The Impact of Road Rehabilitation Projects on Walkability, Road Safety and Local Business A Case Study in Old Kottawa-Pannipitiya Road of Colombo District, Sri Lanka

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Abstract

This paper presents the impact of road rehabilitation projects on walkability, road safety and local businesses following improvements to a 1.9 km, C grade, feeder road – Old Kottawa Pannipitiya road located in the Colombo district, Western Province of Sri Lanka. Data were collected through four surveys: (i) Site Reconnaissance, (ii) Interview survey with Pedestrians, households, motorists (iii) Interview survey with local businessmen (iv) Road safety survey and analyzed in a qualitative approach. Results show that the rehabilitation work has led to a relative improvement of the aesthetic appearance and character of the local area considerably whilst the investment targeted at off carriageway elements of the road has been minimum. With respect to walkability, the pedestrian comfort and improvement to environmental condition shown to be achieved at a lower level. Further the safety criterion apply with respect to road side drains, road side areas, providing bus bays, ensuring safety and comfort of pedestrians demonstrated to be materialized less. Road safety levels are established impaired in terms of placing and aligning traffic signage, poor maintenance and management. Finally the commercial land use on either side of the road being expanded denotes an increase of local businesses after the rehabilitation. Nonetheless, as claimed by the local businessmen the improvement of business income levels after the rehabilitation seemed far less achieved. Thus policy implications should be focused on above drawbacks to achieve the maximum benefits of road rehabilitation projects.

Keywords: Road rehabilitation; Walkability; Road safety; Local business

Introduction

Transportation system of a country could be identified as a significant component of the socio-economic development of any country. Consequently, the roads are reflected as a major catalyst to socio-economic development (Gichaga, 2017). Since efficient

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transportation is a prerequisite for building a market-based economy, the Government prioritizes rehabilitation and maintenance of the road network Operations Evaluation Department (2005). A road rehabilitation refers to structural enhancement of roads and its' pavements via resurfacing, restoration, and rehabilitation (3R) work that extend its' service life and carrying capacity (Chan, Keoleian & Gabler, 2008). It needs considering the optimization of road's efficiency on travel time, travel costs, enhances safety of road users, minimizes emissions and environmental damage and foster broader community goals such as access to employment, schools, businesses and residences, accommodate a range of travel modes such as walking, cycling, transit, and automobiles (Wen, Kenworthy, Guo & Marinova, 2019; Loadache, Cormos, Nemtanu & Tomas, 2012; Ahmed, 2013).

This paper presents the impact of road rehabilitation projects on walkability, road safety and local businesses with reference to the Old Kottawa Pannipitiya road rehabilitation project.

Walkability refers to the degree which an area within walking distance of a property encourages walking trips from the property to other destinations (Pivo & Fisher, 2011). It considers as an important consideration to assess the comprehensiveness of a road rehabilitation because it reflects the concerns having on pedestrians (Choi, 2012) and sustainable development in terms of reducing car dependency in urban areas (Findley, 2011), improve health and environment for communities (Gehl & Rogers, 2010). Academic literature on walkability highlights, roads need to have several conditions fulfilled to support walkability of pedestrians. Accordingly, Pedestrian width, Road width, Pedestrian design, drainage and rainy day comfort, Road safety, Shading, Noice levels, Dust/fume levels, Aesthetic character, Pedestrian crossings, Parking and Traffic congestion were identified as criterion influencing the walkability (Ewing & Handy, 2009; Moirongo, 2002). Thus these made the platform to assess the walkability condition within the rehabilitated road.

Having the aim of rehabilitation to increase the accessibility and the connectivity for wider range of road users who might even be not familiar with the road, safety is an important consideration to look into when evaluating the outcomes of road rehabilitation (Gichaga, 2017). Road safety literature shows that (a) developing a summary of safety effects as these appear in the international experience; (b) developing a method for evaluating safety effects of road infrastructure improvements under local conditions; (c) collecting data on road infrastructure improvements performed on the road network through the years, and building examples of treatment types for analysis; (d) evaluating the effects of these treatments, based on accident statistics in "after" as opposed to "before" periods helps to evaluate the road safety condition (Gitelman, Hakkert, Doveh & Cohen, 2001).

