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Activity Participation and Perceptions on Informal Public Transport and Bus Rapid Transit in Dar es Salaam

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Abstract

This paper seeks to understand participation in out-of-home activities by inhabitants in Dar es Salaam, and their perceptions toward informal public transport (IPT) and bus rapid transit (BRT) in supporting these activities. Without fixed schedules, IPT (e.g., minibuses, motorcycles, and tricycles) is used as a means of transport for different trips. However, IPT is burdened by poor roads, traffic congestion, and high transport demand. Many developing cities are seeking to replace IPT with formal BRT lines. However, little is known in relation to the ability of IPT and BRT to support out-of-home activity participation of the inhabitants. This paper reports on a study in Dar es Salaam exploring the relative contribution of each type of service. The study took place before the opening of BRT, and encompasses focus group discussions, participatory geographical information systems, and questionnaires carried out in two study zones: one close to a BRT corridor and the other in a peri-urban location. The findings show that IPT was used to support participation in daily activities like work, education, shopping, and social matters; and was perceived to be flexible in providing access to both high and low density unplanned settlements. The BRT was viewed to benefit specific groups of people, especially individuals working in permanent offices in and around the city center, particularly professional workers. This paper sheds light on how the two systems were perceived by the local people and can inform policy makers about possible improvements in public transport systems to support activity participation of their inhabitants.

Public transport (PT) is a core factor for improving the livelihoods of many people in developing cities (*1*, *2*) as it offers an opportunity for individuals to participate in out-of-home activities such as work, shopping, education, and social matters (*1*, *3*, *4*). These activities are spatially distributed—it is necessary to travel away from individuals' home locations to access employment or services. However, in many places, PT has been facing critical challenges that reduce its ability to support out-of-home activity participation of inhabitants, including poor access to bus services and lack of travel alternatives as well as high transport costs (*5–10*). Low income individuals with disabilities, elderly people, pregnant women, and school children are suffering limited travel options, and difficulties in accessing basic needs and opportunities located far from their neighborhoods. Likewise, individuals residing in peri-urban areas without access to a private car experience high travel costs as they commute longer distances in their day to-day-activities. In East African cities like Kampala, Nairobi, and Dar es Salaam, few individuals own a private car, and the majority of low income individuals rely on informal public transport (IPT). The use of IPT is also associated with chronic congestion, traffic related accidents, lengthy travel time, and social costs. On the other hand, there is a lack of facilities for non-motorized transport that would make walking and cycling attractive and safer.

To overcome these transport challenges, the Tanzanian government has decided to implement a bus rapid transit (BRT) system, to offer affordable and efficient mobility for the urban population (ability to make necessary journeys to work, school, health, or other social services, etc.), leading to a better quality of life

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(*11*). BRT systems have been shown to be a popular solution for urban PT problems (*12–14*). In African cities, for example, Lagos, Cape Town, Dar es Salaam, and Kampala, BRT systems are expected to revive the image of PT through a modern system that utilizes high quality buses and with a high capacity of passengers per trip (*15–17*).

Therefore, the study focuses on the current use of, and perceptions toward, IPT services to support out-of-home activity participation of the inhabitants of Dar es Salaam; as well as their opinions/views toward the planned Dar es Salaam Rapid Transit (DART) system in supporting their activity participation. This study took place before the opening of the DART service to understand people's views about the new system before making use of it. Based on this, it will also be possible to see in a follow-up study whether these perceptions will change over time, after implementation of the DART system.

Literature Review

Across the Global South, the cost of commuting (in relation to time and money) is extremely high, reducing the ability of individuals to access their desired destinations and important services, which is the fundamental goal of transport systems (*18–20*). In transport, accessibility has been discussed and evaluated from different perspectives (*6, 18, 20–22*). Golub and Martens (*22*) considered the accessibility impacts of transportation investments from an equity perspective, while Lucas and Porter (*2*) proposed an evaluation framework of social exclusion and accessibility. A review of the existing literature showed that differences in accessibility appear to exclude some individuals from out-of-home activity participation (*21–23*). For instance, some individuals in peri-urban areas (non-car users, elderly, disabled) can be more vulnerable to not accessing destinations far from their home if PT is not available, and in an affordable way (*2*, *21*, *23*). In most cases, low income individuals travel in difficult conditions because of limited PT connectivity (*2*, *21*). Thus, the use of IPT among low income individuals is the only option available for them, yet it is constrained by heavy congestion, lack of safety and security, and low quality services (*5*, *23*). Today, most governments in Africa are turning to BRT implementation as the main solution for existing mobility difficulties (*12*).

