

# ADVANCES IN TRANSPORTATION STUDIES

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Section A



## Developing a reliable estimate for value of time for transportation projects

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### **Abstract**

Value of Time (VOT) is a key parameter used to quantify the economic benefits of travel time savings due to transportation infrastructure development projects. Different methods are used to estimate VOT which depends on factors such as income, trip purpose and trip duration. Simple and accurate method for estimating VOT is necessary especially for developing countries where detailed information is not available. In Sri Lanka, VOT has not been updated for long period due to several reasons, where lack of information and identification of an appropriate method being one of the main reasons. Therefore, there is a need to estimate the VOT and a simple but accurate enough methodology is proposed to frequently update VOT estimate based on current economic and social conditions. The methodology has been developed consisting of 3 pronged approach to calculate the VOT and in order to verify the developed methodology, a case study was carried out. As for the first approach, Gross Domestic Product (GDP) has been used to obtain a general value for the VOT of an average person. A willingness to pay survey has also been conducted using a sample of 3,317 vehicle users to obtain a base value for the minimum VOT of a person for non-work based trips. A more detailed analysis was also conducted using the income based approach. Five user categories were taken into account, namely the car passengers, SUV passengers, van passengers, bus passengers and motorcycle / three wheeler passengers. Different VOT values were obtained for each category varying from Rs.528/hr (\$3.52) to Rs.188/h (\$1.25) highest for SUV users and lowest for public transport users. In order to update the VOT for future periods, it was found that Colombo Consumers Price Index (CCPI) is directly co-related with VOT inflations over the past decades and can be used as an index to update VOT.

*Keywords – VOT, willingness to pay, GDP, transport economics*

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### **1. Introduction**

In transportation economics, value of time (VOT) refers to the opportunity cost of time spent on travelling. A cost benefit analysis is often carried out in order to evaluate its economic viability in transportation project appraisal [30]. VOT is a significant parameter which is used to obtain a measurable benefit for any transportation project based on travel time savings. Therefore, VOT is a key input parameter in economic evaluation methods including the HDM 4 software, widely used in transportation projects funded by World Bank [28].

It has been found that the VOT of a person vary with the travel purpose and the individual socio-economic environments [20]. Further, some empirical studies suggest that the value of travel time savings is also a function of trip length [18]. It is also found that the VOT significantly affect the transportation mode selection [35].

There are number of methodologies developed to calculate the VOT considering different road user categories (vehicle types), income levels, geographic location (urban/rural), trip purpose, commodity type and time of the day. For example, the typical values which are used for European transport project evaluations are £21 per hour for business purpose trips, £6 per hour for private purpose trips and £4 per hour for leisure purpose trips [15].

The VOT used in Sri Lanka at present, considering the all vehicle user categories, is Rs.25 per hour (\$0.17) in 1999 Rupees [11]. This value is adjusted to current prices using Colombo Consumers Price Index (CCPI). However, the existing methods to calculate the VOT in Sri Lanka have been by far outdated, due to the usage of single vehicle category estimates. Further, the existing methodology does not account for trip purpose. This results in most of the estimates giving an inaccurate value, when it comes to project evaluations and the benefits are most of the time underestimated. Therefore it is required to determine a more reliable value with more up to date information which is representative of present vehicle users in Sri Lanka. Thus, important case study considering the context of Sri Lanka is addressed in the research.

The objective of the research is to compute a more reliable estimate for the “VOT” for present and also to propose a simple methodology to estimate the VOT for future periods.

## **2. Literature review**

Based on the related studies found on VOT, important insights were obtained. VOT can be considered as a limitation that respond in many studies. Different types of studies for determination of VOT have been conducted considering the passenger trips for different geographical areas of the world using several models, addressing occasions where transportation meets economy science. Not only in passenger transportation, but VOT has also been a key parameter for commodity transportation and related analysis too [4]. In estimating commuters’ VOT discrete choice models such as disaggregate binary choice models [1, 12] and nested logit models [22] were used relying on traveller survey data. Further, time-cost algorithms [13] and incident resolution time and value models [14, 21] were also developed to quantify the VOT savings under different circumstances. Delay fee models are also developed to quantify the costs resulting in a particular traffic congestion [9].

