Tuijin Jishu/Journal of Propulsion Technology
ISSN: 1001-4055
Vol. 44 No. 2 (2023)

# A Study on the Peruvian Public Transportation & ITS Supply Policy

**Prof. Dr. Yeon Soo Kim**[1]
Main Author: Professor: Ph. D. YEON SOO KIM:
National University of Engineering, Faculty of Civil Engineering (UNI-FIC), Department of Road and Geometrics, and, Director of ITS & Smart City Institute.
Email: ysook@uni.edu.pe
Second Email: ikitesoo@naver.com
ORCID= 0000 0003 0000 0986

Co- Author: Doctoral Student. **Victor Pool Rojas- Yupanqui**
Department of Basic Sciences at Civil Engineering College, National University of Engineering, 210 Tupac AmaruEmail vrojasy@uni.edu.pe

Corresponding Author: **Prof. Dr. Daegeon Kim**
Department of Public Administration, School of Public Administration and Psychology, College of Social Science,Kangwon National University, Republic of Korea
Email daegeonkim@kangwon.ac.kr
second Email: daegeonkim@daum.net
ORCID: 0000-0003-2573-3123

**Abstract**
The city of Lima, the capital of Peru, is divided into 49 districts. Population has of approximately 12 million of population covering up the Lima & Callao. More than 80% of people mobility is covered by city's public transport system. There are threetypes of urban transportation for the transport service system: traditional, massive and corridor. Nevertheless, it is not sufficiently and the urban transport service is less effective and inefficient. These are some of the main reasons why the urbantransport problem has become a serious social problem. Traffic congestion, traffic accident and traffic CO2 pollution are consequences of this issue. Furthermore, population demand the change in the city's public transportation service system. In this paper a comprehensive approach to the problem is presented in order to propose a solution to the urban transportation system in Lima. We are trying to supply and apply Intelligence Transportation System (ITS) concept, which is intended as an alternative policy for public transportation. This ITS policy proposal and the change on public transportation service system expected have been formulated in consideration of the Peruvian's ITS regulation. This research was intended to show the possibility of the changes of the public transportation service and ITS policy considering the Peruvian's transportation service style.

## 1. Introduction

Lima & Callao multicultural city with people of diverse ethnic background from all over the country. Since then, it has become the political, economic, social, education and cultural center of Peru, and a reference for the unrest of the cities in Peru. Today, Lima & Callao has a population approximates 12 million inhabitants, which makes itis a big city. Its growth has conformed to exceeds the population inflow from the provinces to the metropolitan area (Akhmouch & Nunes Correia, 2016). "Multidimensional completed" it's identified the public transportation sector as one of three fundamental areas to achieving inclusive development in the city. Today, Lima it is growth has conformed to the migration process from rural areas through it make a multicultural city with peoples of diversity all over the country (Aguirre & Panfichi, 2013). These phenomena affect in to informal development ofurban transportation system. are still encounter user of these informal modes in combination with existing yet in the cities (Jauregui-Fung et al., 2019). to note that the involvement of the operators in transport system informalityof the service under the organization have contracted and government operate system to provide mainstream, conventional service areas regulated (Thet Hein Tun et al., 2020). therefore, transportation service

