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THE APPROPRIATION OF SIDEWALKS FOR E-SCOOTER; FROM THE URBAN BUILT ENVIRONMENT PERSPECTIVE

ABSTRACT

One of the most popular types of micromobility that has rapidly grown in Europe for some recent years is an electric scooter (e-scooter). An emerging phenomenon occurred in many places, including Stockholm. Regardless of some positive claims about e-scooters in urban areas, e-scooters also contribute to new urban problems. Some of the problems occurred in the sidewalk environment, and those issues are widely discussed among pedestrians. Therefore, this study will investigate how e-scooters affect the pedestrian around Stockholm inner-city based on the experience of various groups of people who use sidewalk environments, including pedestrian and e-scooter users. The finding showed that various perspectives occurred while experiencing e-scooters in the sidewalk environment. Some of the experiences also affected their decisions to walk on the sidewalks. This study expected to add some understanding of how humans' perspective on perceiving new materials in their built environment could add value to the future planning and design process for the sidewalk environment.

Keywords: Micromobility; E-scooter; Sidewalk Environment; Human Experience

INTRODUCTION

A significant number of people move to urban areas to get a better quality of life. It is predicted that 66% of the human population will inhabit urban areas by 2050 (United Nations, 2014). Because of the continuous population growth, urban areas often suffer from various problems, including increased poverty rates, greenhouse gas emissions, and traffic congestion, to name a few. Alongside the increased health risk and pollution, traffic congestion is caused by people's dependence on cars (Davies, 2015). Many studies focused on solving traffic congestion, such as linking transport policy to land use planning (Wen et al., 2019) and optimizing traffic management systems by identifying potential hazards (de Souza et al., 2017). In recent years, the act of substituting cars with new forms of transportation has been in favor. Included in this category is the micromobility concept.

Micromobility is a form of transportation that accommodates first/last-mile mobility in an urban area (ITDP, 2018). It came in various forms, including bike-sharing service, motorized scooter, and electric scooter (e-scooter). E-scooter is a two-wheeled scooter that is propelled by a motor. The vehicle was made famous when the shared e-scooter concept was first introduced in Southern California in 2017 (Hall, 2017). Since then, many have claimed the benefits of e-scooter, such as reducing urban congestion & emissions, excellent options for a short trip, and reducing problems caused by a short-distance trip while using a bigger form of transportation (e.g., car) (ITDP, 2018). As of September 2017, this transportation mode has become popular, and the e-scooter sharing services reached 626 cities in 53 countries around the world (EY, 2019), including Stockholm, Paris, and Singapore.

However, despite the numerous benefits of shared e-scooter, discussions regarding its problem have also been occurring. There were reports of e-scooter related accidents in London, Paris, and Malmö, even with casualties in some cases (VTI Cykelcentrum, 2020; Aftonbladet, 2019; The Guardian, 2019). There are also regulation issues in which governments are inconsistent with the implementations and withdrawals of various policies regarding e-scooter usage. For instance, in 2019, Paris stated that they would permanently ban e-scooter in the same year after some accidents occurred in the city streets (CNN, 2019). Yet a month later, e-scooter is welcomed again in the city, albeit with some limitations related to speed and user behaviour (BBC, 2019).

The government of London, United Kingdom, faced similar issues but took a different approach to the regulation. They used the law regarding mechanically propelled vehicles which cover elements such as pavement, paths, and public paths as the basis to ban e-scooter (House of Commons Library, 2019), however, they are willing to commence a new attempt on regularizing the transportation mode in 2020. The project, handled by the Department for Transport of the United Kingdom, began with a pilot evaluating the possibility of integrating e-scooter in the city's transportation methods. The trial began in June 2021 for twelve months, applicable to areas around London (The Independent, 2021). The trial is expected to provide data and relevant insights on whether e-scooters are able to strengthen the greener and healthier future of London.