A sustainable and comprehensive road development should entail multiple benefits to multiple stakeholders (Mugata & Yusef, 2018). Further, the positive effects on local businesses are much encouraged in many road development assessments (UNDP/ILO, 2010). Three criterion reflecting the impact to local businesses: The effect on business opportunities and everyday business income, the effect on commercial property values and

Receipt of compensation to reinstate any damages caused as a result of road rehabilitation work were studied. The research approach to the study was taken through the literature on sustainable transport and traffic impact assessment (White, 2011; Tolley, 2003; Shay, Combs, Findley, Kolosna, Madeley & Salvesen, 2016).

Objectives of the study

Main objective

- To evaluate the impact of road rehabilitation projects on walkability, road safety and local businesses with reference to Old Kottawa-Pannipitiya road.

Sub objectives

- To identify the existing physical construct, character, street connectivity of the Old Kottawa-Pannipitiya road after rehabilitation
- Assess the level in which Old Kottawa - Pannipitiya road rehabilitation supports the walkability conditions for pedestrians
- To understand the current level of road safety established at the rehabilitated Old Kottawa – Pannipititya road
- To understand the impact of Old Kottawa-Pannipitiya road rehabilitation works effects on local businesses.

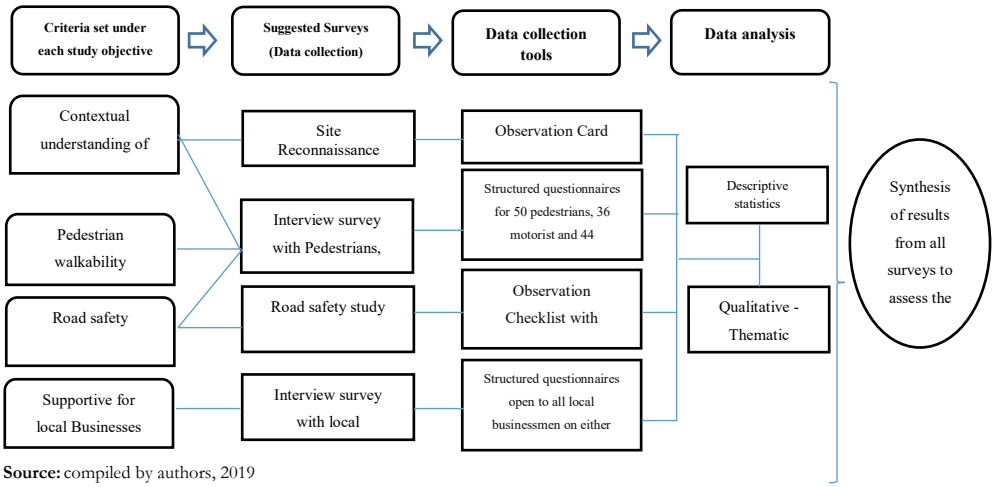
Methods and materials

The Old Kottawa-Pannipitiya road that runs through Kottawa, Pannipitiya and Maharagama in Colombo district, Western province of Sri Lanka was considered as the case study area. Within the 1.9Km road stretch, the Old Kottawa-Pannipitiya road has 07 (seven) primary intersections including the two exits. Besides it also has several other by roads that connects with inner neighbourhoods. As a feeder road it traverses parallel to the A4 Colombo – Batticoloa highway (High Level road) and the Kelani Velly rail line and it has being rehabilitated in 2017 under the Township Development Component of the Greater Colombo Urban Transport Development Project (3K Project) by Ministry of Megapolis and Western Development. It is currently owned and managed by the Provisional Road Development Authority. Whilst a strip of commercial development exists on either side of the Old Kottawa-Pannipitiya road, the residential development in which this road is catered to a greater deal is situated towards the North side of the road.

Data were sourced through four (04) survey types: (i) Site Reconnaissance (ii) Interview survey with Pedestrians, households, motorist (iii) Interview survey with local businessmen and (iv)Road safety survey. Collected data were qualitative. Accordingly observation cards were used in the reconnaissance survey and the collected data were descriptively analyzed. Road safety was assessed based on the road safety guidelines adopted by the Road Development Authority (RDA). The observations of the research team was used to identify what level the required traffic signage and measures have been put in place on the rehabilitated road strip. Thereafter the level of road accidents occurred before and after the rehabilitation have been compared as a way of reflecting the effectiveness of such road safety establishments. Structured interview survey for 50 pedestrians, 36 motorist and 44 households was conducted to assess the level in which Old Kottawa - Pannipitiya road

rehabilitation supports the walkability conditions for pedestrians and to understand the current level of road safety established at the rehabilitated Old Kottawa – Pannipititya road. The level in which the Old Kottawa Pannipitiya road rehabilitation supports the walkability conditions of pedestrians was studied with reference to four factors. Accordingly, walkable distance, purpose of walking, frequency of walking and the influence of road improvements on walkability were examined. Data were both descriptively and qualitatively analyzed (Thematic analysis). Semi structured interview survey opened to all local businessmen (out of which 36 respondents volunteered to participate) on either side of the rehabilitated road were used as the sample to understand the impact of Old Kottawa-Pannipitiya road rehabilitation works effects on local businesses. Data were both descriptively and thematically analyzed. The impact of road rehabilitation on walkability, road safety and local businesses related to Old Kottawa-Pannipitiya road rehabilitation is then derived through synthesizes of all survey findings (Figure 1).