In Dar es Salaam (DES), one of the fastest growing cities in Africa, more than 65% of the population depends on PT provided by IPT modes (i.e., minibuses [*daladala*], motorcycles, and tricycles) for their mobility needs. DES is projected to have 6.8 million inhabitants by 2030, who will generate 9 million trips per day (*5*, *7*). As a monocentric city, existing PT is constrained by inadequate road connectivity, long waiting times, poor local road conditions (unpaved), and extreme traffic congestion on major urban roads, impeding an undisturbed flow of buses. Besides, PT services are mainly concentrated along the major roads and most profitable routes, with little penetration to the neighborhoods that are far away from the major roads. Therefore, commuting in peri-urban areas (i.e., newly urbanized zones at the fringes of cities) and in remote high density settlements is becoming difficult, especially for low income individuals who entirely depend on PT (*24–26*). About 75% of the inhabitants of DES live in such high density unplanned settlements, which are home to a mix of high, middle and low income households (*27*, *28*). The majority of the residents in these settlements are low income self-employed, and their income sources are mainly from commercial or micro enterprises like construction, carpentry, street vending, and urban farming.

The city land use planning has not yet located social amenities in the neighborhoods of these residential areas (*28*), which leads to an increase of both distances and motorized trips to the central business district (CBD) where most social services (e.g., public offices, retail, markets, and referral hospitals) are located (*24*, *29*, *30*). As reliable PT to support the travel activities of many inhabitants is lacking, IPT services, mainly in the form of minibuses, were introduced by private, often small, entrepreneurs in the 1980s (*25*, *31*, *32*). The existence of IPT was initially considered as a temporary condition, but for several reasons—including lack of public funds, rapid and uncontrolled urban sprawl, and the complexity and magnitude of the transport problems in the city—IPT services are expected to continue operating for a long time (*33–35*). IPT is an unorganized system operating without fixed schedules and customized to meet passengers' travel demand (e.g., passengers can be picked up and dropped anywhere). Informal minibuses, so-called *daladala*, with a carrying capacity of between 25 and 34 passengers, do have specific routes to operate, but in most cases they operate only on the most profitable routes with many passengers (*36*). In recent years, besides these *daladala*, other IPT modes like motorcycles (*boda-boda*) and tricycles (*bajaji*) have emerged in different parts of the city, attempting to offer alternative solutions to the growing transport challenges of inhabitants, including areas not covered by *daladala* bus services. Motorcycles and tricycles, with a carrying capacity ranging from one to four passengers, are gaining popularity because of their ability to operate under poor road conditions. They operate by and large as (shared) taxis and are thus not limited to a particular route (or destination).

In DES, the planned BRT system (with schedules, high capacity buses, and dedicated lanes) has been named Dar es Salaam Rapid Transit (DART). The existing plan in DES shows that the DART is a long-term plan PT solution, which will include six phases of

implementation via a 130 km dedicated lane. The first phase of DART (Figure 1) consists of 20.9 km along Morogoro trunk road from the CBD in a westerly direction (to the Kimara area), and started operating in May 2016. However, little is known about the role of the implementation of this DART system in supporting the out-of-home activity participation of individuals in DES, or about the role of IPT in supporting their activity participation. Three specific studies: Rizzo's "Political Economy of an Urban Mega Project" (*37*), Madinda and Mfinanga's "Analysis of Minibus Transport. Operational Problems in Dar es Salaam" (*7*), and Ka'bange et al., "Paradoxes of Establishing Mass Rapid Transit Systems in African Cities" (*38*) have created a platform for this research study.

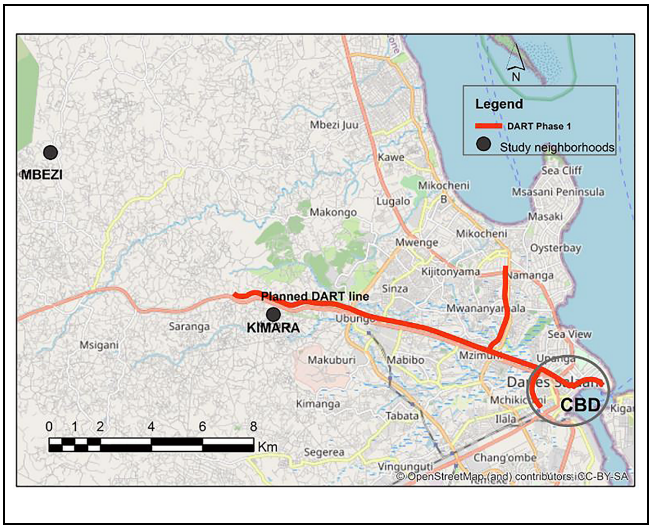


Figure 1. The two study areas: Mbezi (peri-urban) and Kimara (adjacent to the planned DART line).
Note: DART = Dar es Salaam Rapid Transit; CBD = central business district.