Regarding the greener and healthier environment aspect, e-scooter have also been scrutinized for their claim as sustainable transportation. A life-cycle assessment on e-scooter (Hollingsworth et al., 2019) highlighted several issues. For instance, an e-scooter company stated that the average lifespan of their vehicle is around 12 months. When upgraded with new battery technology, the lifetime is extended to 24 months. Other e-scooter companies claimed that their product has helped reduce emissions up to 71% during operation in Paris (EY, 2019). However, research on e-scooter in Brussel showed that the general lifespan of e-scooters in the city is only seven and a half months or approximately 60% of the initial claim. The short lifespan is also caused by external factors, including poor infrastructure, vandalism, and irresponsible user behaviour (Moreau et al.,2020).

These external factors are related to the question of where e-scooters should operate. There has been an attempt to classify e-scooter in the same category as bicycles and thus allowing them to utilize existing bicycle lanes (Latinopoulos et al., 2021). Others, including Stockholm, treated e-scooter equal to pedestrians and allowed riders to utilize sidewalks (Transportstyrelsen, 2021). However, according to The Swedish Transport Agency (Transportstyrelsen), the permitted maximum speed is 20 mph: similar to a bicycle. The regulation did not consider speed differences between e-scooter and pedestrians, where the latter's average speed is just around 3-4 mph. Thus, combining the two modes of transportation in the same infrastructure is problematic.

The allocation of sidewalks for e-scooter considers only the perspective of the rider's speed. However, discourses on e-scooter topics have highlighted the importance of preparing the urban infrastructure and regulation before applying the shared e-scooter concept. Therefore, this paper proposes a comprehensive overview of the sidewalks usage to accommodate e-scooter as one type of micromobility, not only from the riders' perspective but also the pedestrians.

METHODS

This study provides a discourse regarding the use of sidewalks to accommodate e-scooter using literature review, interviews, and field observation methods. The research location is limited to two sidewalks in the inner-city area of Stockholm, which are Odengatan, Vasastaden and Hornsgatan, Södermalm. On Odengatan, which includes Karlbergsvägen, the observation took place starting from the Odenplan station until the intersection of Odengatan and Sveavägen (Figure

1). The length of the observed street is approximately 450 meters. While on Hornsgatan, the observation was held on the 943 meters area alongside Hornsgatan street. Starting from the entrance to Hornstull Station, which is at the intersection between Hornsgatan and Långholmsgatan, until the entrance of the Zinkensdamm Station located at the intersection between Hornsgatan and Ringvägen (Figure 2).

Figure 1: Observation area on Odengatan (source: Google Earth)