Figure 1: Study Design



Source: compiled by authors, 2019

Results and Discussion

The rehabilitation of Old Kottawa Pannipitiya road has led to a perceptible transformation of the construct and appearance of the road strip. The road after rehabilitation is laid with carpet and have nearly 6.28m carriageway width and 3.048 m shoulder width including drainage (i.e a total width of 9.328m). As per the initial feasibility report, it was planned to be widen upto 6.2m carriageway and a 2m hard shoulder including drains having a total width of 9.4m. The comparison of the said figures highlights that the established rehabilitation targets in terms of its' construct has been almost met. Besides upgrading the single lane into two lanes, the rehabilitated road was also added with concrete covered drainages and paved walkways. Nearly 80% of property frontages found to have drainage that could support the storm water of individual land plots also. Moreover, 41% of properties had frontages that had been widen with walkways enhancing the relative outlook of the properties than previous. 41% of those properties adjoining the road have been fenced and walled whilst the rest are on open access. 48% of the properties on either side

of the road held a parking space(s). Nearly 15% of properties seemed to be using the road in front of the properties as their parking spaces. 37% properties had absolutely no space to park vehicles within the vicinity of the property. The Pannipitiya Flyover Intersection, Malabe road junction and the road adjoining Pannipitiya post office are established with traffic lights and pedestrian crossings. Road markings and signage required to regulate and inform the road users are also in place.

Findings of the Interview survey with 50 pedestrians, 36 motorists and 44 local households with respect to the trip purposes in which they have been occupying in the said road were accordance with the responses given by each interviewee. Accordingly, most of the road occupiers have been using the road to get access to places in fulfilling their daily individual/business needs in terms of purchasing goods and services (i.e 45.96% = 31.06%+14.9%) of respondents). One third (i.e. 29.7%) of road users consume the road to meet their commuting needs. The educational institutions such as schools, nurseries, tuition classes situated within Old Kottawa-Pannipitiya road, Kottawa, Maharagama area is another significant reason to attract around 17.93% of road users to consume the road on daily and weekly basis.

On average the walkable distances to and from Old Kottawa Pannipitiya road recorded to be around 1 km and it was bounded by walking distances from households in the immediate vicinity. People (36%) primarily walk to getting access to public transport (bus or train). Highest number of pedestrians were recorded at cross roads connecting Old Kottawa - Pannipitiya road and A4 Colombo-Baticalo highway (High level road) (i.e. Morakatiya and Pannipitiya flyover intersections) and the path to station access via Boo Tree junction. Further, people walk in order to get access to nearby schools and other educational institutions, shops, services and amenities situated at Old Kottawa – Pannipitiya road. A very few instances (3% of respondents) were also found where people would walk for pleasure and exercise and to save time and costs by avoiding waiting for buses or spending for taxies. Bounded by the fact that getting access to public transport being the primary reason for people to walk, majority of respondent used to walk on daily basis. The results also show that for other instances, the frequency of walking along this particular road strip have varied between once a week to once a month.

The particular road rehabilitation has provided the favorable walkability conditions in terms of improvements to aesthetic character, establishing pedestrian crossings, establishing drainage and better comfort on rainy days, and increase in road width. Accordingly interviewed pedestrians' shows higher satisfaction levels to these aspects. They expressed 'satisfied' due to the fact that rehabilitation has improved the previous road conditions to a significant level in terms of increased road width, setting up drainage, establishing pedestrian crossings, better pedestrian design with paved bricks.

