The Application of Tactical Urbanism in Public Space on COVID-19 Transmission Prevention

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Abstract. Tactical urbanism (TU) is frequently used as an interim or low-cost solution to tackle a design-related problem in public space. As the importance of good-designed public open space for mental health now realized significantly during the pandemic, the need for a tool to keep health protocol followed in public space is imperative. The modification of public spaces is applied in several cases to guide people's behaviour and interaction within public space under health protocol submission. This paper tried to analyse the application of TU to combat COVID-19 transmission on public space by using case study and systematic literature review from applied cases worldwide. The cases are categorized based on the problem identification and interventions conducted on urban design elements. It is found that the application of TU can be assembled into health protocol requirements-driven and accommodation of COVID-19-related policies externalities. The outcome of this paper could be used as an issue-based urban design precedent on COVID-19-related tactical urbanism interventions.

Keywords: Tactical urbanism, issue-based urban design, public space, COVID-19

1. Introduction

The scale of the economic and social impact of COVID-19 in urban life is extensive and unprecedented. At the early stage of the crisis, some governments formed reactive policies to contain the disease spreading rate \cite{1}. While the current number of people infected has not shown an assuring trend, in the name of economic growth, people are forced to proceed into their daily routine in this “new normal” agenda. An exponential escalation of the crisis has forced people to mitigate the immediate effects with temporary, and often improvised solutions \cite{2}. This includes how people behave in public spaces. The implementation of health protocol has forced public space managers to rethink how people's activities should manage accordingly while still maintain their functionality \cite{3}. With the urgency of nature, the solutions often look into the idea of informal, small-scale, incremental, low-cost, and intentionally functional modifications of public space \cite{4}. This tool to draw attention to perceived shortcomings in policy and physical design, to widen the sphere of public engagement, test aspects of a plan early and often, and expedite implementation is called Tactical Urbanism (TU) \cite{5}.

TU has been used widely to facilitate place-making and promote “right to the city” in cities \cite{6}. The approach on planning TU interventions adapted from Design Thinking’s approach of five-step: (1) empathize; (2) define; (3) ideate; (4) prototype, and, (5) test \cite{5}. his approach has proven to be suitable in the case of mitigating COVID-19 impacts on public space. Some examples of TU trying to work on livable city issues that approached with creating more pedestrian-friendly urban spaces in the street, neighborhood, district, and even city-scale \cite{7}. While TU is often related to small-scale-low budget interventions, a city-scale program such as the bike-share system has been conducted in an attempt to modify people’s mobility behavior into more environment-friendly means \cite{8}.

The disruptive impact of COVID-19 on public space can be seen in the case of New York residents’ mobility habits. The ridership decrease of its extensive subway system is mitigated with a bike-sharing system and the
addition of a pop-up bike lane, a temporary bicycle lane to accommodate an increase in bicycle ridership [2]. As the future of the pandemic is still uncertain, a “sense of temporary” still appear to maintain on mitigating its impact on public space. With the TU become more and more used widely, a literature study of recent practice on COVID-19 related interventions must be conducted to learn about the best practice with various context from another experience. This paper trying to inventories of TU cases on COVID-19 around the world to resulting issue-based urban design precedents that can be input on how to address the different issues on TU practice.

2. Methodology

An integrative literature review of TU has previously been conducted to show the relationship between pedestrianization and livability, but the context can be updated with COVID-19 mitigation variables [7]. In this paper, approaches to implementation of health protocol by using TU in many cities’ public space around the world listed and analyzed with the systematic literature review based on sources online, coupled with interpretation about the scope of issues to know the design interventions conveyed and the results that these TU cases have shown. Since there hasn’t been any published article on tactical urbanism related to COVID-19 and TU on ProQuest and Scopus database, data are collected from internet sources using search keywords such as “COVID-19”, “tactical urbanism”, “urban design”, and “public space” with various combination and permutations. A further examination was conducted to evaluate on relevancy to the topics and eliminate duplication of cases.

The case study area is encompassed within diverse parts of the world including Asia, Europe, North America, South America, Australia, and Africa, to cover the different approaches globally and to understand how different contexts like social, economic, and culture, can drive into different design interventions. The timeframe of the project started also added to the systematic literature review to know whether these projects held in early or recent COVID-19 situation.

From 29 cases study examined, the issues of concern regarding TU on COVID-19 transmission prevention categorized into four issues that occurred regularly: (1) physical distancing; (2) mobility; (3) open space, and; (4) social inclusion. These categories on the particular case are analyzed to know the scope of the design intervention and the reasoning of why this intervention chose. The results of this systematic literature review can be issue-based precedents to implement TU in a different part of the world.