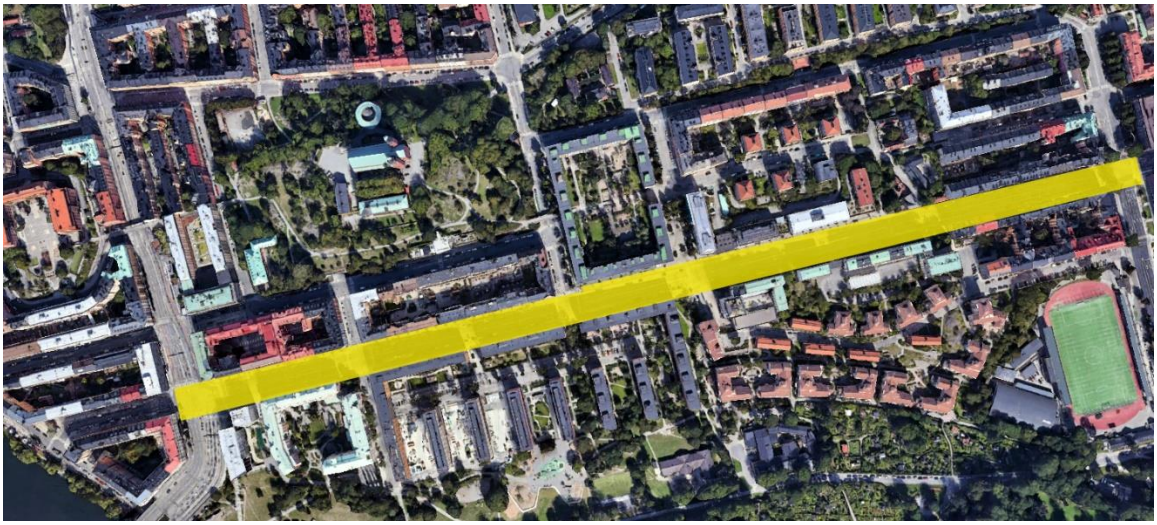

Figure 2: Observation area on Hornsgatan (source: Google Earth)

The review was conducted towards media reports, consultant reports, and academic journals of keywords: micromobility, e-scooter accident, e-scooter and sidewalk, e-scooter and pedestrian, and regulations. The US and European countries were used as context. The literature combination provides a complementary analysis between ongoing phenomena – thus, an update to the current situation is relevant. The study interviewed 10 street users, which focused on e-scooter users, pedestrians, and related experts, including architects from a local architectural office in Stockholm and The Swedish Pedestrian Association (Fötgängarnas Förening). The selected interviewees are respondents who have experience not only walking and/or using e-scooters, but also familiarity with the selected streets before and after the e-scooter phenomenon. Due to the pandemic situation, which occurred in Sweden since March 2020, most of the interviews were conducted online. The initial plan of the interview of a go-along interview, which opens opportunities for the respondents to see, hear, and sense the immediate environment (Burns at al., 2019), changed due to the COVID-19 outbreak that occurred in Sweden on March 2020. However, the respondents still had opportunities on understanding the street and e-scooter conditions through some photographs that showed while conducting the video interviews.

RESULTS AND DISCUSSION

Why is maintaining the quality of public spaces crucial?

Looking back towards the concept of public spaces using the historical lens, public spaces always play a crucial role in the city system. In the first development of human settlements, public spaces act as a location where private and public territories are mediated within the area of the human settlement. The discourses of public spaces vary from their physical characteristics to their political, social and economic activities (Madanipour, 2010). In modern cities, the definition of public spaces has expanded into a form of urban society to support everyday sociability (Madanipour, 2010).

In architecture, urban design, landscape architecture, and planning context, public space is mainly studied based on physical spaces and the relationship between people and space (Mehta, 2014). Public spaces varied in their form as spaces that could generate social and cultural intersections (Movahed et al., 2012). Starting from the larger size, such as the plaza, which could be the center

of the human settlement in this form. On the smallest scale, public spaces are simply translated as a space where people could rest and socialize or have a visual pause in the middle of urban street flows (Carmona, 2010). Public spaces accommodate functional, social, and leisure activities, including travelling, shopping, playing, meeting, and interacting with others (Mehta, 2014), and bind a community (Carr et al., 1992). Public space could also provide reasonable access and linkage alongside a sense of comfort and image, viable uses and activities, and intense sociability to strengthen public life (Project for Public Spaces, 2018).

In the current urban development context, criticism towards public space mainly discusses the shifting in its meaning from a place with value and sense to a more abstract and impersonal space (Madanipour, 2010). The friction in its meaning could threaten social activities and contribute to strengthening the concept of living cities. Meanwhile, as Gehl (2011) stated, the fundamental requirement of a living city is more space where people could interact with each other; additionally, having a living city is better than having a lifeless one. Therefore, maintaining and improving the public spaces' quality and physical conditions is essential in keeping cities alive in various places. It is proven that people tend to spend more time in public spaces by also doing social activities if the quality of the public spaces is sufficient.