Methodology

Research Design

The study was conducted at the beginning of 2016 before commencement of the Phase 1 DART service. Participants were already familiar with the location of the DART line, stations, and terminals, and the image of the BRT bus. Additionally, maps and photos were used to help participants understand about the planned DART system.

Two study areas were selected based on their proximity to the planned DART corridor as well as the distance to the CBD (the zone of concentration of the services and government offices in Figure 1), which indicates variation in mobility demand between the two neighborhoods. The first study zone, Kimara, is located adjacent to the DART system and about 15 km from the CBD. The area is located along the Morogoro road, one of the main arterial transport routes to the CBD. The second study zone, Mbezi, is a peri-urban area located about 30 km from the CBD. The neighborhoods in this area are facing challenges to access PT services because of poor road conditions and a lack of connectivity within neighborhoods.

Focus group discussions (FGDs) and participatory geographic information system were used to capture users' perceptions about IPT and their opinions/views about the DART services, and to gain more insights about their travel patterns (*39–41*). A short questionnaire was used to collect socio-economic characteristics of the participants such as age, gender, education, employment, marital status, and vehicle ownership. The questionnaires were administered to the participants before the FGD sessions. A total of four FGDs were conducted, two in each study neighborhood, with an average of 10 participants in each group (total number of participants = 41). Identification of the participants was done by the researcher in co-operation with local government leaders and was based on pre-determined inclusion factors (both genders; students, retired, unemployed and employed people; both car owners and non-car owners; etc.). The participants from the two neighborhoods were approached in person by their respective local leaders (neighborhood elected councilors) who informed them about the FGD sessions and delivered official invitation letters. Individuals were free to participate or not depending on their willingness. In this study, these local leaders were not among the participants and thus were not involved in the discussions. FGD methods are useful to explore personal experiences and daily lifestyles. FGDs were used to gain insights about common or different perceptions on IPT and planned DART systems in respect to participants' activity participation.

The second method was participatory geographic information system (PGIS) which refers to the integration of local knowledge in a GIS (*41*), allowing participants to share their travel patterns in space by indicating on the map the areas they visited most for shopping, work, and social activities. Two A0-size printed satellite images of DES city were used, displaying the names and locations of the major centers, DART lines, and existing local and major roads. To enable participants to indicate their most important areas and trips on the map, stickers of different colors were used to represent different types of activity participation. The participatory mapping exercises were administered at the end of each FGD session. Through interaction among the participants, the research assistants and the lead researcher, activity destinations were located as precisely as possible on the map.

Data Analysis

Data analysis was mainly facilitated by the following software packages: Atlas ti.7 and ArcGIS 10.3. The

Table 1. Socio-Economic Characteristics of Participants ($n = 41$)

Socio-economic variables		Kimara (adjacent to BRT/$n = 20$)	Mbezi (peri-urban/$n = 21$)
Gender	Male	10	10
	Female	10	11
Age	<35	8	6
	35–55	7	12
	>55	5	3
Marital status	Single	6	4
	Married	13	15
	Divorced	0	2
	Widow	1	0
Education	Primary	10	10
	Secondary	6	7
	Higher	4	4
Employment	Full-time	3	4
	Part-time	4	3
	Self-employed	7	9
	Unemployed	2	2
	Student	2	2
	Retired	2	1
Monthly income	<100€	11	5
	100–400€	5	10
	>400€	4	6
Trip making frequency (in general)	Daily	12	15
	Weekly	2	2
	Several trips a week	1	3
	Monthly	5	1
Car ownership	Car owner	7	9
	Not car owner	13	12

Note: BRT = bus rapid transit.

qualitative data analysis software Atlas ti.7 was used to assist in coding main concepts/themes and categorizing and identifying frequencies and patterns of the statements from the FGDs (*42*). The process of analyzing the FGDs followed a systematic process of transcribing, organizing themes, identifying main points and meanings from participants' discussions (*43–45*), which helped to develop a storyline. The analytical process involved looking for differences, common ideas, themes, meanings, and relationships of various concepts/words used by participants to express their thoughts and values about the transport systems (*45–47*). ArcGIS was used for analysis of the PGIS, which involved georeferencing the scanned A0 images, digitization of the destinations participants visited for various activities, and producing points shapefiles for geoprocessing analyses like spatial density (Kernel density). The results are presented in Table 1, Figures 2 and 3, and direct quotes below.

