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Measuring the Relationships of Road Service Quality and Road Traffic Accidents

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Abstract*: As with the most of middle-income countries, road traffic accidents (RTAs) in Malaysia constitute a serious public health challenge to the nation. Despite the fact that great efforts have been made to understand the causation factors of RTAs, little is known about how road service quality (RSQ) impacted road safety. The primary objective of the current study was to explore the relationships of RSQ and RTAs from the viewpoint of the Malaysian road users. The study employed a quantitative research approach with the use of a self-administered questionnaire instrument to survey a group of road users. In particular, this paper reports the first phase of the study, that is, to develop and administer an instrument to measure the relationships of RSQ and RTAs. A two phased approach was undertaken to determine face and content validity, and reliability of this instrument. The face and content validity were achieved by assembling a panel of academia and industry practitioners to ensure that wording of the items, and the development of the scale, were comprehensible for data inquiries. Reliability and internal consistency testing were achieved by employing the exploratory factor analysis (EFA) to model the interrelationships among items, and Cronbach's alpha to evaluate the extent to which the items measure the same construct. Then, the instrument was pilot-tested by administration to a convenience-quota sample of 24 road users who stopped at the rest and service areas along the case study expressway. The results have pointed to the indication that the measurement instrument reached the accepted levels of internal reliability. Thus, it can be concluded that the developed instrument able to collect sound quality survey data and could enable the next stage of the study draws a valid and generalized conclusion. This paper highlighted the value of pilot testing in terms of improving the design of research studies that contributes to the development of best practices in RTAs research. Finally, the outcomes of the study should become a source for policy makers or local authorities to have better understanding of the safety outcomes of road service quality from which the prevention measures of RTAs could be improved.

***Keywords*: Road service quality, road traffic accidents, measurement constructs, pilot study.**

I. INTRODUCTION

Road infrastructure investment has been singled out as the catalyst for nation's economic growth and social wellbeing. Despite the significant contribution to the social-economic growth, rapid development of road infrastructure has resulted in an increasing in deaths and injuries due to road traffic accidents (RTAs). Thus, issues of RTAs have become a threat to public health and national development. The recent released report of the Global Status Report on Road Safety 2018 remarked that deaths due to RTAs worldwide continue to rise steadily from 1.25 million people in 2013 to 1.36 million people in 2016 which indicates the progress to achieve a 50% reduction in the number of road traffic deaths by 2020 as stipulated in the Sustainable Development Goal remains far from reality [1]. It also reported that 13% of deaths from RTAs occurred in low-income countries, 80% in middle-income countries, and 7% in high-income countries. In comparison, the low- and middle-income countries account for 85% of the world's population. Nevertheless, they bear a disproportionate number of deaths relative to their level of motorization, as they account for only 60% of the world's registered vehicles [1]. Most importantly, the figures have shown that RTAs are significantly occurred in the middle-income countries in which Malaysia is one of the countries. Thus, it can be understood that the rapid economic development of the middle-income countries has led to the increasing numbers of RTAs. As noted by [2], more development will result in more industries which further lead to more vehicles and more road infrastructure, and in turn, lead to more RTAs.

With an average of 19 peoples killed every day, RTAs constitute a serious public health challenge to the Malaysia [3]. The effects brought by RTAs not only to the individuals' life but have extended to the nation's economic losses. In 2014, 6,674 deaths from RTAs were recorded representing an estimated of more than RM9.0 billion or about 1.6% of GDP lost to the national economy [4]. It was projected the number of deaths due to RTAs in Malaysia will continue to be increased to 10,716 by 2020 [5]. Relative to its population, this figure is alarming which indicates Malaysia is one of the highest traffic fatality rates in the world [6].

In spite of various enforcements on road traffic policies, the number of RTAs in Malaysia still increasing with no signs of substantial declined. The Road Safety Plan of Malaysia 2006-2010 was formulated to reduce the number of deaths due to RTAs to 2.0 deaths per 10,000 registered vehicles, 10 deaths per 100,000 populations, and 10 deaths per billion vehicle-kilometers travelled by the targeted year of 2010 [7]. However, these targets are far from achieved since the actual rate of road traffic deaths in 2010 was indeed higher than the set targets for 2010. It was reported that the rate of road traffic deaths in 2010 was 3.4 per 10,000 vehicles, 23.8 per 100,000 population, and 16.2 per billion vehicle-kilometre travelled [8].