At the same time, understanding the user behaviour, especially with mode or route choices, is an important aspect in VOT determination [23]. Even when the tolled roads are available, understanding the cognitive behaviour of individuals does play a major role with the effects of willingness to pay for a particular mode [23].

Further, one of the dominant empirical approach when determining VOT is to rely on experiments when the respondents are the major source of data extractions [26], where the travellers are expected to pay the travel costs from their own as an exchange to the expected travel time savings. Mouter and Chorus [26] further argue that travel time savings obtaining from a government initiative can be valued more than that obtained from a person’s own choice.

Value of travel time is also a function of time, trip length, journey purpose, mode, income and gross domestic product (GDP) [32]. The variables such as income, trip length, work trips have a positive correlation with the value of travel time [2] and it is important to understand that the variation of VOT is a limitation in most of the cases. The variation of travel time has also been a key area for research, where Senna [24] has assessed the variation of VOT using expected utility and mean standard deviation approaches. Metz [24] argues the need for assessing the effects of temporal variation of land use also in determining value of travel time, referring to the United Kingdom policy objectives in valuing transport investments. However, most of the above methods

require complex and sophisticated data as input variables for the models, which are not available in developing countries.

However, a typical uncertainty is paramount with the estimation and appraisal of VOT and it is needed to continuously update the VOT in order to avoid excessive temporal variations in VOT [33].

### *2.1. VOT for Sri Lanka*

With the boost experienced in the construction industry after 2010, number of mega scale transportation projects have emerged in Sri Lanka, where the VOT estimate was of utmost importance. However, limited number of studies has been conducted, focussing on calculating the VOT for the Sri Lankan context.

It is needed to update the VOT regularly since the social and economic conditions of an economy changes rapidly with the infrastructure development.

According to Department of National Planning [11] the VOT of people for Sri Lanka considering the all motorized vehicle users is Rs.25 per hour (\$0.17) in 1999. In order to estimate the VOT in the future years, the study has proposed to use the CCPI, which is calculated annually as an index, for future years. The above values cannot be used any more, even though they are adjusted with CCPI [10], where most of the values are under estimated for today's context.

Referring to a VOT for all vehicle types is not enough since with the newer developments being carried out, VOT for each vehicle category should be obtained. For example, the expressways only allow specific vehicle categories and there are initiatives for public transport only developments also.

### *2.2. Methods used to calculate the VOTs*

According to literature, number of methods are used in calculating VOT savings. The commonly used methods are identified below.

- Wage rate or cost savings model (Income based analysis)
- Hensher model
- Mode Choice Approach
- Willingness to pay analysis
- Gross Domestic Product

#### *2.2.1. Wage rate model or cost savings model (income based analysis)*

Wage rate or cost savings model is mainly based on the theory of marginal productivity [34]. It suggests that VOT of work based trips is the wage rate plus the overheads associated with the work. Number of research have been conducted to obtain the VOT of the work based trips focussing on the wage rate or cost savings model.

Börjesson and Eliasson [5] mention that the VOT of cyclists is estimated as €16 (\$17.9) per hour for those who are using streets and €11(\$12.3) per hour for those who are using bike lanes. It is also essential to mention that the respondents have also valued the additional health benefits of cycling as well, when determining the VOT.

Belosic [3] found out the tools and the methodologies available to calculate the VOT. It further states that the VOT with respect to business can be calculated using the Equation (1).

$$VOT = \frac{(\text{Annual salary} + \text{monetary value of benefits})}{\text{Number of real hours worked in a year}} \quad (1)$$

The VOT for France has been obtained using income based approach and it has been categorized with respect to the purpose of the trips. In that research, professional trips are valued at \$17.5 per hour, home-work based trips at \$10.0 per hour and other trips are valued at \$6.8 per hour [25].

However, this model assumes the full savings are transferred to work based trips which might not be reliable and accurate, since all the travel time savings do not necessarily generate the expected income. Further, the method values the in-work time savings based on wage rate plus overhead costs which would make it more complicated for developing countries with various overhead costs being required in the models.