Socio-Economic Characteristics of the Participants. Table 1 shows the socio-economic characteristics of the respondents, based on the short questionnaires. Individuals from different categories were included to explore commonalities and differences in travel experiences and transport use. The age range of participants in both neighborhoods shows a low number of individuals aged older than 55, and a high number of participants in the age categories 36–55 and younger than 35. In both neighborhoods, individuals who are involved in unskilled jobs or small entrepreneurs are classified under the group of "self-employed," including petty traders, street vendors (door-to-door, along the major road), and those with small shops within or outside their neighborhoods (*48*). Most individuals in the self-employed category travel to multiple destinations to look for local markets, or to purchase business items/products from wholesale markets in small and large centers. Their travel experiences and concerns for transportation are important in understanding their mobility demands in various places. Most participants have a lower educational level (primary and secondary). Full-time employed professionals were those with higher education, mostly employed in public and private sectors (*48*).

Results

Participants' Activity Participation Based on PGIS

The results of the PGIS (Figure 2) visualize the types of activities conducted at different destinations. Figure 2*a* shows activity destinations of respondents from the

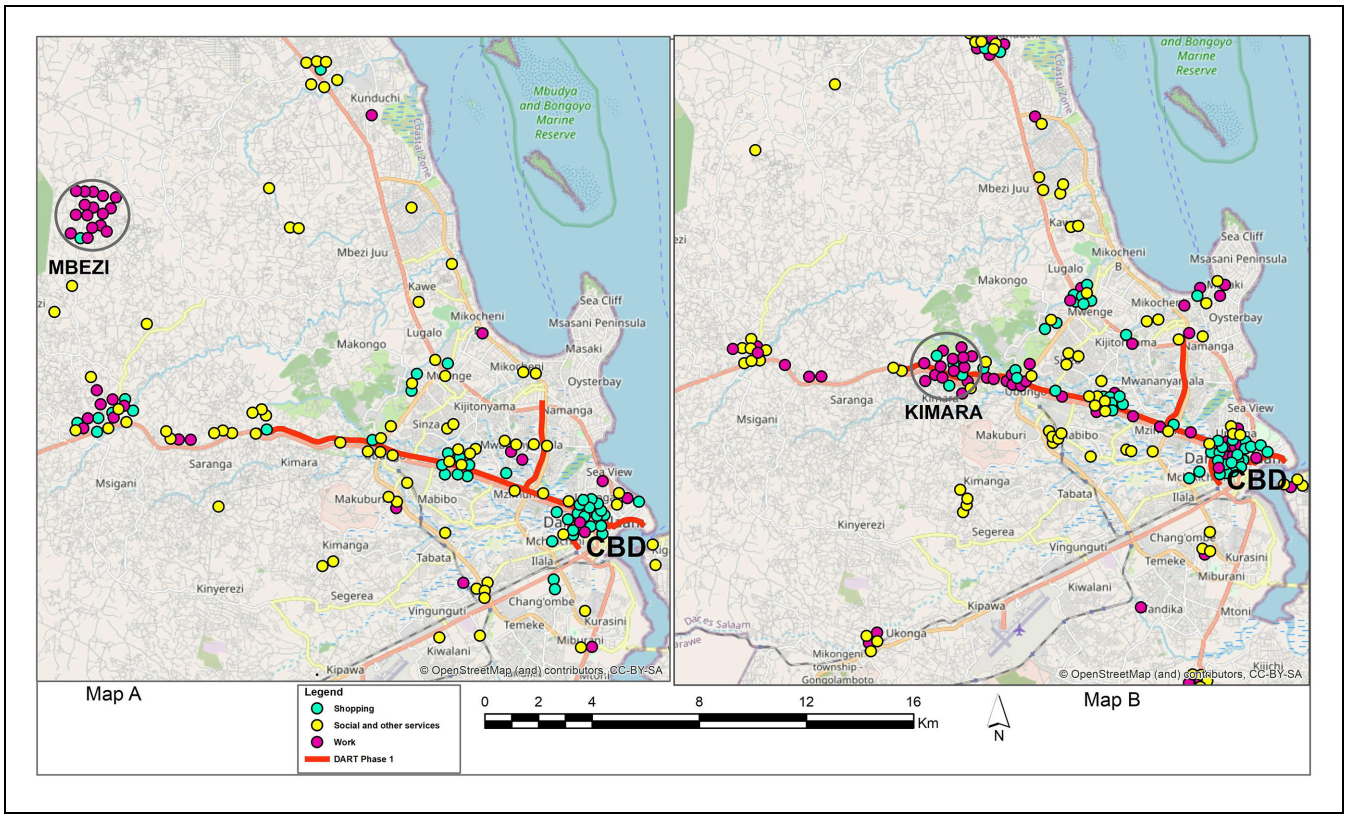


Figure 2. Locations of activities carried out by respondents from (*a*) peri-urban area and (*b*) adjacent to the DART line.
Note: DART = Dar es Salaam Rapid Transit; CBD = central business district.

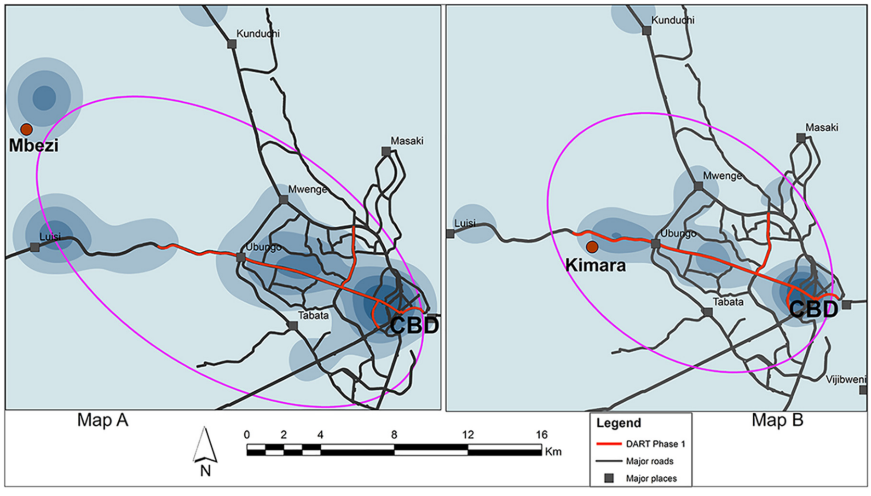


Figure 3. Spatial concentration and directional distribution of travel activities for (*a*) Mbezi, peri-urban and (*b*) Kimara, adjacent to DART line.
Note: DART = Dar es Salaam Rapid Transit; CBD = central business district.

peri-urban neighborhood, while Figure 2*b* shows those for respondents from the neighborhood adjacent to the DART line. The locations for social activity and visits to services (health care, banks) were spatially distributed in different parts of the city, as indicated by the yellow dots on both maps. Shopping trips (i.e., markets, shopping malls, indicated by blue dots) were concentrated mostly around the CBD and some were visited in centers outside

