). Most of the technology mentioned above contribute to monitoring indicator 11.6.1. Through CCTV and AI, the system will be able to identify - albeit not all - waste discharged outside trashcans. Sensors, on trashcans and vehicles, coupled with GPS coordinates and the tracing of the fleet’s routes will also provide essential data, which, through an algorithm, can give information on how much generated waste was correctly discharged. Indicator 11.6.2 can easily be monitored by air pollution stations all over the city.

Based on an initial assessment, a proposed solution could be the establishment of a fleet management technology that integrates various data and information sources, including complaints-localisation, traffic, meteorological issues, as well as other inputs which will allow optimising energy consumption and maximise efficiency.

References


Cities are the heart of regions, countries, and continents. Over the last couple of years, cities’ dimensions and population volumes have dramatically increased. Forecasts show how by 2050 the population in cities will double if not triple, indicating that in the near future, cities will play an even more central role than they do today as centres of conflicts, economy, politics, research and development (Caragliu et al., 2011). According to the United Nations Department of Economic and Social Affairs (2019), half of humanity – 3.5 billion people – lives in cities today and 5 billion people are projected to live in cities by 2030.

This essay looks at the city of Rome (Italy) as a case study to illustrate one of the more pressing urban challenges that cities face. The choice of Rome is driven by the strong inequalities visible in the city from a social, economic and environmental sustainability perspective. Rome is the Italian capital, as well as the biggest city in Italy. According to Rome’s municipality data (Comune di Roma, 2019), the population is about 2.6 million inhabitants, with strong inequalities among the different councils of the city. Indeed, the city has 15 councils which are divided into 155 urban areas. Inequalities within these areas in terms of accessibility to urban services, security issues, economic resources, education and infrastructure are pressing issues for the city. As a matter of fact, these disparities in accessibility create conflict among residents and increase the levels of inequality.

In order to provide a potential technological solution, it is important to introduce the umbrella concept that represents the foundation of technological development in a city: the concept of a smart city. The term “smart city” has been adopted as a tool to help cities tackle challenges related to rapid urbanisation (Giffinger et al., 2007). This term refers to clever, innovative and sustainable solutions that promote socioeconomic development (Caragliu et al., 2009; Letaifa, 2015). Smart cities are seen as a new city paradigm and a new way of conceiving cities. Their aim is to optimise new and available resources to influence the behaviour of the inhabitants (Harrison et al., 2010). According to Letaifa (2015, p. 1414), smart cities represent “new socioeconomic environments in which citizens, enterprises, and governments can more efficiently access services and resources”.

Ms Stefania ESCOBAR

Italy
ASEFSU23 Participant
Residents’ participation is essential in understanding the challenges of each municipality and to support SDG 11. Indeed, a bottom-up approach in the development of a Smart City plan represents a more inclusive approach to development, as it will integrate experts’ views with those of residents who are the first recipients of a Smart City strategy, as well as one crucial dimension of a Smart City (Smart People). Through technology, it would be possible to gather residents’ views on different council challenges, as well as to uncover new issues.

This could be done by adding a new section in an already existing app (APP IO) developed during COVID-19 which includes the digital identity of citizens and which makes it the main tool of communication between the government and its citizens. By adding a section, based on the individuals’ declared place of residence, it would be possible for citizens to report problems to a council, either by deliberately explaining the problem or by answering questionnaires about council challenges. Finally, this data could be processed by researchers through different software such as R, Java script, Dataminer, LIWC, Leximancer, and NVIVO. Based on the analysis of this data retrieved through the app, researchers could perform content analysis. Indeed, in the era of “Big Data,” the methodological technique of content analysis can be the most powerful tool in the researcher’s kit (Stemler, 2015). Content Analysis is described as the scientific study of content of communication. It is the study of the content with reference to the meanings, contexts and intentions contained in messages (Prasad, 2008). Researchers can provide the city with information on the most pressing issues among the different councils and how they connect and intertwine. This will be a valuable tool in the hands of policy makers to understand the priorities among different councils and together with city experts can guide city policies. The positive aspect of this measure is also represented by the tools employed. Indeed, most of the software cited above have a very low economic cost and several researchers are already conducting this kind of research for the interpretation of social media, reviews, and interviews. Therefore, it will be possible to engage research already employing this methodology. Investments in this regard can have a valuable impact on the sustainable development of the city of Rome, which is scalable to many cities in Italy and around the world.

References


“Residents’ participation is essential to understanding the challenges of each municipality and to support SDG 11. Indeed, a bottom-up approach in the development of a Smart City plan represents a more inclusive approach to development...”

Stefania ESCOBAR, Italy
Despite the impact of the COVID-19 pandemic, my hometown, Osaka, was again nominated as the 2nd most liveable city in a ranking by The Economist. The criteria of a liveable city consists of i) stability, ii) education, iii) healthcare, iv) infrastructure, and v) culture and environment. Osaka has already achieved a top-notch level of stability thanks to great safety. Our healthcare is available anytime for almost all residents, supported by solid social security and a great number of healthcare workers and hospitals. In addition, there are 55 universities in total in Osaka as of 2022. Our infrastructure has developed day by day, and by collaborating with local universities and companies, the government is currently trying to create a hub for start-up companies in the Osaka region. In spite of these advantages of a liveable city, I personally believe that Osaka has not accomplished environmental sustainability, particularly carbon neutrality and food waste reduction.

First and foremost, Japan has several robust automobile companies like Toyota, Nissan and so on. Many Japanese people possess their own cars, and on average one household has one car in Japan. However, most Japanese cars are based on petrol, and eco-friendly electronic vehicles are not widespread in the country. In order to decrease the carbon emissions from vehicles, the Japanese government has announced that it will discontinue the production of petrol-based vehicles up until 2035, but it will take a long time to replace all cars so that only eco-friendly ones are seen on the roads.

On top of that, according to estimates by the Ministry of Agriculture, food waste rate is significantly high in Japan, with 27.59 million tons each year. Nevertheless 6.43 million tons of this waste are indeed edible (The Japan Times, 2021). To tackle this issue, the government officially introduced the law for food waste in 2019 in order to increase awareness of the food loss for Japanese residents. Following this, multiple applications have been created to connect customers with leftover food, like Reduce Go, TABETE and FOOD PASSPORT. They are mainly available in the Osaka and Tokyo areas.

Another challenge in Osaka and Japan is the low food self-sufficiency rate. We are almost completely dependent on food imports. This is because many Japanese
youth hesitate to work in the agricultural industry and many Japanese purchase food in the market. In my opinion, it is impossible to encourage Japanese youth to work in the agricultural industry, but we should utilise kitchen garden apps to motivate them to engage in food production. These apps might not only contribute to an increased food self-sufficiency rate but also stimulate their awareness of the importance of food, leading to decreased food waste.

References

“In my opinion, it is difficult to encourage Japanese youth to work in the agricultural industry, but we should utilise kitchen garden apps to motivate them to engage in food production. These apps might not only contribute to increased food self-sufficiency rate but also stimulate their awareness of the importance of food, leading to decreased food waste.”

Yusuke KAGA, Japan
Almaty is the largest city in Kazakhstan and is considered a settlement of national significance. Being a cultural, financial, and educational centre, Almaty attracts people from rural areas in Kazakhstan. Therefore, there is a constant increase in the population. Over the last decades, the air quality of the city has decreased considerably. Despite the absence of major industrial facilities in the region, Almaty takes first place in the country on respiratory, endocrine and blood diseases, cancer, and bronchial asthma (News Factory, 2007).

Digital applications exist that encourage car sharing schemes in Almaty like inDriver. This technology can be improved more in terms of user-interface design to attract more clients. Also, electronic payment and travel registration system ONAY! mobilises payment systems in public transport. However, more advanced solutions can be applied.

Cooperative intelligent transport systems can make transport safer and more efficient. For instance, Green Light Optimal Speed Advisory (GLOSA) systems provide drivers with speed advice to pass traffic lights during a green interval (Bodenheimer, Eckhoff & German, 2015). This technology can help reduce the number of pollutants emitted into the air by traffic. Additionally, these intelligent traffic lights can reduce the number of stop-and-go waves. Moreover, they can give priority to public vehicles or cyclists, so that such types of transport will be more attractive for citizens. These AI-based solutions can lead to a reduction in driving time and subsequently a decrease in air emissions.

Another solution is to accelerate the uptake of electric vehicles. Electric vehicles do not emit exhaust emissions and thus positively impact local air quality. They can also help reduce noise pollution from traffic, especially in urban areas where speeds are low (European Federation for Transport and Environment, 2021).

Digital technologies in transport that can help achieve minimal air contamination are not limited to these solutions. The potential technologies can result in benefits for the environment such as reduction of air pollution, as well as financial savings and increase in transport efficiency.
References


Urbanisation is an emerging issue. In Lao PDR, urban areas are experiencing higher population growth rates than the national average, signifying rural-urban migration. Urban areas are also associated with several issues, such as growing inequality, issues facing migrant workers, pollution and poor sanitation. For decades, inequality has increased within urban areas, which shows the need to focus on improving standards for the urban poor. Urban sanitation is generally low.

Most migration is rural to urban – primarily to Vientiane, the capital of Lao PDR. There is also a significant movement across the border to Thailand. Vientiane suffers from a lack of suitable drainage and sewage systems, and poor design of existing sewage disposal or septic tanks. From households and industries on the edge of the city, the untreated effluent overflows or runs into lower areas, posing a threat to public health and the environment.

The first issue that we are currently facing is growing inequality. While technology is not the best answer, technological tools positively impact education in schools and can support both learners and educators when used correctly. Technology provides personal and private access to educational materials and enables more memorable and varied learning experiences. Moreover, being able to use several technologies is a skill itself. The involvement of an educational community and family also affects education. Whether a child grows up in a motivating environment that supports learning processes and provides technological tools to foster learning will influence the child’s individual progress.