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As a comparison, the global rate of road traffic death is 18.2 per 100,000 populations [1].

This indicates that although vast efforts are being made in the right direction, there are still lacking overall understanding of all the contributing factors to RTAs and their interaction with one another. The World Health Organization (WHO) advised that all initiatives related to road safety must be accompanied with an effort to recognize the bottom-line causation of RTAs [9]. As argued here, understanding the bottom-line causation of RTAs is the first step to their successful prevention.

Therefore, the current study intends to investigate the relationships of road service quality (RSQ) and RTAs from the road users' perspectives. It should be noted that road users are the main customers of the highway, and service quality is generally related to customer satisfaction. A newly opened the East Coast Expressway Phase 2 (ECE2) was selected as the case study area. Since newly opened, the physical conditions of the expressway are expected to be of acceptable quality. For instance, the quality of road surface in term of wear and tear result from normal wear or aging should not be the issues.

In particular, the paper presented here is a part of on-going study. It reports the processes of the pilot study for the survey instrument to be used in the later stage of the study. The instrument introduced here provides a coherent approach to analyzing the relationships of RSQ and RTAs from the viewpoint of Malaysia's road users.

II. ROAD TRAFFIC ACCIDENTS

The Organization for Economic Co-operation and Development (OECD) regarded RTAs as an accident which occurred or originated on a way or street open to public, resulted in one or more persons being killed or injured, and at least one moving vehicle was involved [10]. Therefore, RTAs are associated with all forms of road and road traffic such as expressways, highways, urban or rural roads or even on new roads. In Malaysia, majority of RTAs occurred in the federal roads where the highest rate of fatalities per kilometre was recorded for expressways [11]. Table I showed the comparison of the number of RTAs occurred on expressways in 2014 and 2015 [12]. It is clearly seen that the number of RTAs for the period of January to December 2015 dramatically increased by 22.6% compared to the same period in 2014. The number of deaths also recorded an increasing of 37.6% from the previous year.

Table- I: Number of Accidents in 2014 and 2015

	2014 (Jan-Dec)	2015 (Jan-Dec)	Difference (%)
Accidents	18,727	22,963	22.6
Deaths	505	695	37.6
Serious Injuries	2,886	3,815	32.2
Minor Injuries	3,367	4,592	36.4

Source: Adapted from [12]

Various explanations have been forwarded regarding to RTAs causation in Malaysia. An increasing in number of vehicles, population and road length have led to the increasing of RTAs [13]. However, human factors mostly related to drivers' behaviour dominating the causation of RTAs in Malaysia. Factors such as high speed, lack of awareness, impatience, careless, selfish, and dangerous driving are among the causation factors of RTAs in Malaysia [14,15,16,17]. In related to the road factors, road defects such as lack of street lighting provision, road shoulder edge drop-off and potholes were the most causation of the total road traffic deaths in Malaysia [11,18]. In relation to vehicles factors, poor maintenance of tires and brakes were among the causation of RTAs reported in Malaysia [19].

It should be noted that most of RTAs studies in Malaysia were conducted in specific areas. Although there revealed several consistent results, nevertheless, the results could not be generalized since they are conducted in difference geographical characteristics. Supporting this, a recent study of [20] concluded that the effects of RTAs in different regions vary due to the unique characteristics in climate effect, economic effect, and influences of calendar effects for each region. The important findings from the above discussions is that although most of the studies have had assigned the RTAs to the human behaviour, nevertheless, other factors such as road factors, and vehicle factors are also seen to have effect on RTAs. Thus, the causations of RTAs are complex in nature and can be ascribed to a combination of several factors.

III. SERVICE QUALITY IN ROAD SECTOR

The concepts of service quality and customer satisfaction have been structured around the way that expectations act as a comparison standard for making satisfaction evaluation [21]. In fact, customer satisfaction is based on the customer experience on a particular service encounter [22]. Hence, service quality is an antecedent of customer satisfaction or customer expectation.

In the road sector, customer refers to different groups of road users with sometimes conflicting needs and priorities [23]. They are not only the direct consumer of entire transport network, but, above all, they are the beneficiary (or the victim) of any plan, design, construct and maintain infrastructure in the future, which are normally determined by related authorities [24]. Thus, satisfaction with road infrastructure derives from the extent to which road users' expectations of the journey outcomes and driving experiences that the roads deliver is met [25]. However, not all road users place importance on the same expectations, it depends on their driving experience while travelling in particular road. For that reason, most of RTAs studies have been conducted in particular road areas.