the CBD, while for work (i.e., office, small business, or jobseeking) activity concentrations were around the CBD and within the neighborhoods. This shows that the spatial activity patterns of the participants require consideration of the first and last mile connectivity to support access to the DART line for individuals residing in peri-urban neighborhoods, and participation in diverse activities (e.g., social activity) conducted outside the system.

Figure 3 visualizes areas of high and low concentrations of activities in density maps by color variations. The ellipses included on the maps describe variation in spatial coverage of activity participation of the two neighborhoods. The spatial areas within the ellipses (i.e., visited destinations) cover areas that are within and outside the DART line.

FGDs

Data from FGDs were in the form of recorded audio files and field notes taken from the discussions. These data were transcribed and coded using Atlas.ti7, whereby key issues and important direct quotes from participants were identified and are presented below.

Travel Constraints. Travel constraints varied between the two study areas. Participants identified several travel difficulties (e.g., long waiting and traveling time, financial costs, and poor connectivity) which they experienced within their neighborhoods and along major roads. Participants from the Mbezi study area experienced more travel challenges than participants from Kimara (adjacent to the DART).

Perceptions of IPT

The following attributes of IPT were considered to be important by participants: time efficiency, flexibility, door-to-door, commuting with goods, mode availability, and access to high and low density unplanned areas.

Efficiency in Travel Time. IPT modes such as motorcycles and tricycles were considered particularly efficient to get around in congested circumstances, as they eliminate the need to walk to and wait at a bus stop, therefore reducing time burdens. Waiting and traveling time was considered very important for the use of small vehicles like motorcycles and tricycles.