Furthermore, there are many issues facing migrant workers in Vientiane, and there is a need for problem solvers to visit slum areas to understand how migrant workers can use technology to support their structural empowerment, human dignity, and physical integrity. Financial apps, platforms and services can facilitate and lower the cost for migrants to receive, manage and transfer money. Access to banking and payment services is one of the most important needs for social integration, economic growth, and safety (as opposed to cash, which is usually connected with informality and insecurity). Focusing on education and advocacy for mobility skills implies talking about education, especially the question of
academic skills recognition within the topic of identity. E-learning platforms often provide migrants with low-cost and remote learning opportunities, so as to improve their set of skills and ability to access better opportunities on the labour market.

Last but not least, issues such as pollution, poor sanitation and water safety and quality merit more attention, especially in towns and cities. In Lao PDR, surface water is the major water source for urban supply, as most towns are located along the rivers. Lao PDR still has acceptable water quality in its rivers, but this is under increasing threat from pollution. The main causes are waste and sewage from the growing population and urbanisation, and run-offs from agricultural, industrial, and mineral exploitation activities. Citizens could initiate the use of sensor-based management systems to monitor water loss. Many countries including Lao PDR lack data on water quality, especially in rural areas, which makes it difficult to estimate resource needs and assess delivery. The increased use of sensors in water supply infrastructure helps to address some of these challenges. When sensors are connected, for example over the Internet, information can be gathered on accessible, user-friendly platforms, which in turn aid decision-makers in detecting disruption and abnormalities in water supply systems.

Finally, making cities sustainable means creating career and business opportunities, providing safe and affordable housing, and building resilient societies and economies. This mainly involves investment in modern technologies in public transport, education on green environments and improving urban planning and management.
Vilnius, Lithuania
How could a city that was built mostly in the Soviet Union era meet 21st-century needs? This is the question that is being asked by local citizens and governments of the post-Soviet region. Vilnius is the second biggest city in the Baltics and the fastest growing one. It is estimated that by 2025 it will be bigger than Riga, due to the attractiveness for students and comfortability for Belarussians. As a city gets more and more developed and innovative, some things do not change that fast and require much more time because they are complex. This is the situation with urban planning and transportation lines in Vilnius. In tackling traffic jams and striving for sustainable development, a combination of increasing green areas and growth might cause a headache if everything is not taken into consideration.

Back in the winter of 2019, I remember a great lecture about modern Vilnius’ prospects in which citizens talked about the challenges we are facing. Based on my memories and vision of the present, I would like to express my worries, thoughts, and insights about the development of the city in the fields of infrastructure, transportation, sustainability, and art. Firstly, I would like to mention a competition called “Hackathon Vilnius” where people develop solutions for real problems in Vilnius that they see or that local companies suggest, and which has been held for three years in a row. This is a way in which innovation could effectively use active citizenship participation and brain capacities to improve common well-being. Secondly, providing grants for great ideas and projects is also a good idea. One project that received a grant in 2021, called Portal, received attention from media all over the world. As cities get more interconnected, one artist has come up with a great idea to create virtual live screens in Vilnius and Lublin, Poland. New technology helped us to experiment and change our attitudes toward different cultures and people. After seeing the same life in Poland, fewer people expressed hate towards other nationalities in the past few months. Thirdly, Vilnius is full of electric scooters and car sharing automobiles. New technologies like these are already shaping the new face of the city. Infrastructure, regulations, and priorities are being set with the influence of the new sustainable sharing
economy. If you are not a taxi or delivery driver for Bolt or representative of a profession that requires a car, you likely do not need a car more than 2 times a day. Well-developed and accessible sharing economy technology is knocking at your door and offering you the opportunity to try it. If more people do so, it will create the parking spaces that we want but are missing.

The challenge is that standards came from the Soviet Union. Most of the streets and walkways are under reconstruction right now, and that is being done for citizens’ safety and comfort. New age technology and research help to measure what actions a municipality should undertake to build a safer city. For example, it was measured that reducing the area of some streets in the city would reduce the rate of speeding by 30 percent and reduce the likelihood of accidents by 20 percent. Therefore, Vilnius is now replacing asphalt with greenery.

Last but not least, I would like to highlight block flats. The majority of people in Vilnius live in flats that were built during soviet times and planned to last no more than 50-60 years. Some buildings are getting closer to those dates, and it is scary to think what troubles it could cause. Should governments initiate the construction of the new buildings or reconstruct old ones? New technology could help the city to measure safety and to conduct votes and understand opinions.

In conclusion, I would like to mention that the future of a city depends on us, young people, so we must take care of it.
“Should governments initiate the construction of the new buildings or reconstruct old ones? New technology could help the city to measure safety and to conduct votes and understand opinions.”

Lukas GUDELIS, Lithuania
Kuala Lumpur, Malaysia
The biggest urban challenge faced by Kuala Lumpur, Malaysia is traffic congestion. In 2019, drivers in Kuala Lumpur lost 170 hours, or seven days and two hours, stuck in rush hour traffic, according to TomTom’s Traffic Index (NST Leader, 2020). Traffic congestion is part of our life in Kuala Lumpur. It is annoying. Most of the citizens of each household possess at least two personal vehicles, including motorcycles, cars, vans, and so on. Thus, most of them prefer to use their vehicles for transportation and mobility in their daily life. Usually, the peak hours of traffic congestion happen within an hour before working hours, lunch hour and after working hours.

With the help of technology, traffic congestion could be tackled. Firstly, Intelligent Transportation Systems (ITS) can be used in transportation and traffic management systems to improve the safety, efficiency, and long-term viability of transportation networks, as well as to minimise traffic congestion and improve drivers’ experiences. The traffic management centre hub can monitor and control the traffic network. These command centres can be linked to vehicle detection stations, closed-circuit television (CCTV) cameras, and 80 variable message signs (VMS). These devices are designed to extract data, video, and voice information. The acquired traffic data is saved and then processed before being sent to the general public by VMS, SMS, and MMS. The main goals of ITS are emergency and incident management, which would involve managing a wide range of CCTV cameras, car detectors and VMS boards, and probing vehicles with GPS units. ITS delivers real-time information on locations affected by traffic congestion, estimated arrival times, the sources of traffic congestion, and routes to the next destination.

For instance, the Crowdsourcing-based Traffic Information System (CroTIS) proposed by Roopa, Anantharaman and Rangaswamy (2013) is a server and client-based architecture to address the issues of real-time traffic data. It is made up of CroTIS and mobile user components. Mobile users are those who have registered with a real-time traffic service
using their phone or tablet. The subscriber system saves the mobile user’s GPS locations in a database called Crowd Data Source. The Publisher, on the other hand, offers traffic updates to users based on information obtained from the Traffic Information Controller (TIC). Navigation controller (NC) and Location Source make up the TIC. With the lists of paths provided by Location Manager, NC calculates traffic density and sends it to the Navigation Service Provider (NSP). CroTIS is implemented using Google Maps, Android, and Hadoop. The server application was created using Python and Hadoop, while the client application was created using Android. The proposed system has been successfully simulated using Hadoop to create millions of GPS data points.

Furthermore, users of geosocial networks such as FourSquare, Facebook Places, Google Latitude, and Waze are on the rise, with millions of users. Data mining using geosocial networks for increasing road safety is based on collaborative community-based navigation systems. Waze has used data mining to collect traffic data such as accident reports, traffic jam reports, speed trap reports, and traffic data. Using a custom Web crawler, data is gathered from the Waze geosocial network. The Web crawler is mostly interested in traffic reports.

References


Ulaanbaatar is going through an urbanisation process as the population of the city has increased in the last decade. The degree of urbanisation in 2020 shows that 68.66% of Mongolia’s population is living in urban areas. The growth of the city significantly increased as the migration from rural areas towards urban areas mobility escalated. As a result, the public urban transportation system is overloaded, and transportation services are not sustainable, unsafe and have poor hygienic maintenance. This encourages the use of individual cars that are causing congestion, so a more suitable and sustainable public transportation system and management solution need to be developed and introduced for the citizens.

Our city is young and developing: over 50% of the population are children and young adults. The main public transportation system is the First Line Bus services, which has been operating for a long time. The capacity of this bus transportation system is inadequate and a new, upgraded transportation system needs to be introduced.

With the Municipal Policy on Public Transportation and Implementation Action Plan 2014 and the Sub Program of the Public Transportation Development of Capital City by 2020 there have been few short-term measurements defined to be taken to improve the current situation and to make the city sustainable and sufficient for citizens. According to the short-term goals defined working together with private sector, the Ulaanbaatar smart card system has been introduced and implemented for the bus transportation system. Ulaanbaatar smart card system has also developed an application of users to track the arrival and deporting of the bus, but the application has not been fully functioning well to meet the customers’ needs. The application has important limitations and much improvement is needed.

The application needs to be improved by including functions to show the bus schedule and operating hours, their real-time estimated arrival time at the bus stop. This would allow users to calculate their travelling time and reduce the waiting time at the bus stop. In addition, the application could be synced with the user’s card information, so that charging
the card with one application would boost the use of the app.

References


Mandalay, Myanmar
Mandalay, the second-largest city in Myanmar, is not only a key city involved in China’s Belt and Road Initiative but is also a member city of the ASEAN Smart Cities Network. Economic growth accompanied by rapid urbanisation has increased the pressure on the existing urban mobility systems of the city, which already has a population of 2.1 million people. With built-up areas covering about 17 percent of Mandalay’s land, and a previous limitation on imported vehicles, the city dwellers have mainly relied on bicycles, motorcycles, and buses for commuting needs, resulting in a heavy burden on the mobility of the population and their access to jobs and services. With poor functioning public transportation, motorcycles are dominating the road while public transport is playing a minimal role. “Unless action is taken, Mandalay will consolidate as a motorcycle-only city, posing challenges for the excluded and vulnerable” according to the World Bank (World Bank, 2020).