Extant of literature revealed that only few empirical studies explicitly address the relationship between customers' expectations and satisfaction in the road infrastructure research. Among others, a study on state highways in Georgia, USA, revealed that perceived road conditions, traffic flow, highways safety, and their comparison with expectations have a strong positive effect on satisfaction [26]. A study in Netherlands found a strong influence of the experience with road maintenance process and information provision on road users' satisfaction [27]. Although service quality in road infrastructure is an important issue that needs to be highlighted, however, the exploration is still limited. Indeed, in the construction industry at large, the exploration of service quality and customer satisfaction is under-researched topics and considered as still in its infancy [28,29].

IV. MEASUREMENT CONSTRUCTS

In developing the instrument for analyzing the relationships of RSQ and RTAs from the viewpoint of Malaysia's road users, several related references have been considered as the following:

1) The "Quality Assessment System for Completed Road Work" developed and published by the Construction Industry Board Malaysia in 2011 serves as an independent method to assess and evaluate the quality of workmanship of newly completed road works [30]. The standard was structured around five dimensions of road works service quality: (i) road surface, (ii) slope and retaining structure, (iii) drainage, (iv) bridges and other structures, and (v) traffic and road furniture. Based on these dimensions, the standard represented defect groups as the parameter to benchmark the quality of the road works. However, those parameters are assessed through close observations by the used of either special equipment or visually, and only qualified assessor who certified by the QLASSIC Assessors Certification Training is eligible to carrying out the assessment.
2) A model of RTAs in Turkey developed by [31]. The model assumed that road failure was the significant factor causing RTAs. The study used 72 observation time-series data comprising four time periods over 18 years from 1989 to 2006 and two different causal factors, i.e. factors causing accidents and accidents caused by road defects. The regression analysis confirmed that road failure has affected RTAs in Turkey in term of (i) road pits, (ii) wheel trace, (iii) soft shoulders, (iv) loose material, (v) permanent wave, (vi) deficiency of road signs, and (vii) road settlement.
3) A model called the "Assessment Framework of Road Service Quality from the Point of View of Road Users" developed by [32] to explore how respondents without engineering backgrounds view the road service quality in Taiwan. The framework consisted of five dimensions of road quality service: (i) road safety, (ii) road surface, (iii) road construction, (iv) road management, and (v) road facilities and landscaping.
4) A model of "Toll Road Service Quality" (TRSQ) developed by [33] in Indonesia used in a customer satisfaction survey of 2,082 road users of 11 toll roads in Java. The model consisted of sixteen attributes from seven dimensions of road service quality: (i) information, (ii) accessibility, (ii) reliability, (iv) mobility, (v) safety and security, (vi) rest area, and (vii) responsiveness.
5) A model developed by [34] to evaluate the road service indicators of six highways in the Pune Metropolitan region in India. The model was based on literature review consisting of eighteen service indicators grouped into four road service parameters: (i) quality of road, (ii) safety of road, (iii) security and emergency services of the road, and (iv) road user amenities.

The above references have provided some information regarding the measurement constructs that could be applied for the present study. However, some of the dimensions and elements presented in the models were inappropriate for measuring RSQ from the experience of Malaysia road users for some reasons. In the "Quality Assessment System for Completed Road Work" model, for example, the "slope and retaining structure" dimension measures quality of road works through the elements of slope, retaining structure, slope drainage, above ground services, and slope furniture. To measure this element in service delivery, it is assumed that the assessor must have capability in term of experience and technical knowledge in order to assess this dimension. Although the elements could be assessed visually, they are subjected to site physical inspections which are impossible for road users to evaluate.

The same reasoning applied to the "bridge and other structures" dimension. The elements to be assessed are the above ground bridge elements, and special structures which include piers, abutments, bearing pads and others. To measure these elements, technical knowledge and site physical inspections are required which is irrelevance to the road users. For the remaining dimensions, it is assumed that road users are able to perceive service quality dimensions represented by the variables without requiring specific technical knowledge and site physical inspections. Users observed the service tangibles through their experience while driving along the expressway. They perceived, from the manner in which the service was delivered to them in term of the provided quality. To this end, the three dimensions that could be the potential measurement for measuring the perceived road service quality are (i) road surface, (ii) road drainage, and (iii) traffic and road furniture.