Availability. Participants identified several indicators reflecting limited travel modes, particularly in the peri-urban neighborhood (e.g., long waiting, poor connectivity), which they experienced within their neighborhoods and along major roads. Participants from Mbezi experienced limited availability of minibuses, compared with participants from Kimara (adjacent to the DART). Motorcycles were most available in different destinations. This was also attributed to a lack of supportive transport facilities, such as bus stops, paved roads, and parking.

> "We spend more than 1 hour just to commute a short distance! We do not have official designated bus station; the nearest bus station is located far from here [authors' comment: estimated distance: 11 km from major road]. How do they expect us to walk for such a long distance?" (Female respondent, 30 years, Mbezi).
>
> This means, walking was not convenient for such long distances.

Flexibility of the Modes. The employment opportunities of many people depend on self-employed activities that are conducted in different destinations, and some of them do not have fixed workplaces, for example, petty trading (like fish vending). It was explained that most of IPT modes respond well to the mobility demands of individuals involved in these self-employed activities.

"I normally use the motorcycle to reach my customers. Some of them live in remote areas and the road is impassable, but motorcycles can penetrate." (Female respondent, 29 years, Kimara).

Door-to-Door Services. The behavior of motorcycles and tricycles in providing door-to-door services was perceived as an important factor for using them, especially by women (who travel to the market to buy food items). It was viewed as an alternative means of transport for those without private car and those who cannot afford a taxi.

"I use motorcycle services because it helps a lot, you can call a *bodaboda* rider to pick you up at your home to the market, or wherever you want to go." (Female respondent, 32 years, Mbezi).

Access to High and Low Density Unplanned Areas. In Mbezi peri-urban neighborhood the coverage of the planned PT network was inadequate (spatially limited), and participants were forced to walk long distances of approximately 11 km to reach officially designated bus stops along the major road. Therefore, IPT was mostly used for their trips to these stops as walking was not convenient for such a distance (time consuming, unfavorable weather, and dangerous [in relation to safety and security]). In the area adjacent to DART line, the distance from some homes to the closest officially located bus stops was estimated to be 1–2 km.

"Nowadays, no place cannot be reached, motorcycles help us to work and live any place. Even if you don't have a private car, you will find tricycles and motorcycles in almost every place you go." (Male respondent, 45 years, self-employed, Mbezi).

Ability to Transport People and Their Goods. Traveling with goods in a *daladala* minibus was a big challenge particularly in peak hours.

"Sometimes you may decide not to carry anything when commuting with a *daladala*, just because you will not be treated well by the conductor, but our travels become easier when using a motorcycle or tricycle." (Female respondent, 29 years, Kimara area).

This implies that PT is required to move passengers and their goods.

Fare Pricing. It was explained that even if individuals did not have the exact amount of the fare (in cash), in *daladala* they can still make a trip after negotiation with the driver or conductor. Therefore, IPT was perceived to use a *laissez-faire* approach to help and serve all users of different income status (e.g., low income without reliable source of income). For short distance trips (<3 km) conducted to the local markets within the neighborhood, and to the first mile and last mile to destination, the use of motorcycles and tricycles was dominant as a low cost modes. The fares for these two modes do not differ much. But for long trip distances, *daladala* minibuses were considered cheaper for low income individuals residing in a peri-urban neighborhood than motorcycles and tricycles. Thus, *daladala* was cheaper for long trips than motorcycles and tricycles (less cost for short distance trips).

Safety and Security. The negative aspects of IPT which respondents reported on were the reckless behavior of the motorcycle riders, contributed to by a lack of appropriate driving training or proper control of their services. Motorcycle users were considered more vulnerable than those of other IPT modes like minibuses or tricycles. It was explained that motorcycle riders sometimes do not wear helmets or do not provide helmets for their passengers. The minibuses were regarded to be of poor quality (e.g., old buses in poor mechanical condition) that increased travel times because of breakdown on the way. IPT was also considered to expose individuals to additional risks (e.g., security and safety issues). Participants emphasized that upgrading of these modes and proper control of their reckless behavior through training, would make the IPT system more helpful to the users.

Overcrowding and Lack of Comfort. The minibuses were perceived to have low capacity to carry large numbers of passengers at the stations, especially in peak hours. In most cases the minibuses are overcrowded, and few individuals can sit while many passengers are crowded in buses without seating. Individuals from the peri-urban neighborhood explained that they experienced difficult commuting times and uncomfortable mobility, because of standing for a long time when being stuck in traffic jams. For car users, the use of overcrowded *daladala* was the main option when the car was not working because of lack of fuel or other technical problems.

IPT and Activity Participation

This section presents the links between IPT modes and activity participation. The main question was how IPT modes were used to support various types of activity participation.