Firstly, as the primary mode of urban mobility has been private two-wheelers, Mandalay requires gathering comprehensive transport data to reassess the mobility systems that are in need of reform and reinvestment. Accurate data is also key to making the right decisions for urban planning and setting up pertinent policies. This can be done via digital infrastructure. To gather the dwellers’ travel preferences, an inclusive and re-designed city transport digital survey could be used. Using drones to capture 3D images and having municipal officers roaming around the city with GPS devices to obtain data on practices that are already in place. After identifying urban transportation behaviours and preferences, current traffic and street planning could be analysed in order to plan the routes and frequencies of the to-be-reformed transits. Digital Maps, such as Google Maps, can provide such daily traffic information.

Mandalay already has an Australian-made Intelligent Transport Monitoring System in place. This system collects vehicle types, the routes of the vehicles, as well as the congestion data at every traffic point. The location of each stop or station, the average travel time between each stop by vehicle types, the peak or off-peak hour of each stop, the frequency of arrivals and departures, and the estimated number of passengers boarding or leaving each stop can be extracted and fed into an algorithm to produce an itinerary for every route with the
desired transit type. ‘Test drives’ can then be done along the itinerary by each proposed mode of transit to determine the suitable vehicle types for each route. Artificial Intelligence could then be used to enhance real-world data from test drives of each vehicle type. Data generated with AI can be used by the very first batch of the reformed transit and then improved continuously in real-time with the new data collected by the vehicles. Real-time data can be shared with private drivers with or without monetising. Last but not least, the information on the public transits, such as geo-coded routes, frequencies, speeds, and fares, should be available in real-time in digital formats. With mobile technology and smart algorithms combined, on-demand public transportation is swiftly achievable, while laying a strong foundation for the development of fully autonomous vehicles. Data must be considered as infrastructure.

References


“With mobile technology and smart algorithms combined, on-demand public transportation is swiftly achievable, while laying a strong foundation for the development of fully autonomous vehicles.”

Ei Ei KHAING, Myanmar
Smooth transport not only keeps the economy running but also contributes towards a progressive society. In Lahore city, public transport systems are not working under one umbrella. As a result, they are not providing smooth access to destinations because transfers take more time and cost more money for people to travel with different traffic routes.

Due to this issue, residents prefer the personal convenience of their own vehicle, which is definitely costing them more and causing more pollution. Connected transportation systems are the right way for developing cities to move forward and stay competitive in the global economy. It is the right time to be smart and learn from the innovation happening around us. Learning practices from developed countries and effective use of innovation in technology can solve this problem. These are the key items that Lahore should embrace to move as a smart city:

- Connected infrastructure
- Access to data
- Autonomous vehicles
- Alternative transportation
- Traffic management
- Mobility as a Service (MaaS) Applications

Adoption of technology in this means a communication channel development for the public transport and connecting passengers with real-time information. These new technologies are taking the world’s transportation systems to another level, as adopted in developed countries.

These are dramatically changing the way vehicles operate with information accessibility and developing more capabilities for the real-time traffic management system. The number of smartphone users is increasing with time in the city and the use of the smartphone to
centralise the system with the digitalisation of the whole transport system can help towards sustainable transport in the city.

Moving towards such a smart approach, the use of smartphones and other technologies to collect data and organise transportation timetables more efficiently is required. This will make the citizens more comfortable with public transport and reduce private vehicles on the road and therefore pollution. The integration of GPS systems with the timetable of municipal transport, and subsidising public transport while merging different transports systems under one umbrella will shift people’s opinion towards public transport. Real-time information on transportation will add value to people’s lives and contribute to businesses running smoothly. For this purpose, key stakeholders in city transportation need to be involved and collaborate to drive this plan. The use of smartphones will increase the use of digital payment systems and online ticketing for travel to reduce human involvement in the process. Automation of the whole process will reduce ticket fraud and overcharging passengers, another goal of digitalisation that can bring transparency to the system.
Mr Arhum ISHTIAQ
Pakistan
Cofounder CTO
ConnectHear

A huge challenge in Karachi is the sheer lack of public spaces dedicated to the often-marginalised groups of our society, i.e. women, children, and people with disabilities. As a consequence, they often do not feel that there is a world out there for them, which leads to a significant decline in their representation in the public eye. Furthermore, without the proper incentives for public and private entities, their needs will not be reflected in the policies, budgets, and future ambitions of those entities. There needs to be some mechanism for ensuring accountability and offering incentives so that all the marginalised groups can become part of consideration again.

A very effective way to tackle this issue would be to create something along the lines of an Accessibility Index that can be publicly accessed by anyone. The primary mechanism driving that index score would be the ability for any citizen to contribute to scoring any given space based on factors including but not limited to:

- Whether the location has an accessible entrance
- Whether the space is a smoking free zone
- Whether the place is safe for kids
- Whether the location is navigable for Persons with Disabilities
- Whether the space employs a helpful and courteous staff
- Whether the location is clean and hygienic

Based on exhaustive criteria, people could rate any particular location based on their experiences and observations. The rating would then be combined with all other previous ratings and then compared against other spaces in the area to provide an overview to the public of the most inclusive places. This index could further be used by the government to objectively measure the efforts being put in to ensure accessibility and inclusion by every location and then give out grants, funding, leniencies, etc. accordingly. This would not only
provide an important incentive to space-owners to see accessibility as a cornerstone but make them part of an ecosystem that would establish a competitive landscape for public spaces to become more inclusive, efficient and creative.

All this could be very neatly packaged into an app that can allow users to both browse and rate the spaces they have been to. The app could serve as a free directory for all to utilise when planning their outings. This would also help non-marginalised groups to become aware of the public space inaccessibility and realise how they can help alleviate this issue.

In conclusion, the main crux of this digital solution is twofold:

1. Democratise the idea of accountability itself and allow common citizens to play their part in promoting inclusive and accessible public spaces.

2. Tie financial incentives like grants, marketing mileage, increased foot traffic and much more with ensuring and increasing avenues of accessibility to leverage the free market in order to bring about change.
On a typical working day in Islamabad, office workers drive their car comfortably on an expressway. They frown at pedestrians attempting to cross the road and at non-motorised vehicles slowing them down. To them, they are obstacles in their path. Non-motorised vehicle owners and pedestrians fear for their lives while motorised vehicles swiftly cross their path and overtake pedestrians.

This is just one example of the non-inclusive urban mobility development model the city of Islamabad is following. Islamabad is the capital of a rapidly urbanising nation of over 220 million people. Pakistani cities naturally look towards Islamabad to lead the way in sustainable change. However, Islamabad lacks affordable and decent public transport, and is marred by extreme class divisions in mobility. There is a dire need to improve accessibility for the urban commons by creating affordable and equitable transportation options and infrastructure amidst rapid urbanisation.

Development of singular land-use regimes and low-density housing at the periphery of cities has increased dependence on vehicle usage, promoting motorisation. Government officials invest in road infrastructures, underpasses, signal-free corridors and increase the road capacity to alleviate traffic congestion (Haque & Rizwan 2020; Iftikhar et al., 2020). This leads to a phenomenon known as “induced demand”, an increased road capacity leading to an increase in traffic volume (Goodwin, 1996). There is a need to diversify modes of urban mobility by discouraging the use of private vehicles, improving and adding to the network of public transport, increasing the number of trips made by public transport and promoting non-motorised modes of travelling, i.e. walking and cycling (Cervero, 2002; Ahmed, 2020).

While public transport should be provided by the government, the low-density urban planning negatively affects the feasibility and efficiency of public transport. In the absence of public transport, private service providers such as Uber are meeting the demand. Careem and Bykea are other service platforms similar to Uber. However, the cost of these
modes of transport remains out of reach for many, and they consume a large fraction of earnings just for transportation. The ride sharing service Swvl has started operations in Pakistan but it is not fully active in Islamabad yet. ezBikes is another start-up in Islamabad which has introduced electric bikes through a ride sharing model. All of these initiatives are ICT-based, hence technology is playing a role in meeting the mobility demand. These initiatives can develop further into carpooling and sharing services, which will be more affordable than individual Uber.

As it is often a challenge for women to travel and get their errands done, various travelling services (Bykea, Careem) and food delivery services have extended their features to pick and drop groceries and items. COVID-19 also boosted this transition towards integrating ICT in mobility services. Additionally, Bykea has teamed up with the banking system so that a person does not have to go to a bank to deposit money but can instead deposit money through a Bykea rider who comes to their home. This is soon going to work with the reverse function, i.e. bringing an ATM service to one's doorstep. Quality assurance of the existing services and introduction of more features, which can make doing essential activities quick and easy without needing to travel, can pull people out of the mobility challenge. The challenge of congestion at work hours remains. ICT can be used to promote efficient carpooling, hence reducing the number of cars on the roads and making travel more affordable for citizen.

References


“ICT can be used to promote efficient carpooling, hence reducing the number of cars on the roads and making travel more affordable for citizen.”

Samna KHAN, Pakistan
The city of Karachi, Pakistan is one of the most diverse mega-cities in South Asia. Being the business and financial capital of Pakistan, it accommodates people from diverse backgrounds, all across the country. These include people from the province of Sindh, Balochistan, Punjab, Khyber-Paktunkhwa, Azad-Kashmir, as well as many Muhajirs (Muslim immigrants who migrated after the partition of the subcontinent). Therefore, it can be rightly said that Karachi is the melting pot of Pakistan. However, this has also created many hurdles and differences for the city, due to pre-conceived notions about each other. Although stereotypes are rarely true, people tend to stick with people of their own communities, thus creating a barrier between citizens of the city.

Technology has been playing a major role in shaping cities in our current era. Through the use of social media and seamless communications, cities and countries are rapidly evolving into global entities. The problem mentioned above can also be effectively solved through the use of technology. The following are a few recommendations/ideas to solve the problem of close-minded communities:

**Engaging the youth of the city in events of similar interests:** This could include organising friendly matches of soccer, cricket, running etc. where people from all across the city would be encouraged to participate. Targeted advertisements of Facebook, Instagram or TikTok could be very effective in attracting youth from different walks of life. By participating in friendly competition with people of different communities, many stereo-types can be effectively shattered, thus creating a more inclusive society.