However, the rehabilitation agenda has not succeeded in terms of controlling dust, fumes, noise levels, congestion, establishing parking lanes and investment on greenery (shading) and thus has limited the conditions that supports walkability of pedestrians. This 'dissatisfaction' has arisen as a result of not optimising the walkability conditions. As per

the respondents' perceptions summarised and research teams' observations the dissatisfaction of pedestrians' about walkability has emerged due to following reasons.

i. The mismatch between what was planned and provided through physical (road) development) and the subsequent pedestrians (user) need in terms of road crossing points, where they wanted to have the bus stops, provision of sufficient shading alongside the road etc.
ii. Poor workmanship in construction of drainage and paving pavement bricks.
iii. Lack of management and maintenance of road elements – pavements bricks are being broken, sunk, discoloured, dirty etc. and blocked drainage lines with garbage. Tensions that caused from outside market and social factors – indiscipline driving, ad-hoc street parking, increased formal and informal commercial activities.
iv. Lack of shading on either sides of roads and unavailability of shaded Bus stops.
v. Increased traffic congestion makes the pedestrians to wait longer hours to cross roads, even at the pedestrian crossing. Further it creates unsafe condition as vehicles are driven on walkways (in strips where pedestrian way and carriage way is only separated through a yellow line).
vi. Increased volume of traffic after rehabilitation has increased the noise levels – fast driving, horn beeping, even during night hours. Noise levels have further increased as a result of increased commercial activities

The Road Safety Conditions of Old Kottawa-Pannipitiya Road was examined with reference to the guidelines adopted by the RDA. Accordingly observations were carried based on eleven (11) broad criterions. The results of the observations that were carried under each of such criteria are as in Table 1.

Table 1: Observations of road safety study

RDA Criterion	Observation
Traffic signs (warning, regulatory, informative, priority signage)	Although they were available as required, effectiveness of those to ensure the safety of road users has been compromised due to not having presented them in the recommended angle, distance and the position where the motorists could see it clearly. Some signage were covered by overgrown trees whilst some are damaged.
Road markings	Were provided in thermoplastic. However, some road markings have started to be warning out.
Traffic control devises	Were established as required. In certain instances operations of some devices were interrupted.
Road equipment	No safety barriers, crash barriers, metal fencing, cycle lanes are provided given the context of two lane C grade road.
Other road facilities	Pedestrian crossing lines are provided whilst paved pedestrian ways and off road parking have been provided to a minimal degree. However, bus stops with adequate clearance from traffic lanes are not provided at all.
Alignment of the road	Satisfactory in terms of sight distance and the opportunity provided to overtake vehicles. However, the ruling speed of the road is negatively affected by the road frictions such as adhoc parking, roadside businesses
The road cross section	Unsatisfactory as the shoulder width is insufficient in the case of emergency breakdown of a vehicle and the shoulder cross not always fall sufficient to provide proper drainage

Road side areas and road side drains	The road side areas at some places are impeded by over grown trees. The road side drains are covered but poor management of those are evident having broken slabs and drainage being blocked by garbage.
Intersection of the roads	Observed to be in safe conditions with respect to horizontal and vertical alignment, layout visible to road users and sight distance being adequate for all movements and all road users.
Road condition	Fairly good with respect to its' surface and edges
Safety and comfort of pedestrians	Has improved relatively after the rehabilitation. However, increasing traffic volume intrude the pedestrian ways. Some places such as Boo Tree junction the pedestrian width is less sufficient in relation to pedestrian volume having them intruding the carriageway. The paved ways are not support smooth walking at all places and management of them seemed poor. Besides some slabs covering the drainage are sunk and broken causing a risk for pedestrians to walk.

As per the records at Maharagama and Kottawa police stations, it was noted an increase of accident risk on Old Kottawa Pannipitiya road by 28%. This is an indication of a road safety issue at the rehabilitated road even though the rehabilitation project itself cannot be held account for that.

The study also examined how the road rehabilitation work has been impact on local businesses. Accordingly, Observations indicated a significant linear development of commercial properties along the Old Kottawa Pannipitiya road and the local businesses in either side of the road included shop houses, retail stores, small shops, small scale office buildings, manufacturing businesses, service centres, restaurants and eating places. As confirmed by many respondents, the road rehabilitation had been a significant pull factor to increase the demand to establish small businesses in the local area. 6 out of 36 respondents were found to be businessmen who moved in to Old Kottawa Pannipitiya road after the rehabilitation work. Many businessmen had the ontological security - faithful presumption, that road rehabilitation would increase more business opportunities.