3. Results

Different context of every region has directed to different TU approach in the cases studied. In Asia, physical distancing has become a major issue, while in Europe, the people movement has become the target of many design interventions of TU. In North America, the use of public space has become a major concern of TU. The case study from South America, Africa, and Australia are too limited to be drawn to a conclusion. All these interventions have different objectives which include: (1) keeping people in safe distant in a public area; (2) accommodate a new way of daily commute; (3) improving access to safe and healthy open space on improving mental health
impact on pandemic [9–11]; (4) caring for people who most vulnerable with the pandemic situation [12]. However, the impact of this intervention is still needed to be measured as this is still an open-ended situation.
| No. | Cases                        | Location                      | Time Period | Issue of Concerns                           | Scope of Issues                                      | Results                                      |
|-----|------------------------------|-------------------------------|-------------|---------------------------------------------|-----------------------------------------------------|----------------------------------------------|
| 1   | Pop-up Bike Lane             | Bandung, Indonesia, Asia      | Jul-20      | Mobility - increase on bicycle users        | Addition of new bike lane marking                    | Addition of a new 2.5 km long bike lane     |
| 2   | Salatiga Market              | Salatiga, Indonesia, Asia     | Apr-20      | Physical distancing - safe marketplace      | Physical distancing marking for seller               |                                              |
|     |                              |                               |             |                                             | Alarm to warn operational hour                       |                                              |
| 3   | Tugu Traditional Market      | Bandar Lampung, Indonesia, Asia | May-20  | Physical distancing - safe marketplace      | Physical distancing marking for seller               |                                              |
| 4   | Pop-up Bike Lane             | Jakarta, Indonesia, Asia      | Jun-20      | Mobility - increase on bicycle users        | Addition of new temporary bike lane by cone          | Addition of a new 14 km long bike lane      |
| 5   | Hajj Pilgrimage Tawaf Lane   | Mecca, Saudi Arabia, Asia     | May-20      | Physical distancing - safe pilgrimage ritual | Tawaf lane around Ka'bah                             |                                              |
| 6   | Food for homeless peoples and stranded migrant workers | New Delhi, India, Asia | Mar-20 | Inclusion and Physical distancing - providing food | Marking to put food for homeless peoples and stranded migrant workers | Repurposing parking lot                      |
| 7   | Kalaw Myoma Market           | Kalaw, Myanmar, Asia          | Apr-20      | Physical distancing - safe marketplace      | Physical distance marking for vendor stall           |                                              |
| 8   | Physical-distancing grids, Piazza Giotto | Vicchio, Italy, Europe | May-20 | Physical distancing                         | Physical distancing marking as an artwork            |                                              |
| 9   | Gastro Safe Zone             | Brno, Czech Rep., Europe      | Mar-20      | Physical distancing - safe outdoor dining   | Dining area marking Street furniture for dining      |                                              |
| 10  | Public Art - Murals          | London, England, Europe       |             | Physical distancing                         | Physical distancing marking as an artwork            |                                              |
| 11  | Physical distancing pavement markings on Broad Street | Birmingha m, UK, Europe | May-20 | Mobility and Physical distancing - safe pedestrian space needed | Sidewalk marking                                    |                                              |
| 12  | Streets of Amsterdam         | Amsterdam, Netherlands, Europe |             | Mobility                                    | Road markings                                       |                                              |
| 13  | Physical-distancing cabins   | Knokke-Heist, Belgium, Europe | May-20 | Open space and Physical distancing - safe sunbathing | Addition of Physically distance sunbathing partition |                                              |
| No. | Cases | Location | Time Period | Issue of Concerns | Scope of Issues | Results |
|-----|-------|----------|-------------|-------------------|----------------|---------|
| 14  | Pop-up Bike Lane | Berlin, Germany, Europe | Apr-20 | Mobility and Physical distancing - safe bicycle lane | Widening of existing bike lane | |
| 15  | Inner city center pedestrian and cyclist priority zone | Brussels, Belgium, Europe | | Mobility - increase on bicycle users and pedestrian | Cars, trans, and buses limited to 20 km/h | Addition of a new 40 km long bike lane |
| 16  | 100 priority “zones” | Bordeaux, France, Europe | | Mobility - lack of appropriate cycling infrastructure | Addition of new temporary bike lane | Addition of a new 78 km long bike lane |
| 17  | Temporary park in the city’s Arts Bishop District | Dallas, USA, North America | May-20 | Open space - increase on area needed | Turning parking space into temporary park (parklet) | |
| 18  | Play NYC | New York, USA, North America | | Open space - safe playground area | Street furniture as hands-free play for children | |
| 19  | Lifts Up Local | Tampa, USA, North America | May-20 | Physical distancing - safe dining space | Permissions to extend temporary dining area into sidewalk and parking lot area | |
| 20  | StreetEaters Program | Charlotte, USA, North America | Apr-20 | Physical distancing - safe dining space | Permissions to extend temporary dining area into sidewalk and parking lot area | |
| 21  | Repurposes a Lane on a Beachfront State Road | Fort Lauderdale, USA, North America | May-20 | Mobility and Physical distancing - increase on pedestrian and bikers | Motor lane repurposing into more pedestrian and bicycle area | |
| 22  | Homeless shelter with Physical distancing markers | Las Vegas, USA, North America | Apr-20 | Inclusion - providing shelter | Repurposing parking lot into homeless shelter Physical distancing marking | |
| 23  | Human parking spots' San | San Francisco, USA, North America | May-20 | Open space and Physical distancing - safe open space | Addition of Physical-distance guidance markers | |
| No. | Cases                                                                 | Location          | Time Period | Issue of Concerns                                                                 | Scope of Issues                                                                 | Results                                                                 |
|-----|----------------------------------------------------------------------|-------------------|-------------|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------------------------------|
| 24  | Physical distancing squares at Republic Square park                  | Francisco’s      | Jul-20      | Open space and Physical distancing - safe open space                             | Addition of Physical-distance guidance markers                                  |                                                                        |
| 25  | Pop-up Bike Lane                                                    | Austin            | Jun-20      | Mobility - increase on bicycle users                                            | Repurposing roads into pedestrian and cyclist zone                             | Temporarily open 100km of roads to pedestrians and cyclists            |
| 26  | Pop-up Bike Lane                                                    | New York          | Jun-20      | Mobility - increase on bicycle users                                            | Addition of new temporary bike route by cone                                    | Addition of a new 76 km long bike lane                                 |
| 27  | Sydney’s new pop-up cycleways                                       | Bogota            | Jun-20      | Mobility                                                                         | Addition of new bike route                                                      |                                                                                                                    |
| 28  | Hamar Weyne Market                                                  | Sydney            | Jul-20      | Physical distancing - safe marketplace                                            | Physical distancing marking for vendor stall and buyer                          |                                                                        |
| 29  | Graffiti Arts                                                       | Nairobi           | Jul-20      | Inclusion - public art and information                                           | Graffiti in slum area                                                           |                                                                        |
3.1 Asia