Access to Work Locations. Most participants were involved in different types of work activities such as plumbing, petty trading, fish vending, and welding, most of which have no permanent locations. For example, a person involved in housing construction can travel in any direction, depending on where opportunities are available. Therefore, reliable and flexible transport systems capable of responding to different local contexts were required.

"I have a car, but I prefer to use *bodaboda* because I can spend only 20 minutes from Kimara to Morocco area. Using a car, one can spend more than 2 hours." (Male respondent, 31 years, full-time employed, Kimara).

Access to Health Care Services. IPT was used to access health centers and hospitals for health care services. Participants explained that for a pregnant mother it is very hard to know the exact time when contractions will start, as it can happen at any time. In case it happens in the night, they have to call a motorcycle rider to come and pick up the mother to take her the hospital. In some cases, a tricycle was preferred above a motorcycle because it can accommodate up to four passengers at once.

"If you have a sick person, tricycles help us to rush to the hospital; the system is affordable as compared to the hired taxi. For example, if I want to go to Muhimbili referral hospital, a tricycle can charge not more than Tsh.10,000 (3.5€) but a taxi was more than Tsh.20,000 (7€)" (Male respondent, 35 years, Kimara).

Access to Education. IPT modes like motorcycles were perceived to be efficient for students, especially during exam periods, as it was noted that a lack of school buses and reliable PT impose travel challenges.

"I use motorcycles during exams; it is the only mode, which can help me to be on time in the examination room." (Male respondent, 18 years, Mbezi).

Participation in Social Matters. Participation in social activities reduces the sense of isolation and empowers poor individuals in times of vulnerability; for example, during mourning a death, floods, sickness, and other disasters. Other social trips include attending wedding ceremonies, churches or mosques, and meeting with friends. This means IPT was important for the creation of social capital.

Opinions/Views about the Planned DART System

The FGDs about the DART system were based on the physical location of the road infrastructure, the bus stations, and the expected quality of the buses (*49*). Based on these physical attributes of the DART system, maps, and images of buses were used to facilitate the discussions. The DART fares were not discussed because during the data collection process the authorities and stakeholders were still in discussion on the amount of the fares to be charged. Although it was unrealistic to discuss DART fares in the FGDs, surprisingly it emerged from participants as an important attribute of their concern about the planned DART system, especially for street vendors and the unemployed who needed to travel to multiple destinations.

Informal Activities versus Professional Jobs. The DART was perceived to be designed mainly for individuals with permanent workplaces around the CBD, particularly for professional employees. For low income individuals, the DART system was considered to support shopping and access to services like banks, referral hospitals, and retail markets around the CBD. However, the planned DART system was viewed as excluding other activities conducted outside the CBD and in multiple destinations.

> "You know, for us who are engaged in self-employment such as fish vendors around the streets, the DART is not flexible to support these kinds of activities." (Female respondent, 37 years, self-employed, Mbezi).

DART for Specific Class (Higher Class). The planned DART system was also associated with specific transport users, like car users and high income earners. Since the DART was expected to use high quality buses, participants associated this with an increase in the transport fare, higher than the fare charged by IPT services (*daladala*).

> "The bus seems to be luxurious and of high quality, which reflects the lifestyles of rich people, but for [one] who is traveling with boxes of tomatoes, fish buckets and vegetables, it is hard to use the system." (Female respondent, 43 years, petty trader, Kimara).

However, car users commuting to multiple destinations also showed less than positive expectations of the new system because no parking was to be constructed around the BRT terminals.

Costs for Peri-Urban Communities. Based on the physical location of the DART line, the number of transfers for individuals commuting from the peri-urban area to the CBD will change from one (direct route) to two transfers. It was noted that individuals commuting from Mbezi bus stop to the CBD are required to make a transfer at the Kimara DART terminal when using the DART system, which was viewed as causing increased travel costs (in relation to time and money) and route inconveniences for non-car users.

Saving Travel Time. The use of exclusive lanes in the DART system was viewed by different individuals as positive in minimizing travel times to the CBD, compared with the existing PT like minibuses that operate in the mixed traffic lanes and without fixed schedule.

"We are forced to use motorcycles to go downtown because of traffic jams, and have no other alternative mode." (Female respondent, 27 years, full-time worker, Kimara)

Discussion

The study showed how IPT and the proposed DART were perceived by the inhabitants of DES in relation to their activity participation. The findings cannot be generalized but provide relevant insights and deeper understanding about the two systems from local people's perspectives. The study is also useful in today's scenarios of developing cities where large numbers of people live and work in areas without adequate PT connection.