Similarly, the rest of the models may not universally applicable since they were developed and tested in one particular country. Logically, the models were based on the characteristics of the investigated highways and geographical contexts. In addition, most of them have been developed on the basis to inquired users' satisfaction of the quality services of the particular highways. As an alternative approach, the authors have conducted a site visit to the case study area. Based on the authors personal experience while driving along the expressway, and the available of literature, twenty-eight variables grouped into five dimensions of RSQ were considered as the potential dimensions for evaluating RSQ along the case study area.

On the other hand, most of previous researches have assessed RTAs objectively from the available secondary data taken from sources such as the annual road accident statistics reports issued by the police department or road safety authorities [11,35]. However, researcher has argued that this type of RTAs report tends to be inaccurate since the data does not provide details regarding the exact location of the accident, the weather conditions, and the speed at which the accident happened [6]. As an alternative, subjective measures have been used in road safety researches. Objective measures can be described as the actual number or risk of road accidents or injuries, while subjective measures are the feeling or perception of safety, i.e. how people subjectively experience accident risk in traffic [36].

Regarding to the current study, the aims was to assess the road service quality and its relations to RTAs along the ECE2 from the road users' perspectives, and RTAs were treated as the dependent variable.

Thus, objective measured of RTAs could not possible to be used. Indeed, traffic risk perception is highly individual, and depending on experiences with accidents, thus a subjective measure of risk level can be useful [37]. The measurement constructs of RTAs for the current study were measured subjectively based on the actual occurrence of the accidents as perceived by the road users. Table II depicted the overall initial measurement constructs for the current study.

Table- II: Measurement Constructs of RSQ

Item	Dimension	Component	Variable
1.	Road surface	Carriageway	• Potholes and bumps on carriageway • Permanent wave • Road settlement • Water ponding • Improper cross fall • Oily road surfaces
		Shoulder	• Soft shoulders • Insufficient shoulder space • Untidy shoulder • Level gap between shoulder and road surface
2.	Road drainage	Drain and sump	• Too close to the shoulder • Damaged manhole covers • Not functioning
3.	Road furniture	Marking	• Dirty road marking • Invisible road marking
		Traffic sign	• Unclear traffic signs
		Street lighting	• Insufficient street lighting • Poor installation of street lighting
		Guardrail	• Defective guardrail • Too close to carriageway • Inconsistently aligned to carriageway
4.	Rest area	Rest area location	• Uncomfortable for rest • Inappropriate location • Too far between one another
5.	Road maintenance	Maintenance works	• Fast repair of defects • Insufficient traffic signs • Poor workmanships • Repeated construction
6.	Road Traffic Accident	RTAs occurrence	• RTAs in the ECE2 frequently occurred • RTAs in the ECE2 occurred unacceptable rate • Fast response of emergency unit • Effective of accidents handling • The ECE2 is safe for driving

V. RESEARCH METHODOLOGY

The current study applied correlational research design using a quantitative research method to explore the relationships between independent variables (RSQ) and dependent variables (RTAs). The questionnaire was used as a survey instrument which offers the quantitative data collection, analysis, and findings. The questionnaire comprised of 28 items regarding RSQ and five items related to RTAs. Respondents were asked to express their actual experience on service attributes of the expressway and their perception on the occurrence of RTAs along the expressway. A five-point Likert scales (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly agree) was used for each of the item asked. In addition, questions regarding the information background of respondents were also provided.

To ensure the content validity and to detect any difficulties for respondents while answering the questions and to eliminate any problems in recording the data mistake, three measures were applied. First, the supervisors were consulted to comment on the clarity, relevance, and technical accuracy of the draft instrument. Second, two industry practitioners who have experience in road projects were consulted to validate content of the questionnaire and to check the accuracy of each item asked. All feedbacks were carefully considered and refinements of the questionnaire were made. Third, a pilot study was conducted to test the efficiency of the survey instrument.

The refined instrument was then pilot-tested. However, the number of respondents for the pilot study has not been established in literature. It could depend on the research questions, research objectives, size of research project, available of resources, i.e. time and money, and how well the questionnaire initially designed [38]. As a guideline, a minimum number of 10 respondents are adequate for a pilot study for most student questionnaires [39]. In fact, no matter how many the respondents are, but the most important is to pilot the questionnaire of which some ideas of the questionnaire's face validity could be obtained [38].