In a sense, the sidewalk is also a public space. Sidewalks are considered a people-oriented space (Blomley, 2011) that opens up opportunities for pedestrians to hold social interactions as an essential aspect of everyday sociability (Madanipour, 2010). Even further, pedestrians also tend to conduct higher rates of walking activities if the quality of the sidewalk environment is adequate. Thus, regarding using sidewalks to accommodate e-scooter, it is important to analyze how sidewalks can benefit e-scooter without depriving the comfort of existing users: the pedestrians.

Sidewalk and how it is affected by e-scooter

In some parts of the world, especially in the northern European cities, walking is a common form of transportation. The walking culture affected the cities' urban structure to be compact and equipped with sufficient walking infrastructures (Choi, 2012; Lindelöw, 2013). Research has also developed from initially referring to pedestrians as a subject whose travel methods were analyzed into a mode on its own and sidewalks are included as related infrastructures. Despite its

involvement in the walking transportation mode, sidewalks are often deprived of their ability to be a socially productive place, even though the space is a people-oriented one. Social interaction and engagement in sidewalks could produce enjoyable civic spheres that improve human well-being (Blomley, 2011).

In the current design practice, there is an importance to putting human dimension while designing the built environment under the context of the interplay between humans and surrounding objects (Gehl, 2010). However, many still put aside walking as a form of meaning-making, thus unable to provide spaces that are sufficient in size, free of obstacles, effortless to navigate, and following direct routes (Wunderlich, 2008). The sidewalk designs must accommodate the needs of various types of users by acknowledging that simple physical barriers could turn into obstacles for vulnerable groups such as people with disabilities, people with strollers, and the elderly (Blomley, 2011, Kirschbaum et al., 2001). If sidewalks have too many obstacles, it will affect the pedestrian's willingness to walk. Yet, the declining walking rate will decrease the quality of sense and community (Alfonzo, 2015) and affect the city's liveability. On the other hand, a successful sidewalk is defined as a situation where the static and the moving elements do not disturb each other – in this case, where the static objects (e.g. e-scooters) do not disturb the pedestrian traffic (Blomley, 2011).

Regarding the e-scooter phenomena, many have complained that e-scooter have impacted other sidewalk users, making way for new studies to explore the phenomena. For example, a study carried out in San Jose, California, showed that most parked e-scooters impact pedestrian accessibility (Fang et al., 2018). How and where an e-scooter parked caused different effects to the pedestrians. The research suggested that the issue is managerial. Thus, a clear regulation is required to minimize the clash between different types of transportation (Fang et al., 2018), which utilize the same space. Another research focused on the issue regarding running scooters, particularly the safety aspect, using both e-scooter users' and pedestrians' perspectives as comparison materials. The findings showed that user behaviour plays a big role in producing either a well-ordered sidewalk environment or a chaotic one (James et al., 2019). In conclusion, both studies suggested a comprehensive look at sidewalk accessibility and safety to evaluate how e-scooters impacted sidewalk users fully. There are still many potential ways to explore the sidewalk

users' perspectives and experiences through an empirical study that could be insightfully used regarding better management of e-scooters and another type of micromobility that possibly occurs in the future.

Improving sidewalk environments from an urban design perspective and human experience

Based on a conception that the built environment is an inseparable aspect of the human dimension, it is important to not only design sidewalk environments based on the design standard. Studies covering a broad topic of architecture and urban design have dwelled on topics of how human perspective could be used in understanding and improving the built environment (e.g., Appleyard & Lintell, 1972). Not only limited to those specific fields, study under the branch of transportation planning and urban planning also begin to consider human factors in the built environment planning, specifically in sidewalk planning and design. Additionally, the management of public spaces is also an essential aspect that could not be separated from the provision of a good design (Carmona, 2010). One guideline released by the National Association of City Transportation Officials (NACTO) explained how city planners and designers could divide sidewalks to minimize disruption in each segment into four zones: frontage, pedestrian through, street furniture/curb, and enhancement zones. Each zone has specifically accommodated specific functions while also setting a minimum width to maximize accessibility whilst still having street furniture (NACTO, 2019).