policy can undermine legal stability, and include the creation of a public transportation national safety as well as improving transport connectivity in the Lima & Callao. These early situations have led to the ensuring of urban congestion today. Taking steps to address these issues will not only directly impact changing to the public transportation service but also will lead to an improved public transportation service current traffic condition are changed. Therefore, it is a study for survey the needs of public transportation bus service change in commuter, based on theexisting service system in the scope with handle service system. It was had been by the transportation service beingsupplied form traditional (Bus, Coaster, and Combi), Massive (Metro-Line1, and Metropolitan), and Corridor (Blue, Purple, Yellow, Red, and Green). In addition, recently, it has emerged as a social issue. and increased publictransportation issue (traffic congestion, traffic accident, and traffic CO2 pollution). This study I would like to attempts to explain the current urban transportation real problem of the condition, through commuter response to the service form the public transportation service system, and asking the condition and what do they want to Peruvian's ITS supply policy etc. according to the result of the adaption and alternative it was granted that to provide a guide to Peruvian's ITS supply policy as a researcher analysis. Particular public transportation & ITS supply policy need for develops overtime in the past there might have been no way prevent problem occurring, but with currant ITS supply policy a solution may appear. Form this point on it was expressed Peruvian's ITS supply policy, and ITS implementing of policy. the original pursues the sprite of conversion to Peruvian's ITS's regulation (MTC, 2019a). In addition, experts collected views on the upcoming traffics problem in modern society.It was based on of the question that will be attempted, 1) Lima transits bus service structure through the research of reality have been over time, and tried to analyze satisfaction with exotic transits service?, 2) During rush hour the changing the service, which was reducing waiting time at station, the system of payment by distance transfer,increase the number of stops at the transfer station?, 3) Urgently, what might do to improve that Buses are the kindhelpful Tradition, Massive, Corridor?, 4) The most urgent need for improvement which is traffic congestion, trafficaccident and CO2 pollution?, 5) What is helpful about transportation & ITS supply policy, etc. from this point on,it becomes the brises of the re-developed in the name of the Peruvian's ITS Supply Policy was creation. As modernPeruvian's ITS supply policy develops and implementing promotes. By being refined, the process of the changed with that can be explained of Peruvian's ITS extinction, include, which were public date collection, used existing facilities, changed service system, Net woke linked & Peruvian's ITS regulation in the Peruvian's ITS supply policy. to provide a profoundly appreciate transportation service we sought to deeper into form the analysis. increased Peru still lacks a national transport planning, and policy skill. To serve and address the needs that arise within the sector 1 . therefore, this study comparatively is studied Peruvian's ITS supply according to theperspective of the experience what do you want to aspect of what is changed and service type by satisfaction of opinion for commuter in traffic condition. In addition, through the result to make a policy and policy implement for promotion of transportation service shall be Peruvian's ITS supply proposed.

## 2. Needs & Purpose

Need for this study is that the concept of the Peruvian's ITS supply is rational objectivity to enhance it is to go deeper in to social issue. 1) related to traffic congestion, traffic accidents, and CO2 emission. In order to solve these problems, from then until now, the past decade, there have been efforts to rely more on government ran transportation systems. MTC's infrastructure and transport is pushing ahead in connection with that related traffic policy. Not only with that "ITS" supply policy, but it is continuously trying to will be supply for new public transportation service system and was make the changed based on reality to solving the problem, and to reduce direction traffic service and others possibility, and if possible, to examine the public transportation service system change in city Lima & Callao. 2) it was intended to present public transportation service problem and the reason existed and to changed service types, and also solving the problem. Therefore, the ultimate goal in to introduce ITS's protocol made was made already. Therefore, New it is necessary in this situation. The method of providing Peruvian's supply policy and implementing policy has relevance, and was a purposed. The same purpose as their larger condition and to keep out big-city in Lima & Callao. as well as will supply average user convenient for quality of life, and potentially dangerous prevent. will study for determine implement . will be make it and refer to Peruvian's ITS supply policy and implementing policy. 3) it is expressed Peruvian's ITS supply policy and solving traffic problems as a prevent. to improving public transportation service change through in this study Peruvian's ITS service supply can be done.

## 3. Real-time Lima

**Economic growth:** Increase that has registered in the last years. the evolution of Peru's Gross Domestic Product GDP has increased by 47% Per Capita form 2010 $135 Billion, to 2017 $199 Billion. Today, 42% of the population belongs to the C socio-economic level and 23% to the level (Ganin, Kitsak & Marchese, 2017). whereas only 29%

is considered (Tapia et al., 2018). Road infrastructure that we can mention since that from 2012 to 2017, there wasa significant increase in when the paved national road network. it is shown that in recent years a low percentage of investment, which connects the national road network with the rural road net-work. We have average 14% of paved road. Increased network of road 90%, in 2012, 90%, in 2013, 90%, in 2014, 86%, in 2015, 85%, in 2016, and 86%, 2017 (MTC, 2018). However, there is still a gap of 24%, which has been working on road constructionincreased 40%, in 2012, 36%, in 2013, 32%, in 2014, 30%, in 2015, 26%, in 2016, and 24%, in 2017 (MTC, 2018).
This study attempted to find out and try to explain the relationship between economic growth and increase in urban transportation.