Despite the said demand to establish businesses, many respondents perceive the business income levels to them have not been improved as it was expected during the time of road upgrading. Only 06 out of 36 respondents agreed that the rehabilitation work did improved their businesses. Those were primarily small shops such as a book shops, textile shops, grocery shops, hardware stores, garden shops and further a service centre of attorney-at-law. The rest indicated a negative perception about the road work implications on their businesses:

The local businessmen held different elements of the road rehabilitation works accountable for the lack of customers that they are able to generate everyday. As they claim, road rehabilitation more broadly do not support them to increase the customer base for their businesses as expected. According to them these are as a result of (i) lack of parking facilities available to customers (ii) having no sufficient pedestrian ways to walk comfortably for customers to carry the shopping goods and (iii) many motorists using the road are the ones who wouldn't aim to stop by in this road strip.

The local businesses on either side of the Old Kottawa Pannipitiya road generally spans up to 200m. Their perceptions on the rate in which property values are enhanced as a result of road rehabilitation seemed positive. As per the expert opinion (professional valuers) and the land registry information, the average per perch value of lands in 2019 recorded to be range from 1 million to 1.8 million. This records a 122% to 260 % increase when compared to the land values recorded for 2010 in the 3K project initial feasibility report (i.e. Rs 450,000/ per perch). Similarly, gross rental values per square foot in commercial properties [300 sq.ft standard box with basic facilities] within the said strip recorded to be range from Rs 45/sq.ft to Rs65sq/ft. It is a 13% to 57% growth as per the rental values recorded along the road for the said by 2015 (i.e. Rs 35/sq.ft to Rs45sq/ft respectively). This increase of land values and rental values may have been influenced by multiple factors. However, what can be confirmed through these evidence is that the improvement of Old Kottawa Pannipitiya Road which is C graded Provisional Road Development Authority road has become a significant factor that contributed towards this capital and rental value growth of properties. From the local businesses point of view it is a positive impact that has been brought by the road rehabilitation work.

Among 36 respondents 16 respondents had received compensation as a result of land acquisitions for the Old Kottawa Pannipitiya road rehabilitation. Only 05 of them acknowledged that the compensation received were sufficient, The inquiry into the way in which those utilized highlights, a good proportion of them have been gone into the improvement of their local businesses and other family scale investments such as building houses and buying lands

Conclusion

According to above results the rehabilitation of Old Kottawa-Pannipitiya road has improved the aesthetic appearance and character of the local area considerably better than before whilst the investment targeted at off carriageway elements of the road has been minimum.

It also has improved the condition that supports the walkability of pedestrians when compared to conditions it had before the rehabilitation. However, the prevailing walkability condition do not provide much evident that the rehabilitation work have invested on pedestrian infrastructure to the extent that it would promote walkability towards broader development goals such as reduce car dependency, promote health and environment. Besides, the evidence highlights that the poor workmanships on brick paving and construction of drainage etc., lack of maintenance and management of road elements, incompatibilities with user interfaces in terms of road crossings, bus stops etc., and the unintended market and social consequences such as increasing congestion of the area, indiscipline driving and so on, have caused significant limitations to the walkability condition of the road despite its rehabilitation.

On the other hand the rehabilitation project is in adherence with the mandatory road safety measures which include establishing required traffic signage to warn, regulate, inform road users, having good road condition, road markings, traffic control devises, alignment and

road side drainage. However, the effectiveness of those in certain instances have been impaired due to poor workmanship (at establishing those on the road) and poor maintenance and management undertaken by relevant authorities. Furthermore, despite the rehabilitation project seemed to have been invested on safety elements such as pedestrian safety and comfort and increasing shoulder width than it was before, the actual condition observed aren't shown to be fully met with the standards recommended by the Road Development Authority. The increase of accident risk by 28% during the post rehabilitation period is an indication of a road safety issue at the rehabilitated Old Kottawa-Pannipitiya road even though the rehabilitation project itself cannot be held account for that.

The rehabilitation work has also provided its development benefits to the local businesses. The upgrading of the Old Kottawa Pannipitiya road has generated betterments for local businesses in terms of increased land and rental values. However, the road development proven to have been broken with respect to their initial perceptions held that it would eventually increase the business opportunities to the locality. As per the local businesses, the road development has supported marginally for them to enhance the everyday business opportunities to the area.

Recommendation

- Rehabilitation projects needs to invest on off carriage way elements such as hard shoulders, walkways, drainage, bus bays, off-street parking, fences as equally as investing on carriage ways.
- The authorities such as Provisional Road Development Authority should ensure an appropriate model or (adhere if already available with Standard Operational Practices) for the operations, maintenance and management of the rehabilitated road to sustain its quality of construction and operations.
- Having a two-way communication process to inform the project objectives to local communities as well as be informed of the local community voices about their expectation can develop a common consensus about what the rehabilitation aims and objectives to be.

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