**Organising free vocational training workshops for women:** Since women in the city generally have lesser avenues to explore or socialise, short training workshops on skills such as sewing, art, computer-literacy etc. could be held regularly. By incorporating the use of YouTube and other e-learning platforms, these skills could be easily taught without the need of hiring highly paid teachers. This would not only improve the employability of the female residents, but would also allow women of different backgrounds to interact with each other, allowing the society to be more open-minded and healthy.
Creating safe community centres for retired residents: Currently, the retired residents of the city do not have many avenues to explore. By creating community centers which could include activities such as board games, television, reading area etc., the senior citizens would be able to spend their free time productively, as well as interact with people from different backgrounds.

Public screenings of movies and sports events: Organising such events would attract people from different communities across the city with similar interests. For example, during a cricket match, all cricket lovers would gather to view the match, despite their cultural differences. Similarly, screening a classic Bollywood or Hollywood movie would unite people having similar interests, while also having a wonderful and productive time.
According to the Poverty Index of Pakistan by the World Bank for the years 2020-2021, the poverty ratio stood at 39.3% and is estimated to remain at 39.2% for year 2021-2022. Poverty increased from 4.4% to 5.4% and with this increase more than 2 million people have fallen below the poverty line in Pakistan. This indicates that an even larger population is suffering from unmet basic needs like education, health and living standards. The minimum wage defined by the government in the 2021 budget is approximately $144, while the inflation rate in Pakistan increased to 9.0% in September 2021 from 8.4% in the previous month, the highest inflation since June. Pakistan's economy has been declining since the past two decades and a significant population is at risk of falling below the national poverty line if the economic growth remains the same.

As a solution, the government of Pakistan initiated several programmes to tackle this challenge such as the Benezir Income support, Bait-ul-mal, Employees Old Age Benefit (EOBI) and the Ehsas program. An example of digital solutions that could be implemented here would be the Kenya WeFarm Project. WeFarm is a digital network that connects farmers from all across Kenya, Uganda and Tanzania. It is an Artificial Intelligence digital product which connects farmers who have the same questions. It is a platform for sharing information, innovation and solutions regarding farming. It results in significant increase in earning, pricing and quality of products. Pakistan is an agricultural country, agriculture contributes to 18.9% of its GDP and absorbs 42% of the labour force. Therefore, Pakistan can also follow this solution.

I would suggest to open digital solution incubation centres all across Pakistan to train youth on new digital skills, such as AI, IOT, AR, VR, software programming languages, etc. There should be free of cost institutions providing basic facilities such as computer, internet and learning environments. The government should support students to initiate start-ups rather than giving some fixed amount, as with the Benezir Income support programme. Pakistan is already earning $0.5b entirely from the freelance market and is placed as the 4th most popular country for freelancing. The government should also give interest-free
loans for young entrepreneurs to start new projects.

There should be an online learning platform because improving educational opportunities is essential for the nation's growth and stability. Universities should record all their lectures and upload them on a platform where students who want to learn can use those resources free of cost. This platform should be multi-purposed for learning and it should also have short skills courses which will help poor people to develop high earning skills quickly. It should also have a newsfeed option for people to share their ideas and innovations. The government should invest in this type of platform which will help to solve two major issues: poverty and education for all. I would name this Platform Taleem, which means education in Urdu.

References


In our city, one of the biggest problems we are facing is the poor drainage and sewage system. Especially in summer, due to heavy rains, water fills up everywhere. Water even enters homes and shops. This water is very dirty, leaving stench and dirt everywhere. This is due to the lack of proper cleaning of drains, because of which, droplets accumulate in drains and the water cannot flow through them and remains standing for a long time. This muddy and dirty water causes many diseases, especially dengue, malaria, Hepatitis A, C, etc. It also contaminates drinking water after it is absorbed underground. When unfiltered water goes into the oceans, it greatly affects marine life. One of the main reasons for the breakdown of this system is poor waste management.

A digital solution, which can solve drainage and sewage system problems, would have two key aspects. Firstly, the waste management system should be improved as waste remaining in drainage pipes means that water cannot pass through it and remains standing. The entire drainage system should be brought underground so that garbage does not enter drainage pipes. Drainage pipes can be periodically fitted with sensors that can detect and clean obstructions preventing water to move forward. People could also control these sensors with their mobile apps – they just have to check the area where the blockage has taken place. The mobile app would indicate the location and would call cleaners to clean it. In addition, the sensors could detect where the water level rises too much and help avoid potential obstruction risks. They can signal alerts for standing water. With the help of this information, people would know in advance which parts of pipes are at risk of standing water and where there is accumulation of garbage, and could be cleaned accordingly. This solution will reduce the spread of many diseases such as malaria, dengue and Hepatitis A, C, etc.

When all the dirty water collected is ready to be dumped into the sea or river, it should be filtered several times so that it can be dumped without harm to marine life. Industrial chemical water should be filtered separately so that all toxic chemicals are released without
risk for the drainage system and marine life. All the waste that is collected in the filtration process can be used in energy generation.

These methods can address many problems including diseases, dirt and water from entering houses, waterlogging, death of birds and animals due to dirty water, and dirty water in rivers endangering marine life as it enters oceans.
Karachi, the metropolitan city of Pakistan, is one of the fastest-growing cities in the world according to pre-census results conducted in 2013. It is the largest city of Pakistan, with a high influx of migration and a population of almost 25 million people. This increase in number has a direct effect on the demand for urban services, especially in the department of transportation. However, due to the lack of a public transit system and infrastructure, private transportation is the only means left for people to commute around the city. This increasing number of citizens has directly affected the number of vehicles on the roads. Almost every person from the low-income group to high-income group uses private means such as car, bike, rickshaw, van or bus to commute. Oftentimes one can see a line of cars outside schools only carrying a single student inside or many employers and employees filling up parking spaces and roads with their individual cars. All of these daily individual choices have a deeper collective effect on the city and the increasing congestion.

My digital solution, ﺳﻔﺮ-less (Safar-less) (translation, travel-less; read: Suffer-less), addresses this issue through a public awareness campaign for the people of Karachi who are affected by the traffic on a daily basis. The application would provide a platform for carpooling. For safety concerns, it could be applied to individuals who share the same working, educational or institutional facilities. For example, educational institutes (school, university and college) can encourage carpooling within their institute by investing in applications which will allow their students to coordinate their schedule for carpooling. Student 1 can insert his/her starting point and time on the app which can be seen and accessed by other students on the application and give them the opportunity to reach out to Student 1 via the app and get a ride to the same destination. To encourage the participation of students, an incentive could be given out to individuals in the form of reward points. To tackle safety issues, each registration would be thoroughly monitored. The application would allow every user to choose the gender group they feel comfortable traveling with.

Another added feature of the application would be route registration. It would allow individuals to register the route that they plan on taking along with the timings. It would help create a pool of data of traffic flow, which can then help others reroute themselves to avoid
adding to traffic congestion of the city. The information would be supported by satellite navigation (GPS) and City Traffic Control Police. The application would provide holistic alternate solutions to the citizens, which would help them find a better and “suffer-less” solution to traffic congestion.
The biggest challenge that I see is the rising urban sprawl in the city of Lahore, Pakistan. The population of Lahore is continuously increasing due to the migration effect from the neighbouring cities and rural areas of Pakistan. Migration is increasing as Lahore is becoming the centre of opportunities in terms of employment and an educational hub. People want to move towards more developed cities as they seek more opportunities. Since Lahore offers better transport, top educational institutes, private companies, provincial government services and business opportunities, people from less developed areas move to Lahore, resulting in massive and rapid urban sprawl. The city's capacity has already reached its limits in terms of housing. The urban sprawl now consists of irregular housing units and properties and agricultural land around the city. This requires urgent attention and a solid solution, that could be reflected in the following:

**Education:** Communities that are informed about the negative consequences of urban sprawl are more inclined to take steps to prevent unsustainable development. Communities must be aware of the disadvantages, which include increased traffic as a result of an increase in commuters and a lack of public transportation, which results in higher pollution. Other issues include increasing taxes and the conversion of farmland to housing complexes and shopping malls. After a community has been educated, it is more inclined to take action.

**Community Action:** Through participation and action, the community can be a solution to urban sprawl. Local project lobby councillors might be challenged to vote in favour of more sustainable development strategies. Residents can also ask the city administration to collaborate with organisations that support smart growth and modern urbanism.

**Smart Growth:** Smart growth is intended to counteract urban sprawl by developing in a way that does not endanger the environment or the community. Smart growth planners and
architects strive to create a greater sense of place through more compact development, also known as mixed-use. Instead of isolating specific neighbourhoods, mixed-use development blends residential areas with sites of employment and business, allowing for more pedestrians and public transit instead of traffic and pollution. Smart growth audits, which give an assessment of the region and community to see how well existing policies match the principles of smart growth, are another option for communities to consider.

**New Urbanism:** When the focus shifts away from the suburbs and towards the city, growth can occur without the pollution and degradation of the environment that comes with sprawl. Existing urban centres and villages can be revitalised to help conserve the natural environment and thereby reduce urban sprawl. The goal of new urbanism is to transform existing towns and neighbourhoods into diversified districts, while also cleaning up polluted and decayed places.

Considering all the above points, it is clear that there are ways to control urban sprawl. All these ways can be incorporated to create digital solutions using digital tools and applications. This includes updated ArcGIS mapping of all areas of Lahore by dividing them in zones and highlighting/categorising the areas with rising urban sprawl. The maps should be available to all government services and participating local communities. Secondly, data must be analysed by using software such as SPSS, that will create statistical analysis and will be helpful to produce maps using real-time data.
Lahore is the second most populated city in Pakistan. In the past, Lahore city was famous as the ‘city of gardens’ in Pakistan, but today, it is among the most polluted cities in the world (WWF, 2018; Ghani, 2018). Instead of planting more trees, Lahore is losing its green cover fast in an account of development projects that demand cutting down trees. Tree cover went down by 75% from 2007 to 2015 in the city, and if unplanned and uncontrolled urban expansion continues, it will further decrease (Ghani, 2018; Hassan, 2017). The provision of green spaces is an important element of SDG 11, and The World Health Organization (WHO) suggests that 0.5 hectares of green space area should be available for people within 300 meters of their houses (WHO, 2016).