Issues of concerns: With its large population, keeping people distanced in public space become a major challenge in many Asian countries. This tends to happen in an outdoor market where this type of economic activity becomes the signature of Asian quasi-informal trading. With the people's tendency to avoid public transport, Bandung and Jakarta, Indonesia trying to manage the mode-shifting of workers' commute. Caring for marginal also becomes the motivation to conduct TU in countries where poverty still becomes an issue like India.

Scope of issues: To implement physical distancing, some traditional market in Indonesia and Myanmar expanding their vendor area into the street. This because the space needed per vendor becomes expanding with temporary paint marking of designated stalls area. These TU interventions are supported by other policies such as road closure at a certain time of the day and the installment of alarm to warn operational time. The religious aspect of Asians, especially in Moslem country, which heavily affected is the Hajj pilgrimage. This urban scale religious event is now limited to the locals with physical distancing arrangements such as tawaf lane in Ka’bah. With a decrease of mobility in lockdown time, repurposing automobile infrastructure has become one of TU interventions. A parking lot in New Delhi converted into a place for feeding homeless and stranded people with paint marking to put and pick-up food. A transportation mode shifting was also conducted in addition to the pop-up bike lane and addition of bike marking to accommodate the increasing number of the biker in commuting and repurposing vacant road lane.
Figure 3. Design interventions of TU in Asia.

3.2 Europe

Issues of concerns: European cities have historically been developed as pedestrian-oriented cities with extensive public transport networks. Fear and precaution of COVID-19 transmission have become a challenge in public transportation use. This caused an increase in the shifting of mobility means to bicycles to become more popular in several major European cities.

With its location in the Northern Hemisphere, the need for using open space, essentially in the summer, has caused the issue of physical distancing to become a concern in European cities' public open spaces. These reason has led to some example of TU with mobility and physical distancing issue to be found in Europe.

Scope of issues: Cities that are already using bicycles as a means of transportation massively, such as Copenhagen and Amsterdam, are making adjustments to their bicycle paths to make them more in line with health protocols. Meanwhile, Berlin and Bordeaux accommodate the mode shift from public transportation to bicycles by providing additional infrastructure in the form of a pop-up bike lane. Pop-up bike lanes regularly follow with policy support in traffic management, such as the Brussels case where the addition of a new bike route accompanied with the lowering of the maximum speed limit for automobiles to create a safer environment for pedestrians and cyclists. In the cases in Birmingham and Amsterdam, protection of pedestrians in applying physical distancing is carried out by providing paint markings on the sidewalks that regulate pedestrian directions and lanes so they are not too close and intersect.