#### 2.2.2. Hensher model

Hensher model is mainly focussed on modifying the VOTs obtained through number of methodologies with the use of several factors. For example, the cost savings approach transfers the full time savings for money, but there can be occasions where the travel time may be utilized for leisure activities. The Hensher method focuses on such situations, in order to reduce the value of travel time for those instances [19].

Further, Hensher method accounts for the travel time utilized for productive activities, where the cost savings approach does not account for that [34].

Based on a study in 1986, it is mentioned that Hensher model gives valuations which are closely going in line with traditional cost savings approach [31]. Therefore, when Hensher model is compared with the traditional cost savings approach, it is decided to use the latter to be considered as official appraisal forecasts for the Department of Transportation. However, with the modifications and the improvement proposed to Hensher model, number of other parameters were also introduced such as travel time related to leisure trip, which is important as the travelling is considered as a negative attribute in most of the cases [31].

However, for the context of developing countries using Hensher model would still be questionable due to the lack of data available and the difficulty in obtaining detailed and sophisticated information.

#### 2.2.3. Mode choice approach

Value of travel time can also be determined by the use of mode choice approach [16], where significant amount of research are conducted. Mode Choice is highly used in travel demand modelling which can significantly affect the congestion in the entire road network and can be useful in minimizing the total travel cost attributed for a particular journey [17].

The mode attributes such as travel cost and travel time are often considered as utility attributes when determination of VOT using mode choice approach [1] [6]. Use of traveller attributes such as income and car ownerships are also useful in developing the models [1].

However, the main limitations in applying approaches such as mode choice for value of travel time estimates for developing countries are the unavailability of various travel cost, time data, traveller attributes and utility attributes.

#### 2.2.4. Willingness to pay analysis

The main aim of conducting a willingness to pay analysis is to obtain the price, a person is willing to pay, for using a particular transportation route/mode and in turn obtain a VOT.

“Willingness to pay analysis” has also been used as a tool for calculating the VOT in other countries specially in calculating the VOT for work based and non-work based trips. However, in most research, it is argued that the estimates for VOTs which are arrived through willingness to pay



analysis do not reflect the true VOT. Merket and Beck [23] argue that time is a scarce resource, but direct use of willingness to pay values for social appraisal is inappropriate. Therefore it can be argued that estimates obtained under willingness to pay analysis do not reflect the work based trips VOT but the non-work based trips VOT.

Victoria Transport Policy Institute [29] states that that the VOT of people at New Jersey would be varying from US \$ 10 -40 per hour, which is calculated based on the willingness to pay analysis data and can be considered as VOT for non-work based trips.

### 2.2.5. Gross Domestic Product

Gross domestic product was used as a tool in calculating VOT for other countries. Therefore, as part of the literature review the general values for GDP of Sri Lanka and the growth has been considered (Table 1).

It is argued in this research that the above GDP based method can be used for obtaining a general understanding of a country’s VOT without a detailed investigation.

### 2.3. Summary of the findings of literature review

Table 2 would summarize the different values of estimates for value of travel time used in different countries.

Summary of the methods that were reviewed in detail is presented in Table 3.

Referring to literature it can be concluded that out of the 5 methods mentioned, GDP based method, Willingness to pay method and wage rate model would require data that is easily accessible, where Mode Choice and Hensher model may need some amount of sophisticated data for analysis work. As for the condition of developing countries, generating sophisticated and complex data will not be feasible and thus proper and combined tools and techniques should be developed to estimate a reliable estimate for VOT.