Therefore, the current study employed 24 respondents for the pilot study, each six for each population groups, which equivalent to 10% of the actual sample size. The target population of the current study was the main users of the expressway, and can be categorised into four distinctive groups: (i) motorcyclists, (ii) motorists, (iii) bus drivers, and (iv) truck drivers. All completed questionnaires were analysed using SPSS 20.0 software.

The non-probability sampling techniques were adopted for data inquiries. The convenience sampling technique is the best suited for the ecological data where the data is collected along the roads, trails or utility corridors as the case of the current study [40]. In addition, the population of the current study which specifically categorised into four distinctive groups is likely synonym with quota sampling technique. In quota sampling technique researcher is guided by some evident of characteristic [41]. In the case of the current study, the control categories for quotas were motorcyclists, motorists, bus drivers, and truck drivers. The survey questionnaire was self-completed by the respondents, with assistance available if required. Considering the nature of the current study, the delivery and collection type questionnaires were employed [38]. In particular, the questionnaire was delivered by hand to each respondent who stopped at the Rest and Service Areas along the expressway and those who willing to participate in the survey were given a questionnaire to fill.

The questionnaire was then collected about 15 minutes later. As consistent with the used of convenience-quota sampling technique, the survey questionnaire was conveniently administered to the four distinctive groups of population. Each group may have a difference viewed and experienced about the road quality service and RTAs of the case study area. The survey was conducted continually until reach the targeted 24 samples. The returned questionnaires were checked for completeness. Data from complete questionnaires was coded into numerical values for analyses.

VI. RESULT AND DISCUSSION

A. Demographic Characteristics

Demographic analysis has been described in terms of population group, gender, age, educational level, occupation, type of vehicle, average distance travel per year, frequency of travelling via the case study expressway, reasons of travelling via the case study expressway, and personal experienced accident(s) along the case study expressway. The frequency analysis indicated that:

1) Each 25% of respondents grouped into motorcyclists, motorists, bus drivers, and truck drivers which incorporated to the used of convenience-quota sampling technique.
2) 70.8% of respondents were male, and the remaining 29.2% were female.
3) 37.5% of respondents aged between 21-30 years old, 25.0% between 41-50 years old, and both 16.7% between 31-40 years old and over 50 years old, and only 4.2% of respondents less than 20 years old.
4) 37.5% of the respondents having bachelor's degree, 25.0% completed secondary school, 16.7% graduated with master's degree, 12.5% completed high school, and the remaining 8.3% held diploma.
5) 50% of respondents worked as driver, 16.7% were teachers or lecturers, 12.5% worked in private sector, both 8.3% were businessman and self-employed, and others 4.2% were public officers.
6) 37.5% of respondents travelled an average of less than 20,000 km per year, 25% travelled between 20,001-40,000 km per year, 20.8% travelled between 80,001-100,000 km per year, 8.3% travelled between 40,001-60,000 km per year, and both 4.2% travelled at an average of 60,001-80,000 km and over 100,000 km yearly.
7) In the case of frequency of travelling along the ECE2, 45.8% of respondents declared that they travelled once a month, 29.2% travelled every day, 16.7% travelled more than once a month, and both 4.2% reported that they travelled 2-3 times a week and 4-6 times a week.
8) 62.5% of respondents reported that official work as the main reason for travelling along the ECE2, 20.8% return to hometown, and 16.7% holidays.
9) Only 8.3% of respondents declared that they experienced in RTAs along the ECE2. The respondents perceived that road factors and vehicle factors were the causation of RTAs which account for 4.2% each.

B. Exploratory Factor Analysis and Reliability Test

Table IV depicted the results of the exploratory factor analysis (EFA) of the independent variables (road surface, road drainage, road furniture, rest area, and road maintenance) and the dependent variables (road traffic accidents).