The provision of urban green spaces can be improved with the help of digital technology. Geographical Information System (GIS) is an important software application that helps in assessing the current situation of a locality and also identifies the land use in the different parcels of land. Location-based data is assessed with the help of Google Earth and also uses satellite imagery to identify the land use situation by assigning different colour codes. Artificial Intelligence (AI) and Machine Learning (ML) can be used within GIS databases to provide better data analytics.

With the help of technology, the areas and localities with fewer parks and green spaces can be identified. The local governments and concerned authorities can use this data to develop new parks in the city and improve the facilities in the existing green spaces. The involvement of technology will also help to assess the distribution of parks per population and density in the different areas. Moreover, the COVID-19 pandemic has also changed the relationship with nature and green spaces, and residents are more concerned about healthy outdoor recreation (Rice & Pan, 2020; Samuelsson et al., 2020). The use of technology in decision-making can help to consider different factors like park distance, size, and status of facilities.

Urban green spaces are also helpful in improving air quality near parks and public spaces.
with greenery. Technology will help in monitoring the air quality index in different locations with the help of preinstalled air quality monitors which would be regularly evaluated. Software like GIS can be used to develop air quality index maps with centralised techniques. It generates a visual map with different categories of air quality assessment ranging from very good, good, good-moderate, moderate, moderate-unhealthy for sensitive people, unhealthy for sensitive people, unhealthy, and very unhealthy in different locations. These types of maps will help government authorities and policy makers in taking precautionary measures in areas with poor air quality.

Henceforth, there is a dire need to include technological advancement in planning urban green spaces in Lahore, to minimise inequalities between residents of planned and unplanned areas. It will help promote sustainable cities with equal facilities provided to every citizen.

References


“With the help of technology, the areas and localities with fewer parks and green spaces can be identified. The local governments and concerned authorities can use this data to develop new parks in the city and improve the facilities in the existing green spaces.”

Amna SHOAIB, Pakistan
Despite its various benefits, urbanisation puts a burden on the city’s transportation systems, resulting in traffic congestion, inadequate public transport, and unsafe roads. In Lahore, women’s mobility is restricted due to safety concerns, societal pressures, and a lack of transport facilities. Harassment, transport fares, bus stops, societal norms and income levels are further exacerbating this issue. These challenges inhibit women’s participation in the labour force, their access to education and social activities. Women from low-income and socially marginalised societies are more vulnerable to these issues due to the lack of private modes of transport, e.g., cars. Women not only face issues while travelling on transport but also before and after their trips. Walking to bus stops and waiting for vans, chingchis and buses is not safe due to incidents of harassment and robbery. Women are 30% more likely to use public transport than men as riding a motorbike or bicycle is considered taboo for them. However, due to the lack of public transport infrastructure and the behaviour of uncivilised men towards women, they are forced to either shift to high-cost transport alternatives or leave their jobs and education. These issues can be tackled using digital technologies. The role of the Punjab Government is very important in disseminating and implementing such digital solutions.

Currently, no data on public transport routes (e.g., metro bus routes, feeder bus routes, LTC routes etc.) is available on navigation applications like Google Maps. Thus, there is a need to integrate routes information and bus schedules on such platforms so that women are aware of possible transportation options and don’t have to wait unnecessarily long at bus stops. Government and transport organisations in Lahore should develop a central digital transport portal where all service providers share information on their services and facilities, which can be accessed through a single platform.

The informal public transport routes of chingchis and local vans are not registered and regulated by the government. It is necessary to computerise and register this sector, which will ensure service quality, accountability, and women’s safety. Women face daily
harassment while waiting in long queues to buy tickets at counters or when they purchase tickets with bus conductors. The use of contactless and digital transactions can help solve this issue.

The usage of travel apps like Uber and Careem is increasing in Lahore, but there are no ride-sharing apps and platforms which are cost-effective and environmentally-friendly. The initiation of a ride-sharing platform exclusively for women by women will help create safe and cheap urban mobility. Most travel-related apps and services do exist for Lahore city, but most women are not aware of such alternatives. The government should make use of social media platforms like Facebook, Instagram, Twitter, YouTube etc. to create awareness about these services and platforms, so that women can make the best use of available services.
Manila, Philippines
The Philippines is known for its breath-taking landscapes and farmlands which are mostly made up of mountains, hills, volcanoes and plains. Due to its geographical location, the Philippines is also known for experiencing strong thunderstorms and heavy rainfalls and is prone to landslides, mud slides, rockslides and flooding. Many Filipinos have died due to natural disasters such as landslides and flash floods. Filipino lives are not the only thing that these common natural disasters have destroyed. Filipino infrastructure has also had its fair share of experiences. The challenge for the Filipino Community is to build innovative and sustainable systems and techniques that could withstand and minimise the effects of the above-mentioned natural disasters.

Technology is the product of one’s innovative imagination. It is made to make lives more comfortable and their environment more sustainable. Technology is created to provide tools and techniques for innovating processes and products. It can also provide crucial information and data which will help create accurate and precise models or algorithms that can predict issues that may arise in the long run. Technology plays a big role in creating a sustainable living environment for everyone.

Natural disasters pose one of the greatest challenges and threats to humans. Their unpredictability and abruptness make it one of the things no intelligent life can control. Since floods and landslides are dependent on water or specifically, rainfall, it is not easy to predict their effects without proper equipment or accurate data. On the contrary, predicting the movement of storms has been made easy and convenient thanks to decades of data and technological progress in meteorological equipment. This is the first step in minimising the severe effects of weather and climate disasters on the Filipino community.

Technological solutions introduce new opportunities and challenges for everyone and everything. Digital solutions tackle problems at their core. Digital technologies rely on the accuracy of the information it receives to optimise the efficacy of the solution. It also provides support for personnel to do their jobs more effectively and safely and provide
sustainable solutions to issues such as data monitoring and collection. Therefore, most of the proposed solutions nowadays are based on digital solutions. However, to function properly, digital solutions demand high electricity and must be designed to solve specific issues and challenges.

With the emerging progress of technological innovation, I believe that Filipino infrastructure and lives will be less likely to be destroyed by landslides, mud slides, rockslides or flooding. This will only be possible if technology is properly managed and regulated by the government and the citizens.
Metro Manila or the National Capital Region (NCR) of the Philippines is the 18th largest megacity in the world (MMDA, 2018). NCR also has the highest level of urbanisation among the country’s region. However, due to inadequate urban planning, different environmental and social issues have become more prominent in recent years, thereby reducing the overall quality of life in the region. Green spaces, which are essential to conserving biodiversity, mitigating the impact of the heat on the island and improving mental health, are insufficient and have been reduced over time. The World Health Organization recommends 9.5 m² of green space per capita (MMDA, 2018), amounting to about 122,333,903.5 m² for 12.8 million people living in the NCR. However, there are only 121,527,900 m² of existing green spaces, thus falling short by 806,003.5 m². The government estimates have also shown that green spaces in NCR were only 21 percent of the total land area (Enano, 2019). The challenge is: how can the existing green spaces be maintained and also possibly increased despite the lack of land area?

There are several existing digital solutions to urban green space issues that may be utilised for the city. The Amsterdam-based open-source initiative Green City Watch has an open-source software called TreeTect that utilises satellite imagery and machine learning to make an AI-enabled digital tree inventory (Mullova, 2020). It provides high-resolution satellite imagery to gather information on the quantity and health of green spaces in cities. The initiative reports that this software detects the spectral signature of trees to “pinpoint the location, size, shape – and even health – of individual trees in near real-time”. Such technology can help scientists, residents, and policymakers in managing and evaluating green space projects.

To further promote citizen scientists, open-source collaboration software could be also made where citizens and scientists collaborate on documenting, identifying, and locating existing species within cities. There are currently some digital solutions that are similar to TreeTect, like Open Tree Map, which is available on a subscription basis.
Even if there is a lack of land area, green spaces can be increased by installing green roofs on buildings. Optigrün, a German-based company, provides different types of green roofs empowered by smart technology, so that building inhabitants can control water that reaches the green roof. As a result, while urban gardens increase, water is also managed efficiently. Optigrün’s technology, called Retention Roof Flow Control, is a system that controls water retention in reservoirs and based on information from weather forecasts (Optigrün, n.d.). Specifically, this technology not only waters the gardens, but also restores natural water balance and increases flood protection.

Related to water management, smart irrigation is another technology that is used to maintain green spaces. It uses “sensor networks and automation” and gathers information on current weather and soil conditions. The watering system then waters the green space based on the information. It aims to provide water to greenery at the most important times so that water is conserved. This technology is already present in city parks in Barcelona and Singapore (The Economist, n.d.).

While urban planning and policies are important to develop green spaces, digital technologies like TreeTect and Open Tree Map can encourage collaboration in data collection. Technologies like Optigrün and smart irrigation can also help in maintaining such spaces.

References


Mr. Jadiene Shani TENG
Philippines
Community Team Member
UX Philippines

There are a lot of ways to get around the Philippines or Metro Manila in particular: cars, buses, taxis, motorcycles, tricycles, bicycles, train, metro/light rail (MRT/LRT), and the unique Philippine jeepney. Pre-pandemic, I remember leaving the office at 18:00 and arriving home 3 hours after driving by car. During rush hours or rainy seasons, it is usual to see incredibly long lines at the MRT, LRT, and bus stations. You cannot predict when you can get on a ride or what time you will arrive at your destination. This problem caused numerous losses: wasted time, increased air pollution, and billions in economic losses. Even with a significant reduction in travel due to the pandemic, a recent study shows that Manila is still one of the most congested cities in the world. The question is: how might we save time commuting around Metro Manila?

While there can be a number of ways to answer this question, we will mainly focus on digital solutions. A quick search of popular transport apps in the Philippines mostly shows ride-hailing apps which are alternatives to public transportation. Looking at some of the best transportation systems in Asia showed a similarity: availability of real-time transportation data. Various developers have started to make similar mobile apps for the MRT and LRT, but it’s just a small representative portion of the complex Metro Manila transportation system. Numerous operators of buses and jeepneys traverse various routes across Metro Manila. For jeepneys, routes are not always the same; there is no standard drop-off point and one can get off just by shouting “Para! (Stop!)”.