Tab. 1 - Gross Domestic Product of Sri Lanka [8]

Year	2010	2011	2012	2013	2014
GDP (At current prices) (Rs.)	5,604,104	6,543,313	7,578,554	8,674,230	9,784,672
GDP (2002 Constant prices) (Rs.)	2,645,542	2,863,691	3,045,288	3,266,041	3,506,664
Growth(Based on constant prices)		8.25%	6.34%	7.25%	7.37%

Tab. 2 - Summary of Value of Time for different countries

Year of Study	Country	Mode	VOT
2012	Sweden	Cyclists - street	16 euros (\$17.9)
		Cyclists - bike lane	11 euros (\$12.3.)
2015	France	Professional trips	\$17.50
		Home-work based trips	\$10.00
		Other trips	\$6.80
2013	New - Jersey - US	General	Can vary from \$10-40

Tab. 3 - Summary of methods for value of time estimations

Method	Main parameters	Applicability for developing countries / Data availability/ Remarks
Wage Rate Model	Salary/income/Monetary benefits/ working period	Can be applied since Central Banks produce reports
Hensher Model	Employer and employee value/ Network user charges/ Change of income and attributes /Leisure travels	Availability of data is very limited
Mode Choice Approach	Travel cost/time/ income/ car ownership	No particular centralized database is available to access data
Willingness to pay analysis	Income/ non-work based time and value	Can be made available through surveys conducted
Gross Domestic Product	Gross domestic product/ total population/ per capita income	Available through central bank annual reports

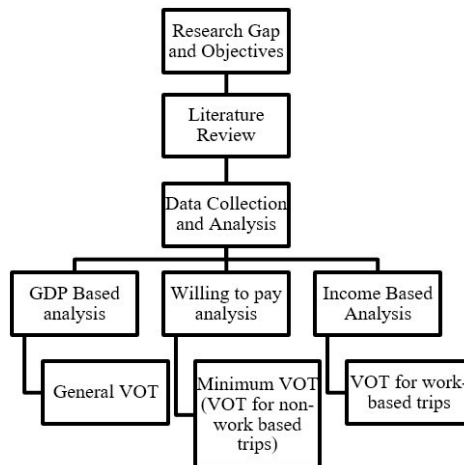


Fig. 1 - Study framework

### 3. Methodology

Based on the findings of the literature review a comprehensive methodology was developed to be used for estimating the VOT for transportation projects.

The study framework used for the research comprises of a three pronged approach and is presented in the Figure 1.

#### 3.1. Method 1: GDP based technique

As identified in Section 2.2.5 in order to have a general understanding on the VOT for a country, it is necessary to identify the VOT based on the Gross Domestic Product (GDP), which is available in literature. The GDP based technique is specifically used in the research in order to approach and proceed with the research.

With the data being obtained based on the GDP, the VOT of a person can be calculated using the Equation (2). When calculating the VOT of a person, it has been assumed that an average person would work for 40 hours per week over a period of 50 weeks per year [11].

$$\text{Value of time} = \frac{\text{Gross Domestic Product}}{\text{Mid year Population} \times (40 \times 50)} \quad (2)$$

The value that will be obtained in this method can be used to obtain a general VOT of a person considering the total population. The advantage of this method is that it gives a general understanding of VOT, since the GDP is calculated based on the productive work that has been generated throughout a year all over the country. However, it is argued that the estimate which is calculated through GDP is of limited usage, since it is not categorized to transport modes, income levels or trip purpose.

### *3.2. Method 2: Willingness to pay analysis based technique (for non-work based trips)*

Further to the section 2.2.4, it is argued in this research, that the VOT that is generated from “Willingness to Pay” can be considered as the VOT of a person for non-work based trips [29]. The rationale behind this is the travel time savings of the non-work based trips would be used by a road user for his leisure activities. Therefore, the price that would be getting would reflect his opportunity cost of that leisure activity, which would be the value of one’s time for non-work based trips. However this would heavily depend upon the social and cultural factors of a particular society.

What is expected from a willingness to pay analysis is that a question is asked about a fee that a person is willing to pay for using a particular transport initiative. For example, an unbiased sample needs to be first identified, where most of the times random sampling techniques are being used. From the interviewees, few questions are asked in order to arrive at a judgemental response based on their own logic. In this research few questions are asked from the users on how much they are willing to pay for a 30 km long trip which is generally taking 1 hour, to get it reduced to 20 minutes was used.