On the other hand, the human experience aspect, specifically on how pedestrians perceive various external stimuli and how it affects people's willingness to walk, is also important. Placing the human as the priority in street development has meant that cities are urged to balance the need to effectively allow pedestrian circulation with the goal to create safe, active, and interesting public spaces that attract people to use it (Active Design, 2013). In some interviews, both pedestrians and e-scooter acknowledged this issue. One interviewee mentioned how some conditions of parked e-scooters caused various issues, either they impeded the walking flow or disturbed the visual aspect of the walking environment.


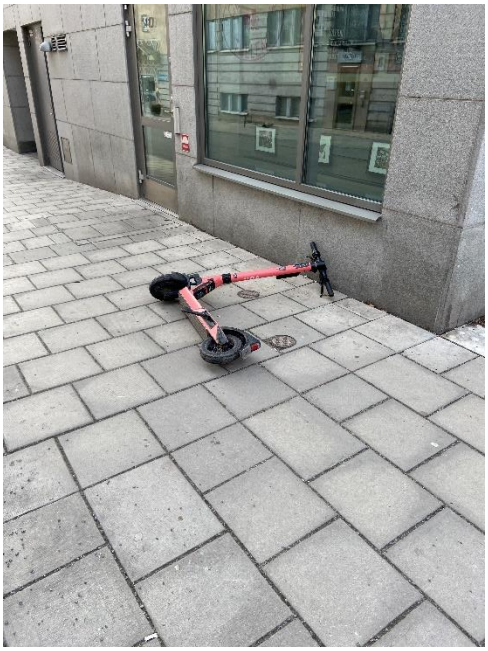

Figure 3, 4: E-scooter that laying on the sidewalk and impeded pedestrian access (left) and e-scooter that caused visual disturbance (right) on the Hornsgatan street (source: personal image)

> *"Hhm… ok then this one where an e-scooter is laying in the middle of the sidewalk, I think it is not nice. It makes the street looks like rubbish" (Interviewee 1)*

> *"Then for people with a stroller, or some kind that has a mobility impairment, in a wheelchair or something. That might be hard to navigate while it [the e-scooter] is in the middle of the sidewalk or the pedestrian lane…." (Interviewee 2)*

Furthermore, safety issues were one aspect frequently raised amongst e-scooter's debates. Pedestrians tend to feel unsafe towards the moving e-scooter, especially if the vehicle moved in the same place as the pedestrian. In one conversation, a pedestrian admits that he tends to avoid walking on the sidewalk after the presence of an e-scooter on it.

> *"I have never been scared in my whole life to walk on the sidewalk but now with all those scooters and bicycles too, I am afraid…." (Interviewee 3)*

Additionally, an interviewee shared her experience of encountering accidents on the sidewalk. Although she declared herself as a pro-e-scooter, she thought that riding e-scooters in the same space with pedestrians could be dangerous for both sidewalks' user types.

> *"I came across when I was picking up my daughter from preschool, and I saw a man had been hit by one of them [e-scooter rider], and they were laying on the ground. I think he had a head injury, and it did not look very well so, yeah, they should be on the road (not in the sidewalk)" (interviewee P4)*

On the other hand, e-scooter users interviewed in this study also understand that many protests were widely raised concerning the reckless e-scooter users' behavior, both caused by the parking and the moving one. Therefore, they stated themselves as responsible users and minimise conflicts with pedestrians (see figure 5).