Integrating all transportation options into a web-based application providing real-time data to commuters can aid them in making better decisions - which mode of transportation to take, or whether to pass the time somewhere else while waiting for traffic to subside. Imagine Waze, with its real-time traffic data, combined with Google Maps’ direction feature, showing directions for MRT, LRT, and buses with their estimated timetables, and expanding this to include jeepneys and more bus operators.
To collect information, a Global Positioning System (GPS) can be installed in each vehicle to track the location of such vehicles. All data gathered will be presented on a dashboard/map to show the availability of transportation at a certain location and time. Estimated timetables using real-time traffic information can be shown for buses and jeepneys, together with accurate locations, which may help in estimating potential delays.

Moving forward, a redesign (or possibly overhaul) of the transportation system may be beneficial, especially for those who are not familiar with the ins and outs of getting around Metro Manila. This may include redesigning bus stops to show routes and maps, taking inspiration from Hong Kong and Singapore. Similar stops may also be established for jeepneys but adjusted accordingly to fit the system.

This initial idea still needs further research on availability and accessibility of technologies in the country, and the feasibility and usability of the overall concept. However, it is important to note that while technology can be a tool in alleviating some of the pain points of the transportation problem in Metro Manila, it is also essential to implement policies that veer away from being car-centric, to policies that prioritise safety, accessibility, and convenience of public transportation. With these changes, together with behavioural changes, one can hope that getting around Metro Manila will become smoother.

References


“Integrating all transportation options into a web-based application providing real-time data to commuters can aid them in making better decisions”

Jadiene Shani TENG, Philippines
Warsaw, Poland
Currently, I reside in my hometown Otwock in Poland. It is a town located 25 kilometres southeast of the Polish capital city, Warsaw. The population is approximately 45,000 inhabitants and the city is famous for a distinctive architectural style – Świdermajer. Various reports on sustainable development and SDG 11 highlight the poor condition of transport infrastructures as one of the main challenges in Polish urban areas. This problem also exists in Otwock. In the middle of 2017, the modernisation of the railway line (intended to improve the public transport system) was launched but it presently entails great difficulties for commuters, such as delays, insufficient number of trains and overloaded trains, to name just a few. Moreover, as a result of the COVID-19 pandemic and the reluctance of residents to use public transport for fear of infection, the main private bus company went bankrupt. Because of these inconveniences, the inhabitants of Otwock tend to choose private cars.

Digital tools may be able to help solve some of the problems related to insufficient urban transport in Otwock. Two of them seem particularly relevant at the moment, when it is necessary to ensure that passengers can access the most recent information in cases of delays and to collect data to properly assess the need for the number of train connections in the region. Firstly, introducing a mobile application in which the passenger has access to the most up-to-date timetable of the integrated public transport network (trains + buses), to the announcements of departure time modifications and the corresponding rerouting suggestions. The application should be free and ensure inclusive access, especially for people with disabilities. At present, there is only a website serving this purpose, but it is not as convenient to use as smartphone application, and information on timetable changes is not always updated on time.

The next step could be to incorporate a function into the app that informs passengers of the actual location of the train or bus, making it easier to plan their journey. The second possible option is to install a system to collect real-time data on train travel, such as the number of tickets bought at ticket machines or the number of travel passes scanned on
trains (the travel pass is issued in the form of a plastic card to be scanned inside a train before departure). Many cities around the world (e.g. Singapore) install sensors to collect real-time traffic data in order to improve road network efficiency and manage traffic flow. The same approach should be taken for the train traffic in my town. Currently, the number of trains in Otwock does not meet the needs of the local people, there are simply not enough trains. The collection of this data would provide a reference point for city authorities to evaluate demand more accurately, for example at peak times, and adjust the number of connections to meet the needs of residents (also in the context of the maintenance of the sanitary regime and the reduced permissible number of passengers during the COVID-19 pandemic).

References


“Introducing a mobile application in which the passenger has access to the most up-to-date timetable of the integrated public transport network (trains + buses), to the announcements of departure time modifications and the corresponding rerouting suggestions.”

Anna WIERZBICKA, Poland
Moscow, Russian Federation
Ms Anastasiia BREDIKHINA
Russian Federation
Undergraduate Student
Russian University of Transport

Magnitogorsk, my hometown, is not very big and modern. However, transport infrastructure is well-developed here. There are a lot of trams, buses and taxis. I personally live in a private house which is a little bit far from the city centre. Sometimes I need to wait for my bus for a long period of time and there is no schedule. Therefore, I do not even know when the bus will come. I would suggest to implement electronic schedules that would be placed on every bus stop and tram station. We should also create a mobile application where people can see where the means of transport they need is located. These technologies may be useful for tourists or people from other cities, as there are a lot of people who visit the city, particularly sportsmen or foreigners, because ice hockey and snowboarding are popular here.

The implementation of electronic schedules will also help people to plan their activities accordingly. In the big cities of my country like Moscow, Saint-Petersburg or Kazan, such technologies have already been implemented. It is not a challenging measure to implement for public authorities, but it would help a lot and make the town more sustainable. In Russia we have a popular service called Yandex Transport which allows to create routes. To implement it in my hometown it is essential to get from carriers car ID, route number, type of transport (bus, trolleybus, tram or minibus), signal time and coordinates (latitude and longitude). We should track the route trajectories of all public transportation vehicles, and double-check whether, for instance, bus 28 is actually travelling on the correct route. This would allow to exclude vehicles that have left their route. Buses, which have been successfully verified, would be shown on the map in the form of tags.

Electronic schedules in public transport stations would show the correct time of bus arrival and would allow people waiting to do something else during their waiting time. Additionally, I suggest to create a route using all possible means of transport. For example, if I need to get from point A to point B, I should first take a bus, then move to the tram and, finally, do the last mile by foot. Such application would estimate the whole journey’s duration. In my
opinion, it would help to enhance citizens’ mobility and to save their time. When people know where their bus is, they feel less stressed. I believe that with my idea, SDG 11 related issues in my city could be tackled through digital technology.
Singapore
Singaporeans often think of the phrase “Reduce, reuse, recycle” when it comes to waste management as it is an actively used guideline for our community. While the simple alliteration is an effective reminder, people may stop short of delving deeper into what constitutes effective methods of observing these guidelines. Effective recycling is determined by both recycling rates and correct recycling. While Singapore is actively addressing the former, our current strategy towards the latter relies more heavily on education.

To supplement a conventional approach towards recycling education, computer vision can be employed to assist with guiding people to recycle only correct waste and reduce contamination in recycling. This can be done by using machine learning to detect items that are recyclable. The algorithm can be deployed as a practical application in the following ways:

- A smartphone app for users to check if the item they intend to dispose qualifies for recycling. This allows users to conveniently and quickly assess how they should dispose of their waste. Through the process, a user may also discover new items that are suitable for recycling (perhaps not specified in static / dated infographics) and learn what constitutes suitable recycling, in terms of an item’s material and usage during its lifetime.

- Smart recycling bins that will channel contaminated items to a different section, avoiding contamination of the current content in the recyclable section.

- Sorting of general waste for recyclables in existing bins upon disposal, prior to exposing it to the bin’s current content. This will then be channeled to a separate section / conventional recycling bins for processing.
• Reverse vending machines, that offer incentives for users who return the packaging or container for the products purchased after use.

The deployment of the algorithm across different applications locally serves to enhance the model’s performance in the following ways:

• Increasing the size of the dataset for the model to learn from, over time and use. This helps with the model’s accuracy and stability, while reducing overfitting.

• Ensuring the relevance of the model, as the learning dataset used would be waste commonly disposed or recycled in Singapore.

However, one potential problem this approach may face would be the growing diversity in how products are designed – variations in material composition and visual design would take more data points for the model to learn before identifying the product correctly. Hence, manual effort (in terms of refining the algorithm by validating) will not be eliminated from this endeavour.

To conclude, the introduction of technological innovations in recycling has more benefits than the direct increase in recycling rates. In application 1., it modifies consumer behaviour over time to be more conscious of recycling methodologies, thereby improving the community’s knowledge base (amplified by knowledge sharing) and reducing contamination by improper recycling.

References


In my city (Singapore), one of the urban problems related to SDG 11 is that currently children do not have enough space to perform outdoor activities. Due to the COVID-19 pandemic, most outdoor activities that may involve gatherings of people have been suspended by the local government. This seems to be a necessary measure to take during the pandemic, but children need outdoor activities, for both their physical and their mental health. While their academic lectures could be carried out online by having live sessions on Zoom, it is harder for them to get enough exercise. Also, culturally parents unconsciously pay more attention to their children’s academic performance, because this is of greater importance in the process of entering a higher school, and they ignore the significance of physical health for children’s growth.

In order to deal with this problem, we can start from the following aspects. First, during the pandemic, vaccination is the most important aspect of prevention and control. In addition to vaccination, it is also important to use modern digital technology to track the vaccination records of citizens and to track where they have visited. For children, their resistance is weaker than that of adults and they may not be the earliest vaccinated, so more attention should be paid to using digital technology to record their activities.

Secondly, because of the pandemic, it is indeed necessary to avoid overcrowding, especially for children. On this issue, government departments or corresponding sports organisations could regularly open some venues, with limited positions and required pre-registration. This could provide children with venues for activities, and also avoid excessive crowding to a certain extent. Institutes could also organise some sport activities or training programmes for children, like skateboard training. Participants should book positions online in advance and present vaccination vouchers when entering the venues. At the same time, when children are engaged in outdoor activities, they should avoid other people, to avoid spreading COVID-19.
Thirdly, schools could urge children to promote outdoor activities through online supervision and management. Take rope skipping as an example. The frequency and time of rope skipping could be recorded by means of sensors. Children could upload the sensor records to a cloud service after completing tasks every day, and teachers could supervise and manage through this cloud platform. Meanwhile, in the process of running, children could wear sensors. They could track their trajectory to avoid appearing in higher-risk areas, and also record their indicators in an exercise application to figure out the heart rate, speed and duration, etc.