It can be argued that the willingness to pay analysis would reflect the minimum estimate of an individual VOT. When individuals express the price they are willing to pay as a toll to save time from their journey, they will always factor in a net saving for them after paying the toll for the particular trip. Therefore, it is prudent to assume that the values given in such surveys are at the lower end of the actual VOT of a person and can be considered as the minimum VOT for non-work based trips.

### *3.3. Method 3: Wage rate based method (for work based trips)*

As mentioned in 2.2.1 wage rate model, which is based on the income, was used to estimate the VOT of people. In calculating the benefits arising from transportation projects, the main concern is to identify the value of the total time savings.

It is essential to categorize the VOT using the mode of transportation, such as the private transportation and public transportation. This can even be categorized further, for the type of vehicles as well. In terms of data collection and the availability, the easiest way is to obtain data on the transport mode which is mainly focused on this research.

If the average monthly income of people using different types of transport modes can be obtained, the estimates of the VOT can be obtained from the Equation (3) for respective transport mode assuming the a person is working on average 40 hours per week into 50 weeks per year. The assumptions based on the methodology are clearly justified by the field data when considering the case study of Sri Lanka.

$$\text{Value of time for work based trips} = \frac{\text{Average Monthly Income} \times 12}{(40 \times 50)} \quad (3)$$

### 3.4. Estimating VOT for future years

One of the main shortcomings of the existing methodologies is that no proper techniques are available which will account the effects of interest rates, consumer behaviours and inflation. Therefore, the estimate for VOT obtained needs to be updated over the years and there should be a reliable methodology to follow. In this research mainly two indices have been considered to update the VOT.

- Wage Rate indices
- CCPI

## 4. Case study for Sri Lanka

Almost all the transport projects in Sri Lanka currently use a single value for VOT. In order to have a more realistic and reliable value, the VOT needs revision, accounting for different user categories at present. Therefore, a case study was conducted for a developing country, Sri Lanka. The methodology produced in this research could be used to obtain an estimate for VOT for Sri Lanka for the present condition, since the VOT, currently being used is thus far outdated, giving an underestimated value in benefit calculations in evaluating projects.

### 4.1. Method 1: GDP based technique

As per the section 3.1 the GDP values for Sri Lanka along with the mid-year population were obtained using the Annual Reports of Central Bank of Sri Lanka over the past 20 years.

By considering the above data and using the equation (2), GDP per hour is calculated. This is the general VOT of a Person and the values are obtained for the past 20 years as mentioned in the Figure 2.

The general VOT obtained through the GDP is Rs. 211.74/hour (\$1.41) and Rs. 236.63/hour (\$1.57) for the years 2013 and 2014 respectively. Based on the above calculations, the VOT for 1999 Rs.29/ hour, which is even higher than the value used as the base value for 1999 for motorized transport, Rs.25/hour and the same occurs when adjusted with CCPI for the present context. This also suggests that a revision is required for VOT estimations for Sri Lanka.

VOT which is obtained through the Gross Domestic Product of a country would reflect the average value of a person considering the total population, which would consist of people who will not even benefit from transportation infrastructure projects especially in rural areas. Thus, an underestimated value would be generally obtained using GDP based techniques.

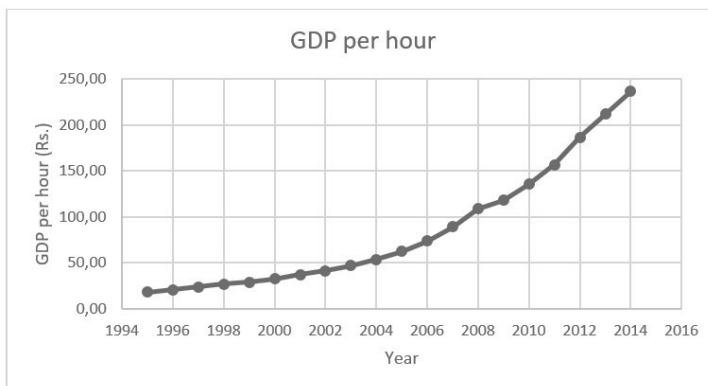


Fig. 2 - GDP per hour (General VOT)

Therefore, it can be concluded that the general VOT, obtained through GDP would most of the times be less than the VOTs that are obtained through other mechanisms.