**Traffic congested**: Lima & Callao the public transportation system user daily commute of about 80% of the city's population. Public Buses competing for passengers in a highly congested in city. Lima & Callao has increased cars rate. we can see an increase of number of cars each year in 9.24%, annually, this show that, nowadays in our road, we have almost double of vehicles than 10 years ago. Traffic accident: Currently, Peru hasbeen suffering different problems associated with traffic and road transport, for example, the roads producing traffic congestion in the main roads of Lima & Callao, as well as Other problem is high accident rate, which has as consequences personal injuries, annual deaths of around 50,000 and 3,000 respectively. Traffic accidents: Another social problem related to the transit and transportation is insecurity road. in the last 9 years, we have more than 800 thousand traffic accidents, near 500 thousand injured and 27 thousand died, that show a big problem. urban congestion worldwide and provides free access to city-by-city information. along with drivers, city planners,

[1] Recent changes required irresponsible drivers to temporarily give up their vehicle, and obliged those breakingtraffic laws to take road safety and awareness classes (Javier Lancha Micheo, 2018).

automakers and policy makers, can use the index to help tackle traffic-related challenges. For safety is relate to was studied 52,489 transit accidents which represent 59% (Alegre, 2016). Others was reported without considering Callao, 49% of the accidents occurred in Central Lima, followed by Eastern Lima 21%, Northern Lima 17%, andSouthern Lima 14% (Droste, 2017). The highest number of accidents was along Javier Prado Ave. There were 492deaths in fatal transport accidents, 60% of which were caused by driver recklessness. whereas only 22% were thepedestrian's fault. The district with highest fatal accidents was Callao (Casana-Jara, 2020). followed by Comas
(46) in Northern Lima. Currently, we have not gotten to reduce significantly, these indicators, due to the information of what happens when an accident occurs is very basic and also is not systematized, the use of ITS would help to create useful information on our roads, including the driver's vehicle or commuter. Thus, based on research by effectively supplying Peruvian's ITS, in tented to contribute to reducing traffic congestion, and to contribute traffic accidents mitigate.

**Traffic Pollution**: Peru has emitted reached 218.7 CO2 Mt. which implies 13% growth four years. Furthermore, our automotive fleet is subject to late from 2018, with a total of 6.4 million vehicles between smaller vehicles (Motorcycles, Mototaxis), and larger vehicles, where the main source of fuel consumption is Gasoline for both types. In the case of larger vehicles 55%, use gasoline, while smaller vehicles 97%, use gasoline, with four wheels (SINIA, 2020). Finally, we have the environmental pollution produced by the emission of gases from vehicles, which has increased over the years as a result of the increase in the car fleet. The details of the gasoline 54.6%, Diesel 27.9%, Glp6.1%, Hybrid 0.01%, Unclassified 5.5%, Others 0.1%, Traffic CO2 emission (MTC, 2019b). Definitely, this phenomenon creates a need for research transportation alternatives supply policy and to reduce traffic congestion, traffic accident and CO2 emission. Through these studies it is believed that providing transportation service by accurately investigation reality traffic problems in Lima. It could be contributed to alternative transportation policy to reduced traffic problems and to change for improve transportation service.