In general, due to the impact of the pandemic, children’s outdoor activities cannot be as free as before. However, the full use of digital technology can guarantee children’s outdoor activities to the greatest extent possible. Its function is to ensure the health of children and reduce the risk of the pandemic as much as possible.
“Due to the impact of the pandemic, children’s outdoor activities cannot be as free as before. However, the full use of digital technology can guarantee children’s outdoor activities to the greatest extent possible. Its function is to promote the health of children while reducing the risks related to the pandemic as much as possible.”

Zhebin CHEN, China
Singapore remains an economically vibrant and secure multi-racial society during these turbulent times. Policies on affordable housing, public transportation, and job resiliency previously enacted by the government have allowed the city state to mitigate disruptions brought forth by the pandemic. Nevertheless, tackling urban management and planning challenges such as food and water security, land shortage, and aging population continue to be key to maintaining a secure and sustainable society. While technology has proved to be a double-edged sword, creating controversies related to income inequality and privacy, it has also enabled individuals and corporations to stay connected and shift societal norms to better increase accountability, productivity, and standards of living.

Focusing on urban mobility, information and communication technology (ICT) offers transformative opportunities to enable transportation efficiency and availability for the masses. An example of a ‘smart nation’ project is Beeline, an open, cloud-based smart mobility platform offering data-driven shuttle bus services for commuters. Faced with non-constant mobility trends, fixed bus routes are often only optimised during the route design phase and do not take into consideration travel habits and on-demand services. Beeline utilises crowdsourcing technologies to offer direct, private express bus routes based on existing demand. By leveraging product-service paradigms, smart connected devices, and artificial intelligence to meet the needs of the masses, this inclusive project is able to provide affordable and sustainable transportation. Currently hosting 13 private bus operators and more than 200 drivers on 300 routes, the platform service has demonstrated well its scalability and appeal to the public.

Meanwhile, the Singapore government has invested in a novel technological implementation featuring the use of digital twins to replicate the entire city-state on a virtual platform. Coined as Virtual Singapore, the project aims to tackle urban planning and management issues ranging from location identification for infrastructure development to disaster management to counterterrorism and social behavioural analysis. While the project is still ongoing, the use of adaptive multi-use technologies to encompass and enhance
multiple urban and social aspects beyond mobility serves as a cornerstone to inspire the development of open systems for public benefit.

With smart projects such as Beeline and Virtual Singapore amongst numerous digitalisation undertakings of the government, it is essential to consider potential conflicts and disruptions that may arise. As such, technological adoption should be paired with complementing social policies and safety nets to minimise inequalities. The local government has released digital programmes for the elderly while providing economic assistance to citizens embarking on tech-centric career switches, as well as upskilling courses. Technology development outsourcing through open challenges and grants is also a good approach to produce quality solutions without reinventing the wheel. Furthermore, partnerships with private industry entities and academic institutions will significantly aid in fostering a dynamic and robust technology ecosystem, thus driving meaningful innovation as determined by user demand.
As a highly developed and urbanised country, Singapore consumes a large amount of energy. Since gaining independence in 1965, Singapore's per capita energy consumption has increased from 48 TWh to 986 TWh in 2019, approximately a 20-fold increase (Ritchie & Roser, 2020). Singapore's energy usage per capita is the 17th highest in the world (World Population Review, 2021), reflecting its disproportionately large energy consumption despite its small size. Considering that Singapore's energy mix still largely relies on fossil fuels (albeit the less-polluting petroleum and natural gas) (EMA, 2021), this correspondingly results in huge greenhouse gas emissions, which exacerbate the changes in the climate and sea levels that threaten Singapore's existence. At the same time, there are limits to how much renewable energy Singapore can harness to substitute fossil fuels due to physical and environmental constraints (MSE, 2019). As such, how can Singapore reduce its energy consumption and consequent greenhouse gas emissions, without compromising on its economic development and quality of life?

A key solution lies in the use of digital technology. Data can be used to enable governments and companies to plan the delivery and usage of energy more efficiently. For example, Sembcorp Marine shipyards use machine learning software to monitor the production and usage of energy from the solar panels lining roofs and the conditions of the national grids, allowing the company to manage its energy use and shave off the peak energy consumption (Basu, 2020). Employed on a national scale, similar technologies, coupled with data analytics and advanced batteries, could potentially allow Singapore to smoothen its national energy demand, and reduce intermittency in its renewable energy supply to keep power supply reliable. Taken together, this would allow Singapore to better plan the allocation and distribution of its energy resources, maximising the generation and usage of the available renewable energy and minimising its reliance on fossil fuels, thus reducing greenhouse gases.

Smart technologies can be used to ensure that energy is only used when necessary. For example, sensors can monitor human activity and footfall at a given location and calibrate
the level of lights and temperature control based on the number of people in the area. Such technologies would allow Singapore to lower its energy consumption across the country, from offices to public facilities to outdoor spaces. On a more personal level, this would mean smart homes that track your lifestyles and monitor your energy demands, with the goal of finding ways to cut down on energy consumption when it is not needed. This would allow each household to conserve energy better. A possible added bonus is that it would make people more aware of their energy consumption, and inspire positive behavioural changes.

Finally, digital technologies can change our transportation systems. With ride- and bike-sharing apps on the rise, people are increasingly turning to lower energy alternatives to get from one place to another, with car-pooling and even riding bicycles gaining popularity. Even for those who continue using public transportation, digital technologies can provide more comprehensive and real-time information on the available routes, making them more convenient and appealing to people. These modes of transportation use less energy than driving a car by oneself, and their attendant carbon emissions are also lower.

References


“Data can be used to enable governments and companies to plan the delivery and usage of energy more efficiently.”

Su Chen TEH, Singapore
Ljubljana, Slovenia
I live in Kranj, the fourth largest city in Slovenia with 58,527 inhabitants. The city is quite old, although in recent years they started to renovate it. The old town is settled on a rock surrounded by rivers, and the new town spreads around it. In the last 20 years, shopping malls began to appear at the entrance of the city. The use of cars increased and in the city, we only have a temporary main bus station and a train station in very bad shape.

In the future, it is necessary to renovate the roads so that people are in the forefront and not the cars. Streets need to be renovated according to sustainable planning guidelines with sidewalks and bike lanes. We already have traffic sensors on the traffic lights telling us which roads are already congested. Traffic congestion increases carbon emissions and affects air quality exposing people to significant health risks. Using technology, the carbon footprint could be measured. Where it is high, more trees would be planted along the roads. The modern transit centre which includes new bus and train stations can incorporate digital solutions. The use of technology can also be used at bus stops in the city to tell the bus schedule. Buses and trains should run on electricity or sustainable petrol. Also, contactless payment for transit systems can be incorporated. Elderly people already have free public transport. Electric cars should be promoted in the city by installation of a larger number of electric car chargers.

In the city we already have a bike sharing system of ordinary and electric bicycles - KRsKOLESOM – as well as an app where you can see information about the bike sharing system – number of bikes, time usage, etc. Regarding parking systems, users can pay parking fees in cash with a parking card of the Municipality of Kranj and mobile phones (SMS or EasyPark application). The younger generations use more smartphones, so it is necessary to develop apps to help increase the use of public transport. Women’s needs are also often overlooked in transport systems, especially since they take more non-work-related journeys than men. Transit systems have to redesign facilities to accommodate women’s needs. People with disabilities encounter numerous challenges, including lack of and/or blocked wheelchair ramps, buildings without lifts, and shops with no step-free
access. In the old town, we have an electric car called Kranvaj for transporting people. These vehicles can be requested across several locations in city centre.

In Kranj we also have a centre for sustainable mobility. It is a modern cycling rest area with a bicycle shed and a building with an info point for promoting the use of sustainable modes of travel. It is intended for all public transport users, cyclists, pedestrians, the disabled and vehicle sharing users.
“The younger generations use more smartphones, so it is necessary to develop apps to help increase the use of public transport.”

Katja FRELIH, Slovenia
In Barcelona, transportation is considered as one of the most energy-consuming sectors (Climate Plan, 2018). More precisely, it contributes to 30% of the CO2 emissions turning it into one of the main cities where urgent action is required (Climate Plan, 2018). If things are changing progressively, the use of cars in this city is still strongly embedded in the urban environment. Indeed, bicycle transportation was representing only 2.8% of the mobility in Barcelona (before the pandemic) (Blanchard, 2021). Just like other cities around the world which have been pushing towards a more sustainable and greener mobility system, the city of Barcelona has also been aiming at reducing the number of cars and increasing the use of public transport and bikes. Barcelona wants to follow a more sustainable model of city where bikes would gain more importance than cars. Hence, enhancing the use of bikes is one of the important challenges that the city of Barcelona is facing.

As one of the solutions for this problem, the city of Barcelona has been implementing a bike-sharing programme, called Bicing. Bicing is a sustainable and economical transport service based on the shared use of mechanical and electric bicycles. Created in 2007, Barcelona was one of the first cities to implement this type of service. The Bicing service offers 7,000 bikes and 519 stations distributed around the city. It was improved in 2019 by providing electric bikes, and in 2020, the service was incorporated into the mobility application of the city council. In this application, named Smou (It’s moving), it is possible to check the stations on the map and see the availability of bicycles in real-time. It is also possible to book and take a bike directly through the app. This application has already proven a success as 52% of the trips are now made through it. By providing easy access to bikes (in real-time), this application plays a role in increasing the use of this shared bicycle service. More broadly, the municipality is also using this data to improve the use of bikes and optimise vehicle transit. Here, the use of technology participates in rendering the service of bicycle sharing easy to use; hence, increasing the use of bikes in the city. However, to increase the potential of the service and its application, it is also necessary for the city of Barcelona to change the physical urban environment. Indeed, although the
municipality is increasing and improving cycling tracks, they are not present everywhere throughout the city and some places are still difficult to access by bicycle.