4.2. Method 2: Willingness to pay analysis based technique (for non-work based trips)

As for the Method 2, willingness to pay analysis has been conducted where the first step was to obtain an unbiased sample using random sample techniques.

The survey was part of a wider survey which was conducted for an econometric analysis of Ruwanpura Expressway, over a period of 1 month in 2016. The survey was carried out at 16 locations, in the existing main arterial roads for a total sample of 3317 vehicle users by stopping the random vehicles and distributing the questionnaire forms as mentioned in Figure 3.

As mentioned in the methodology, the respondents were asked to give a price that they are willing to pay for a 30km long trip which is generally taking 1 hour to get it reduced to 20 minutes.

The values obtained were considered as the minimum value of a person for saving 40 minutes of one’s time. It was then converted to 1 hour to reflect the minimum VOT of a person per hour.

In deriving the results under willingness to pay analysis, six income categories and the respective transport modes were first identified. The survey data was first categorised into the above six categories and the average values of the respective categories were identified. The results were as mentioned in Table 4.

It can be seen from the results that even the minimum VOT, which is the VOT for non-work based trips, that is obtained through the willingness to pay analysis is more than the VOT used currently for economic feasibility assessment in Sri Lanka, which is Rs.180/hour (\$1.20).

Therefore the research could be further progressed to obtain a representative estimate of VOT of a person based on the wage rate or cost savings model.

Vehicle Type		Category			Occupancy			Origin		Type of Origin		Destination		Type of Destination	
	Car	1	Private	1	1	1	Village/GN Division		Home	1	Village/GN Division		Home	1	
	Jeep/Pickup	2	Official	2	2	2			Work	2			Work	2	
	Van	3	Hired	3	3	3	DS Division		School/Educ.	3	DS Division		School/Educ.	3	
	Special Bus	4	Chartered	4	4	4			Business	4			Business	4	
Approx Travel Time				Other	5	5	District/Province		Social	5	District/Province		Social	5	
H	H	M	M	6 or more					Recreational	6			Recreational	6	
				Monthly Income Range Rs.	<25,000	1	50,000-75,000	3	100,000-200,000	5	Willingness to pay (1 hr trip -30 km, in 20 min)				
					25,000-50,000	2	75,000-100,000	4	>200,000	6					

Fig. 3 - Questionnaire form used

Tab. 4 - Willingness to pay analysis results

Income Category	Monthly Income Range (Rs.)	Dominant Transport Mode	No. of respondents	Minimum VOT (for 1 hour in LKR)
1	< 25,000	Public Transport	223	174 (\$1.16)
2	25,000 - 50,000	Motorcycle/ Three Wheel	598	222 (\$1.48)
3	50,000 - 75,000	Van	1,456	268 (\$1.79)
4	75,000 - 100,000	Car/SUV	626	295 (\$1.97)
5	100,000–200,000	Car/SUV	200	297 (\$1.98)
6	> 200,000	Car/SUV	138	405 (\$2.70)

**4.3. Method 3: Wage rate based method (for work based trips)**

It is important to obtain a more reliable estimate for VOT, as it was proved from the earlier methods, the VOTs that are currently been used are too low. The wage rate model has been used to obtain a more reliable estimate of the VOT for the Sri Lankan context.

The same sample and the survey questionnaire forms were used for the wage rate based method as well and when the additional data was needed reliable literature from the department of census and statistics was also referred [7]. For determination of the VOT, five main vehicle categories were identified as mentioned below.

- Public Transport
- Motor Cycles and Three wheelers
- Van
- Car
- SUV

Next step was to calculate the average monthly income of users in each category. For this purpose, data obtained through willingness to pay analysis and the data obtained through the surveys done by the Department of Census and Statistics were used. The average incomes obtained through the above sources are mentioned in Table 5.

The above average monthly incomes obtained, were then converted to hourly income, which was considered as the VOT of a person per hour for work based trips using the Equation (3).

When calculating this VOT per hour, as earlier it was assumed that a person would work 40 hours per week for 50 weeks for one year. The results obtained through the analysis is mentioned in the Table 6.