The physical distancing aspect of European cities is carried out in public open spaces by integrating them with public art. This TU intervention allows ad-hoc objectives in handling COVID-19 to remain in line with TU's original goal of improving the quality of public spaces. This kind of intervention can also help to combat the psychological stress related to the adjustment to a new normal way of life of the pandemic time [10].
3.3 America

**Issues of concerns**: The majority of Americans are accustomed to using private vehicles and are less affected by COVID-19 in choosing their mode of travel. The exception is some cities that have a high level of public transportation use, such as New York, where the extension of bicycle lanes is an issue in implementing TU in terms of mobility. In South America, Bogota, Colombia is a leading example of implementing TU for bicycle lanes.

The issue that most people concern about from the TU example in the Americas is the need to use safe open spaces to address psychological needs due to the effects of quarantine. Meanwhile, the issue of physical distancing became a concern when TU was used to accommodate the needs of the reopening of the business sector.

**Scope of issues**: The relation between quality public open spaces and the mental health of city dwellers is known and its importance is felt more in the situation of the COVID-19 pandemic [9,11]. The need to maintain distance makes the need for open space per capita even greater. Several examples of TU in America seek to increase open spaces area by utilizing the empty spaces that arise as a result of stopping activities. An example of this can be seen in Dallas where the currently empty on-street parking space has been converted into temporary additional open space in the form of "parklets" by adding amenities on a non-permanent basis. Another interesting practice was presented in New York where a street closed due to quarantine was used as a children's playroom by providing contactless play facilities. TU intervention that is quite often found is setting the sunbathing area on the grass by providing markings called "human parking spaces".

The reduced intensity of motorized vehicles in areas with more stringent quarantine has resulted in empty spaces in some vehicle lanes. Fort Lauderdale and New York take advantage of this newly available space by turning it into pop-up bicycle lanes and pedestrian areas. This TU intervention allows pedestrians and cyclists to have more space to practice physical distancing while encouraging the use of non-motorized transportation modes.

Good collaboration between design interventions at TU and policy support can be seen in the physical distancing aspect in accommodating the reopening of cafes and restaurants in the cities of Tampa and Charlotte, United States. To maintain physical distancing, the dining area is expanded to the sidewalk and part of the road. This is reinforced by the policy to close these roads at certain times to allow the use of road space for the expansion of business areas and modification of business hours. In pre-COVID conditions, TU interventions of this kind are often carried out with different goals, namely to improve the quality of road space and make public spaces more vibrant with pedestrian-oriented activities.
3.4 Africa and Australia

**Issues of concerns:** In this paper, the practice of TU in the continents of Africa and Australia has not been widely obtained so that it cannot be concluded about the dominant issue of concerns in the two regions. However, from several examples obtained, the context of developing countries in Africa is similar to Asia, especially in terms of the informal economy. In the case of TU, the issue of physical distancing in traditional markets is also applied to the case example in Africa. Another example of TU in Africa is the expansion of bicycle lanes. The motivation for this is similar to other cities in Europe and America that have implemented similar strategies.

**Scope of issues:** In the example of TU in a traditional market in Mogadishu, Somalia, the intervention carried out was similar to that of traditional markets in Asia, namely the provision of markings that limit the distance between sellers and buyers. While a similar example of TU interventions in Asia shows policy support for the use of urban space by local governments, the Mogadishu case is more about supervision by placing personnel in charge of maintaining order.

The condition of densely populated slums and still far from access to sanitary facilities in Africa makes the area prone to the spread of COVID-19. A local community in Nairobi, Kenya assists public education to promote health protocol by making graffiti in public spaces that are informative and artistic.

Sidney, Australia diverted some of the road segments that had reduced their usage intensity to become pop-up bike lanes. This bicycle path is made with a sense of temporary by placing traffic cones along the route. Policy support in traffic regulation is provided by lowering the maximum speed limit on the road section where the pop-up bike lane is located so that it becomes safer for cyclists.
4. Conclusion

TU has become a widely chosen strategy in modifying people's behavior in public spaces during pandemics. The design intervention characteristics of the TU which are low cost, temporal, and accommodate a bottom-up approach are very suitable for the urgent and large-scale circumstances of the COVID-19 pandemic. The issues to be tackled could be identified as: (1) to apply physical distancing; (2) to increase access to safe open space; (3) to adapt with a new way of movement; (4) to care for the marginal group of people (social inclusion).

In developing countries, TU design interventions mainly focus on preventing crowding in public spaces and mitigating social impact from those who are vulnerable to lockdown situations. Developed countries generally have high mobility so that aspects of movement related to economic activities are a concern in TU design interventions.

To improve the elaboration of the systematic literature review based on the case study in this paper, more data on TU that has been conducted in various regions are required. When more data is obtained, an analysis using Qualitative Data Analysis Software can be done to provide more comprehensive results with a method such as clustering data analysis. However, the impact of tactical urbanism application on slowing down COVID-19 transmission in the area is yet to be measured.

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