**Public BUS**: is not enough. even though many people sued by bus fleet services allows citizens to travel across the city every day, it has several social effects that discourage from using it. The public transportation utilization rate of citizens is that uses public bus 76.9% are middle to low class citizens. While the bus system is slow, inefficient and unsafe, but many individuals are forced to take it. The reason for this phenomenon is affordability the price of bus fee is less than $1. compared to the $2.5 base fare for a mobility of massive. when used the of rush hour spending time and is rate that private vehicle 24.9-minute, Motorcycle 10.8-minute, taxi 22 minute, 60 minute and large bus 44.7minute used (Barbier, 2015). Are concerned with that about safety, traffic congestion, traffic accident and CO2 emission. Begin earlier and return to their houses late at night. Increased traffic, the amount

of traffic generated by buses has nearly halted the lima' public transport system that not only is the bus fleet outdated,excessive in number of units but also its routes and driving manners are low compliance regulation and companiesthat subcontract individual operators (Hermoza-Moquillaza, 2016; Vickers, 2016). On the other hand, due to the response to public transportation demanded by users is an intense atmosphere of competition. which leads to reckless driving and low service quality (Mosahab et al., 2010). Thus, the average time per trip of large buses is more than twice the average time used of private cars. different trip for vehicles can be different time. when mostpeople are trying to go or return from work, can take up to 2 to 3 hours each way. many passengers begin their commuter. ITS supply for revising existing BUS service is reflection of the process understanding the object of the implementing, in the process the subject is said to be the same. According to has identified the following clearpattern for current distribution of public BUS with traditional, massive and corridor level of Lima (Jauregui-Funget al., 2019). They also depend on one other in variety of ways approach bus station center (CSP, 2018). Whereasliving on big lots in exclusively residential gated commented belong to approval authorities at all levels Peruvian'sITS supply policy. such as it will be possible to provide a Peruvian's ITS supply policy. public transportation service is very important to economic growth and urban transportation.

## 4. Theory of backgroundDescription of the theory

Theory2 is they can be is a reflection of the process understanding of the subject action. In the process objectivity and subjectivity were said to the same according to Ackermann and von Neumann (1920).
The research's theorical background was based on the limited to the extents of public transportation acquisition as factors of Peruvian's ITS supply policy. research for the based public transportation service experience, information acquisition about change of the service and Peruvian's ITS supply policy creation. On the base of theresearch was described. with sufficient real service of public transportation service intention are inference when we are supply Peruvian's ITS supply opportunity arise. Therefore, we intended to used factors this study. The methodology of subjectivity independent. Moreover, it is the biased for having a knowledge system of independentvariables for use. the limitation of the range of recognizing and acting will be able to inferred prediction implicationthat can be explained it. has the possible of the methodology in the process of forming the knowledge used. in other to adopt this theory Exploration commuter, pedestrian, public transportation, ITS, and Peruvian's ITS Supplypolicy and implementing policy were used as theories. Measurement variables shown in consider for each constructused in this study were either selected or modified form previous studies.

### Public Transportation

Since the being a member of the applied transportation planning to impacted of the process understanding the object of public transportation planning (Harry & Timmermans, 2014). As well as inter subjective in the files including meaning of accustomed price and time with that all about transport shapes was given scientific credibility (Marchetti, 1994). To show that there is a universal 'travel-time" of around one hour on average per person per day (Newman & Kenworthy, 2006). Cars start relying on public transportation (Bean et al., 2008). To impacted public transport passengers for developed transit service and the enhanced a well-developed public transportation & ITS supply creates and improved access to user (Alkharabsheh & Duleba, 2021). To solve the public transportation service regarding to reduces congestion, traffic accident, and traffic CO2 emission and to change ofimproved transportation service in Lima & Callao. Although it is urgent to improve transportation service and supply transportation policy there is not enough theory and practice. the purpose of this study is to increase and supplement creation of the borrowing and research theory on the supplement to change public transportation service. Therefore, this study uses to adapt to mutual subjective has a theories implication that can explain, and utilized it possible of the theoretical.