Therefore, the values obtained would clearly highlight that the existing values of time used, which is Rs.180/hour (\$1.20) is too low.

Tab. 5 - Average Monthly Income [7]

Vehicle Category	Average Monthly Income (Rs.)
Public Transport	31,254 (\$208.36)
Motor Cycle and 3 wheel	39,345 (\$262.30)
Van	59,907 (\$399.38)
Car	85,325 (\$568.83)
SUV	87,993 (\$586.62)

Tab. 6 - Results from income based approach

Vehicle Category	Average Monthly Income (LKR)	Average Hourly Income (VOT for work based trips) (LKR)
Public Transport	31,254 (\$208.36)	188 (\$1.25)
Motor Cycle/ 3 wheel	39,345 (\$262.30)	236 (\$1.57)
Van	59,907 (\$399.38)	359 (\$2.39)
Car	85,325 (\$568.83)	512 (\$3.41)
SUV	87,993 (\$586.62)	528 (\$3.52)

#### 4.4. Estimating VOT for future years

The presently used method to update the VOT over the years is to use CCPI [11]. CCPI is calculated each year in Sri Lanka, having a base year as 2013 currently [10]. CCPI was recommended for future as well, since it directly reflects the income potential and the increase of the citizens through the purchasing power changes over time, which is directly linked with the value of time of a person.

However, wage rate indices was not recommended due to the limitations such as not accounting for the income generated through the businesses, income of some private sector categories, and income from self-employment.

Therefore, CCPI has been recommended as the reliable updating method over the years to account for effects of inflation and growth. This method can be used as CCPI is calculated for Sri Lanka for each year.

#### 4.5. Summary of the results

The general VOT which is obtained through the GDP is Rs.236/hour (\$1.57) and the minimum VOT obtained through the willingness to pay analysis for non-work based trips was varying from Rs.174/hour (\$1.16) to Rs.405/hour (\$2.70) (Table 7).

With respect to the car and SUV users the VOT obtained through the income based approach are Rs.512/hour (\$3.41) and Rs.528/hour (\$3.52) respectively and that of the van users was Rs.359/hour (\$2.39). The VOT for motor cycle and three wheel users was Rs.236/hour (\$1.57), whereas that of the public transport users was Rs.188/hour (\$1.25) (Table7).

### 5. Conclusions and recommendations

This research has been conducted to update the VOT that is currently used in Sri Lanka, since it is considered as outdated and not suitable for the current context, considering the present socio and economic conditions. Since VOT and variation of VOT is a limitation that is crucial in most of the studies, a solid methodology with a three pronged approach was developed to obtain a reliable estimate for a developing country and a case study was carried out for the context of Sri Lanka.

The first two methods were aimed at identifying the general VOT and the minimum VOT which is the VOT for non-work based trips. These values are methodologically derived using the study framework proposed in this research study.

Tab. 7 - Summary of the results and conclusion

GDP Based VOT	Transport Mode	VOT of a person (Rs. Per hour)	
		For non-work based trips	For work based trips
Rs.236 (\$1.57) per hour for all the vehicle categories	Public Transport	174 (\$1.16)	188 (\$1.25)
	Motor Cycle/3 wheel	222 (\$1.48)	236 (\$1.57)
	Van	268 (\$1.79)	359 (\$2.39)
	Car	296 (\$1.97)	512 (\$3.41)
	SUV	405 (\$2.70)	528 (\$3.52)

Both the values obtained above are higher than the value that is currently been used for transportation projects in Sri Lanka. Since the general and minimum values are more than the practically used value, it is required to obtain a reliable estimate for the VOT using income based approach.

Finally it is recommended to link the VOT to the CCPI in order to update the VOT over the coming years.

The main limitation of the study is the non-availability of required data for all the modes separately, so that all the different transport modes could have been addressed. It is also recommended for future researchers to update the value of time using CCPI.

Therefore, the developed methodology and estimates of Value of Time can be used explicitly in transportation and infrastructure development projects in judging the feasibility when linked with CCPI for future years.

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