> *"I parked my scooter in the bike rack because the building provides it. And I think it is not good to put it in the middle of the street, right?" (Interviewee P7)*

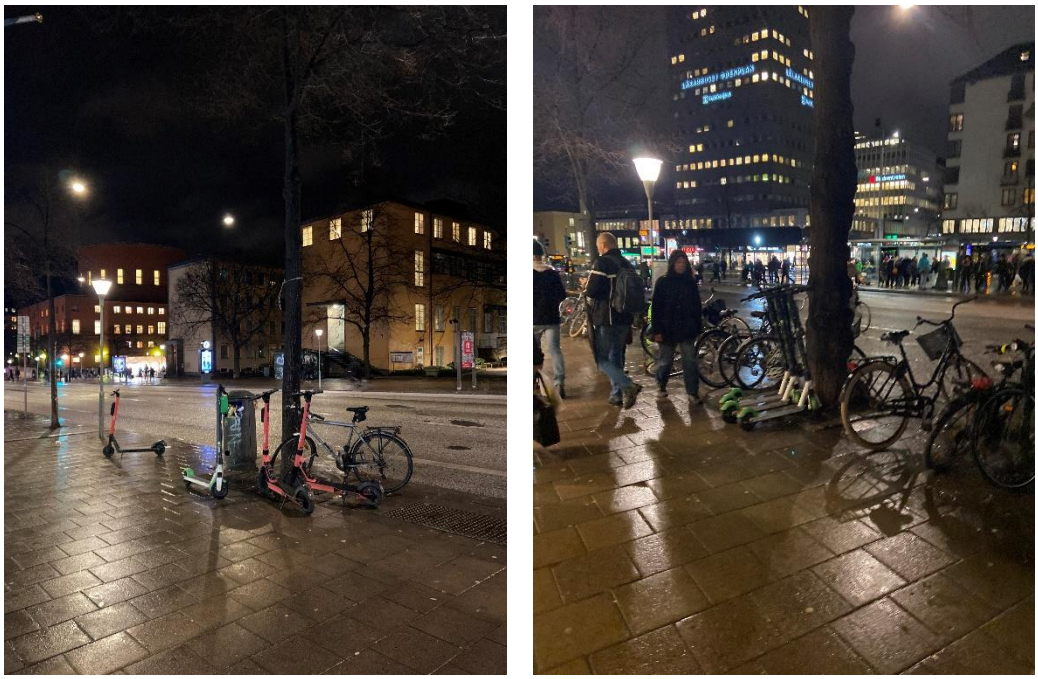

Figure 5: E-scooters that parked on the bike rack around Odengatan (source: personal image)

These interviews indicate that pedestrians' comfort and safety felt threatened if e-scooters were allowed to utilize the sidewalks. Henceforth the banning policy should the impacts are not adequately addressed. However, there was also a probability of utilizing other currently existing features (i.e. bike rack) to optimize sidewalks usage to accommodate both pedestrians and e-scooter users.

CONCLUSION

The review implies a few considerable aspects in incorporating e-scooter usage into sidewalks: safety, comfort, management, and regulation. The safety and comfort aspects are explicable by answering how e-scooter uses affect pedestrians and vice versa; answers may already be available in the form of the existing features of the sidewalks. Whichever parts are considered proper should always refer to the notion of walkability in sidewalks as its primary purpose and maintaining a livable city as its defining characteristic as a public space. Using urban design and planning approach is one of the suitable ways to analyze this topic further.

Secondly, the management and regulation aspects should address the issue of vandalism potentially done by irresponsible e-scooter users. It is essential to regulate every activity involved in e-scooter usage, including moving, parking, and registering users and vehicles. Likewise, it is also crucial to manage the shared e-scooter, which may apply to other micromobility transportation modes in the future. The current systems might be lacking in the post-establishment monitoring phase. E-scooter should not be viewed as the pinnacle form of micromobility to solve urban traffic issues. Instead, constant evaluation should be held towards the sustainability, efficiency, and effectiveness claims of all types of micromobility, including e-scooter.

In the end, the review has highlighted the importance of acknowledging walking as a mode of transportation. It thus should be considered equal with other modes, such as e-scooter, when occupying the same infrastructure, the sidewalks. Sidewalks should not be denied their inherent quality in providing a space for pleasurable social interactions and walking activities to all users without exception.

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