Table- IV: EFA and Cronbach's Alpha

	Item	Loading	Cronbach's Alpha
A.	*Road Surface*		*0.834*
1.	Potholes and bumps on carriageway	0.689	
2.	Permanent wave	0.645	
3.	Road settlement	0.640	
4.	Water pounding	0.803	
5.	Improper cross fall	0.750	
6.	Oily road surfaces	0.728	
7.	Soft shoulders	0.742	
8.	Insufficient shoulder space	0.954	
9.	Untidy shoulder	0.902	
10.	Level gap between shoulder and road surface	0.728	
B.	*Road Drainage*		*0.810*
11.	Too close to the shoulder	0.810	
12.	Damaged manhole covers	0.882	
13.	Not functioning	0.867	
C.	*Road Furniture*		*0.887*
14.	Dirty road marking	0.702	
15.	Invisible road marking	0.802	
16.	Unclear traffic signs	0.843	
17.	Insufficient street lighting	0.739	
18.	Poor installation of street lighting	0.814	
19.	Defective guardrail	0.767	
20.	Too close to carriageway	0.859	
21.	Inconsistently aligned to carriageway	0.782	
D.	*Rest Area*		*0.765*
22.	Uncomfortable for rest	0.731	
23.	Inappropriate location	0.940	
24.	Too far between one another	0.814	
E.	*Road Maintenance*		*0.739*
25.	Fast repair of defects	0.907	
26.	Insufficient traffic signs	0.694	
27.	Poor workmanships	0.964	
28.	Repeated construction	0.723	
F.	*Road Traffic Accident*		*0.829*
29.	Frequently occurred	0.824	
30.	Occurred in unacceptable rate	0.938	
31.	Fast response of emergency unit	0.912	
32.	Effective of accidents handling	0.882	
33.	ECE2 is safe for driving	0.862	

All the 33 items are subjected to the EFA with varimax normalized rotation. A factor loading of 0.60 is regarded as good and significant [42]. The results revealed that all items recorded value of more than 0.60 with 0.954 was the highest value and 0.640 was the lowest value. This implies that all constructs have achieved eigenvalues greater than one and considered as significant.

The reliability of the measurement tool was tested according to Cronbach's alpha coefficient analysis. Reliability is the measurement of internal consistency which indicates the ability of the measurement tool to accurately measure the true value [43]. Cronbach's alpha is therefore, evaluates the extent to which all the items in a test measure the same concept or construct, and connected to the inter-relatedness of the items within the test [44]. The higher the alpha coefficient is, the more reliable the instrument is [45].

The results revealed that all of the items achieved Cronbach's alpha coefficient more than 0.7 with the highest value of 0.887 demonstrated by the constructs of Road Furniture, and the lowest value of 0.739 was Road Maintenance. In particular, Road Furniture, Road Surface, Road Traffic Accidents, and Road Drainage recorded Cronbach's alpha coefficient of 0.887, 0.834, 0.829, and 0.810, respectively and seemed to have achieved good reliability [45]. In the case of Road Furniture, for example, 88.7% of the variability of the observed or measured value is "true" whereas only 11.3% of the variability is due to random error. On the other hand, Cronbach's alpha coefficient for Rest Area, and Road Maintenance were found to be 0.765 and 0.739, respectively which indicated an accepted reliability [45].

VII. CONCLUSION

RTAs constitute a serious public health challenge to the Malaysia. Various efforts have been made to account for the significant reduction in RTAs, however, the number of RTAs in Malaysia is still increasing with no signs of substantial declined. It is argued here that an effective mitigation effort will only make sense if the bottom-line causation of RTAs is well defined. By understanding the bottom-line causation of RTAs, it is intrinsic to their successful prevention. Therefore, the central focus of the current study was to investigate on the relationships of RSQ and RTAs from the Malaysian road users' perspectives. Yet, the links between road service quality and RTAs has not been fully recognised and less covered in the literature.

A part of on-going study, the purpose of this paper was to evolve a measurement instrument for exploring the relationships of RSQ and RTAs along the ECE2 from the road users' perspectives. The identified components for RSQ were road surface, road drainage, road furniture, rest area, and road maintenance comprising a total of 28 items, and five items for RTAs. These components were included in the measurement instrument that could be used for further empirical investigation. The pilot study undertaken was to test the feasibility of the instrument in term validity and reliability. The EFA and the Cronbach's alpha coefficient analyses revealed satisfactory which confirmed that all constructs have good validity and reliability. The results have pointed to the indication that the measurement instrument reported here reached the accepted levels of internal reliability. It can be concluded that the developed instrument able to collect sound quality survey data which would enable the next stage of the study draws a valid and generalized conclusion. This paper highlighted the value of pilot testing in terms of improving the design of research studies, adds to the body of knowledge on pilot studies, and contributes to the development of best practices in RTAs research. Finally, the outcomes of the study should become a source for policy makers or local authorities to have better understanding of the safety outcomes of road service quality from which the prevention measures of RTAs could be improved.

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