The use of IPT among participants was perceived as a solution to the high travel demand and spatial limits of planned PT services within their neighborhoods and traveled destinations. Given the existing travel difficulties on and away from the major roads, the use of IPT modes, especially motorcycles and tricycles, was considered an important opportunity to participate in different activities that were carried out in any destination, as IPT services do not operate on any fixed route. Thus, the vital role of IPT modes in supporting livelihood activities and reducing the risk of exclusion for residents of these neighborhoods should not be underestimated. This is also in line with the literature (*2, 50–52*).

The flexibility of IPT to respond to individuals' activity participation provides insights about the need for a feasible PT in a real local context. As the DART system would integrate high capacity buses on fixed routes, the system seems most applicable in densely populated areas and on busy and congested roads. In unplanned settlements and less densely populated areas, the DART system might bring additional travel costs because of new interchange points (increased number of transfers) and fares. Consideration for service coverage of PT within neighborhoods is fundamental, especially for individuals without access to private cars, living far away from a DART system (or major road), and those involved in low income self-employment outside the CBD. Planning should include both inner city as well as peri-urban areas.

Participants in this study perceived the implementation of the DART system as primarily serving the high income groups and not the low income individuals: "the project has come to serve the big fish and not the small fish" (Male respondent, 50 years, Mbezi). The planned DART system was positively perceived, however, as a mechanism to ease traffic congestion.

Every mode of transport has its own strengths and opportunities to offer. Consideration should be given to integrating various modes along with first (origin) and last (destination) mile connectivity for easy access to DART stations or stops. In these study neighborhoods, the presence of micro vehicles (e.g., tricycles) with the capacity to carry a minimum number of passengers is more flexible, and perceived to be more useful for reducing waiting times. Reports from the participants showed that, in situations where a *daladala* bus was available, especially in non-peak hours, the bus tends to wait longer for passengers and only departs when it is full.

The current travel patterns of activity distributions require an intervention to address core barriers to the use of DART system (*16*, *17*, *49*, *50*). Extensive study in this area will enable adaptation of the planned DART system to the unique environment of each location (to best suit the local needs) (*15*).

IPT services offer an alternative solution in areas where planned (formal) PT is inadequate or not covered, particularly in peri-urban areas, as the findings show that individuals living far away from major roads experience other travel constraints, such as lack of connectivity and poor road conditions (unpaved), and high transport costs. The IPT system can be seen as a solution for reducing transport exclusion and supporting out-of-home activity participation for under-served individuals and neighborhoods located far away from major roads. The planned DART line was viewed as concentrating only on highly congested roads to improve access to the CBD. The need for PT improvements which meet door-to-door connectivity is important for individuals living far away from the DART line and without the option to use a private car. The methods (e.g., FGD and PGIS) involved in this particular study can be seen as useful for exploring the constraints and opportunities of the DART system in a wide variety of local contexts.

Limitations and Recommendations

The empirical work presented was not statistically representative of the entire population in the city. This study is significant for improving PT in the local context where individuals are involved in low income jobs conducted in different destinations. The opinions about the DART system help to uncover the ability of the system to support activity participation of different individuals. To minimize hypothetical bias, the physical aspects of the DART system such as the location of the DART line, stations, bus photographs and routes (use of maps) were used to gain insights about the system before the actual use. Further research can be done to compare and quantify changes in individuals' travel behavior and experience after implementation of DART system.

Conclusion

The study showed how IPT and the proposed DART were perceived by the inhabitants of DES in relation to their activity participation. The findings provide relevant insights and deeper understanding about the two systems from the perspectives of local people. The study is also useful in today's scenarios of developing cities where many people live and work in areas without adequate PT connection. The IPT system can be seen as a solution for out-of-home activity participation for under-served individuals and neighborhoods located far from major roads. This is important especially in cities of the Global South, where IPT is available and plans are in process for BRT. Every mode of transport has its own strengths and opportunities to offer. Consideration should be given to integrating various modes along with first (origin) and last (destination) mile connectivity for easy access to DART stations. Planning should include both inner city as well as the peri-urban growth areas. The planned DART line was perceived as only concentrating on highly congested roads to improve access to the CBD.

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Authors Contributions

The authors confirm contribution to the paper as follows: study conception and design: L. Joseph, A. Neven; data collection:

L. Joseph; analysis and interpretation of results: L. Joseph; draft manuscript preparation: L. Joseph, A. Neven, K. Martens, O. Kweka, D. Jansen and G. Wets. All authors reviewed the results and approved the final version of the manuscript.

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