References


Stockholm, Sweden
I am from the Russian Federation, but I am currently living in Stockholm, Sweden, a city that received the European Green Capital award in 2010 for its dedicated environmental efforts (The Eco-smart City, 2021). Nevertheless, city officials maintain high ambitions to make the city better. One of the current challenges that has already been identified and worked on is climate adaptation (United Nations, 2021). The goal is to counteract the effects of excessive rain and sudden heat waves (City Council, 2020). This is especially important now, when the effects of climate change can be felt everywhere on the planet and particularly in cities that have many paved surfaces, a lack of green areas and dense population. Climate change is an inevitable danger, which can be slowed down but not stopped fully. The ability of a city to adapt to climate change is thus vital. In the case of Stockholm, city officials have a list of measures (City Council, 2020) that can help with the situation. This list includes risk and vulnerability analysis, which I believe can be done through digital solutions.

Firstly, climate-related risks are quite unpredictable and can be very damaging, which makes them a high-priority challenge. It is impossible to predict with high accuracy when and where we will have excessive rainfall and if it will damage streets and buildings. However, we have accurate satellite data that can showing coming rains or temperature increases. In Beijing, air quality sensors can detect and signal to the population if there are too many contaminants in the air. I believe the same sensor principle can be used for heatwaves and floods. It would not only be possible to signal to citizens when there are high-risk situations, but also to use sensors to research urban areas and detect “weak zones”. Such sensors could show the areas that are the most exposed to climate effects, the hottest areas during heat waves and the flooded zones during rains. Furthermore, this could also give pedestrians better information about the real-time situation in the city and give suggestions on how to navigate without entering uncomfortable or unsafe zones.

Secondly, technology can provide fast and reliable information on how developed and newly developed areas are functioning during heatwaves or excess precipitation. There are many climate-related ideas that are implemented nowadays, such as green roofs and smart systems that hold excessive water to use in case of droughts. Monitoring them
through technological solutions can give us a good understanding of how those ideas are performing in a real environment.

There are challenges with implementing such solutions, such as the lack of financial resources. Sensors also require metal components and sufficient electricity supply. Nevertheless, the benefits of having such smart systems are exciting. In the coming years, knowing which streets are the hottest during heat waves can be important information to be routinely checked, similar to traffic issues or general weather forecast. This will be true for Stockholm relatively soon, but might be even more urgent in regions that are already experiencing such issues.

References


“Technology can provide fast and reliable information on how developed and newly developed areas are functioning during heatwaves or excess precipitation.”

Valeriia TATIANINA, Russian Federation
Bangkok, Thailand
The key urban challenge I have experienced all my life living in Bangkok is transportation. We are known as one of the world’s most traffic-congested cities, where people waste eight days a year in traffic. Inequality of access to public transport in terms of physical and financial aspects encourages people to use their own car or motorbike even more. Buses and boats are the cheapest way to get around the city but are also time-consuming since there is no timetable that citizens can count on. Most buses and boat piers have no common design, so it’s difficult for seniors and disabled people to access them. Metro and Skytrain systems are the fastest, but they do not cover all areas yet, and they are expensive for people who earn the minimum wage (the furthest route costs 1.80 USD while the minimum wage is 11 USD/day). There is also a lack of connectivity between transportation systems. If you need to get from the Metro to a bus station, you need to walk. And in most areas, the footpath is not walkable, especially for people in wheelchairs.

In my opinion, the key to mitigating traffic congestion is to improve public transportation systems so that they are affordable, widespread, accessible, interconnected and punctual. Making public transport appealing to all citizens can reduce their need and desire to use private vehicles. With so many issues to solve, the first thing technology can do is gather opinions from citizens. Having a digital platform where people can report the problems they are experiencing and give their feedback to public authorities would be the fastest way to recognise the current situation in each area. Moreover, engaging people in problem-solving will also create a sense of ownership among citizens and make them want to participate in evaluation when any solution is implemented, which in turn will lead to an effective transport development cycle.

IoT could play a significant role in improving public transport by collecting data about current users’ behaviours and monitoring the existing problems. IoT sensors can detect the footfalls at bus stops, railway platforms or boat piers throughout the day. The authorities can then rearrange the appropriate schedule and number of vehicles to different routes to
avoid crowded stations or empty rides. Real-time tracking of streets and stations can notify commuters on the real-time status via smartphone applications. Therefore, commuters can know when the next bus will come or even how packed the bus is to better manage their commuting time. Furthermore, bus drivers can know which route is the fastest and avoid traffic jams to minimise operating costs. Hence, public transportation can be more affordable to all. And if we have data on the existing commuting traffic, we would see which areas need more connectivity between transport systems and which areas have the potential to become transport hubs. We can even predict the future urban sprawl and develop new routes to support new urbanised areas.

Developing reliable, efficient, and convenient public transport using IoT will reduce the number of private vehicles on the road and minimise traffic, pollution, and carbon footprints, making the city more sustainable in the long run.
“With so many issues to solve, the first thing technology can do is gather opinions from citizens. Having a digital platform where people can report the problems they are experiencing and give their feedback to public authorities would be the fastest way to recognise the current situation in each area.”

Patlapa SEREECHAIPORN, Thailand
London, United Kingdom
A major problem in London is the issue of homelessness. Homelessness is defined as the state of living without a fixed address. According to the homelessness charity Shelter, in 2019 approximately 60% of England’s homeless population were based in London. Some statistics suggest that homelessness has increased by as much as 90% over the past 10 years in London and this will likely (and unfortunately) rise in the future due to the impact of COVID-19 on the local economy. This represents a challenge within the context of Sustainable Development Goal 11 because homelessness conflicts with having an inclusive city.

Homelessness could potentially be reduced with the help of Big Data. A major cause of homelessness is job loss. Statistics in the form of predictive analysis could be used to predict the likelihood a person will lose their job in the near future. If the risk of job loss could be accurately gauged, those who are very likely to be homeless could be warned in advance so they can begin looking for work and can also be informed of what they might be entitled to in the form of government benefits. An app could help tackle this problem. It would function somewhat like a weather app and would give indications periodically to a user such as, the risk of losing your job in the next 6 months is 30% or the risk of losing your job in the next 6 months is 15%. There would be a threshold limit at which the user would need to take action. For instance, a risk of 50% is considerably high. If a user had a 50% chance of losing his/her job in the next 6 months, the app would communicate to the user that the risk of losing your job in the next 6 months is 50% and that you may be entitled to Universal Credit (Universal Credit is the name of the welfare system that prevails in the United Kingdom).

The warning would also inform the user that his/her council may be able to provide him/her with housing assistance. The underlying statistical tool used to determine the risk is a field called categorical analysis which attempts to determine whether the independent variable (usually designated “Y”) is between the values of 0 or 1, both representing the probability of an event X happening.
“Homelessness could potentially be reduced with the help of Big Data. A major cause of homelessness is job loss. Statistics in the form of predictive analysis could be used to predict the likelihood a person will lose their job in the near future.”

Babatunde ONOBAJO, United Kingdom
Hanoi, Vietnam
At the United Nations Conference on Sustainable Development (Rio + 20) in 2012, world leaders agreed that transport and mobility are at the heart of sustainable development, as they connect developed cities with remote areas while improving access to goods, services, rights and bringing social equality. However, in my city, the public transportation system, particularly the local bus system, is still in poor condition. People are afraid to use this type of vehicle for two main reasons: the routes and timings are not clearly announced. Many people make claims about faults, including the bus not announcing the stops leading passengers to get off at the wrong station or not knowing when the bus will arrive causing them to wait or miss the bus. This results in a waste of time and money. Therefore, improving bus route management and increasing interactions with users through digital technology is essential to overcome the above problems.

It is hard to overstate the importance of public transportation. It is the primary form of mobility for those who cannot afford to purchase or operate a private vehicle. Besides, it helps to reduce CO2 emissions and traffic-related issues such as traffic congestion and accidents. As a result, upgrading and improving the performance of the local bus system is critical. Firstly, there is the issue of the bus schedule. Many people who are taking the bus for the first time are perplexed since they do not know which bus to board, where to transfer, or at which stop to get off. The bus system management agency must create an accurate digital route and update it on their own website or application, or combine it with Google Maps so that users can take the correct route. Furthermore, each bus must be equipped with GPS navigation, as well as a system to announce the next stop allowing them to disembark at the correct station.

The bus timetable is the second issue. In most cases, bus routes must follow a strict schedule with great precision. For example, in my city, the bus route from the southern bus station to the northern bus station takes one hour according to the schedule, and the bus leaves the station every fifteen minutes. This timetable, however, will have some disruptions depending on the traffic. Traffic jams can cause delays of up to half an hour and many
individuals waste time waiting for the bus since they do not know when it will arrive. Again, the effectiveness of creating a digital route that is constantly updated with the location of each bus is crucial. Users can use digital technology to locate each bus and predict the optimal arrival time for the nearest bus stop based on the distance and traffic conditions. We can sit at home, open a website or application and check when our bus will arrive at the bus stop. Additionally, an electronic board system that updates the travel time of the bus should be installed at each stop so that passengers can decide whether to wait for the bus or choose another mode of transportation to save time.

I believe that with the above technological applications, our local bus system will gain more acceptance and contribute to the sustainable development of the city.

References


The Asia-Europe Meeting (ASEM) is an informal process of dialogue and cooperation bringing together the 27 European Union member states, 3 other European countries, and the European Union with 21 Asian countries and the ASEAN Secretariat. The ASEM dialogue addresses political, economic and cultural issues, with the objective of strengthening the relationship between our two regions, in a spirit of mutual respect and equal partnership.

www.aseminfoboard.org

The Asia-Europe Foundation (ASEF) promotes understanding, strengthens relationships and facilitates cooperation among the people, institutions and organisations of Asia and Europe. ASEF enhances dialogue, enables exchanges and encourages collaboration across the thematic areas of culture, education, governance, economy, sustainable development, public health and media. ASEF is an intergovernmental not-for-profit organisation located in Singapore. Founded in 1997, it is the only institution of the Asia-Europe Meeting (ASEM).

www.asef.org