### Commuter

In this way is seen objective knowledge to understanding commuter & pedestrian. to improve service and convenient can be theory since being a public transportation is a reflection of the process understanding the object action. in the process of object are point of view to be the same. It can be grounded theory since being the number transport service has become the mobility standard for accessing a reflection of the understanding of the objection public transportation systems are said to be the same (Bernick & Cervero, 1997). On the other hand, there is a study of commute and pedestrian can be explanted to explore and to influences of land-use variables on walking and behavior is essential in the process of public transportation and facilities and shopping malls, it is likely to increase by ITS system estimation have been to predict forthcoming actions awareness (Cohen, Dearnaley & Hansel, 1955; Allan et al., 1966; Helbing, 1998; Daamen et al, 2005; Rasouli et al., 2017). According to (Havarda & Willis, 2010). As well as study the majority of these theoretical findings of traffic interaction and treat the problem as dealing with a rigid object rather transportation service than a social being (Schulz & Stiefelhagen,

2015). Commute without any passenger on board of studies in the field of behavioral have addressed it can

[2] Theory can be described of the general structure of arguments with demonstrative force as encountered in logic.Aristotle's *Analytica Posteriora*: a deductive science is organized around a number of basic concepts that are assumed understood without further explanation. Defined concepts are reduced to these two, Aristotle's account of proof as demonstrative argument fits very well to the structure as in Euclid. The specific form of Aristotle's logic, so it seems (web, *2008)*. Hilbert a method of consistency to deal with that indirect inferences in cases with an infinity of objects were the crucial of consistency, and a justification. if the assumption that all-natural numbershave the property leads to an impossibility, it can be inferred.

potentially to influence the way road users the decision to recognized as an ability to perform an action. Collecting the studies of the commuter by have an effect on that it is influenced by directly experience in the transport sector. Therefore, it can be explained and commuter will be attempted. This study will be adopted could be utilized as a basis for this. Transportation service objective experiences and as a factor in Peruvian ITS supply policy.

**ITS: Intelligence transportation System (ITS)**

Requires participation of all the stakeholders such as government administrations, scientific institutions, tourist agencies, local and financial communities, network operators, providers of transportation services and other interested users. the introduction of ITS has to be methodically prepared and well managed. The majority of the developed countries in the world have a built ITS such as America, Japan, Australia etc. (Marsden et al., 2003). The following separate are known of different France, Norway, Italian, Finland Czech, Austria, Netherlands, Sweden, Spain, Switzerland, Slovenia, Slovakia, Poland, Hungary, (Approaches for Introducing Intelligent Transportation Systems into Developing Countries (Yokota et al., 2004). Since ITS represents the structural hierarchy of the future system, it has to diverse equipment that is going to be used (Prodi, 2002). There are goals and plans that involved specifying, where performance of the public transportation & ITS supply lima will take place. it said that developed as a rational theory cognitive (Kim, 2020a). the initial step in transportation & ITS. As well as Public transportation & ITS supply will be design and changed that requirements defined, and must beharmonized supply service. It can be used as an important study. ITS is using to obtained the step-by-step principlehas control variables and was assumed.

**Peruvian's ITS supply policy**

Restrict policy served as an immediate response to the high demand for low cost solution, which drive make more trip per day compensate for the reduced passenger capacity of minibus and combis (Jose, 2013). Public transporting free access to routes and permitted to provide transport service with motorized vehicles with more them two wheels without the request for approval form municipal (Bielich Salazar, 2009). Service provider impose sing its own transited fare penny war is providing complimentary access to its entire 73-year archive (IRE, 1952; New York Times, 1973). Informal service provides reduced waiting period from 5min to 8min, related to transit due significant to the explore inform route (CAF, 2016). Lima & Callao was finally approved the Authority will provide an integral solution (MEF, MTC, GTU, and AATE). in other to Peruvian's ITS supply policy, it was assumed everywhere can reach, and also offers wider coverage with frequencies that allow short waiting periods and shorter walking distances to bus stops as it possible. We need to introduce for reform, it was trying to suggested that a strong the impact of the Creation Peruvian's ITS supply policy and proposed can be expectation implementation policy. In other to do so investigation thoroughly beforehand reality traffic problems in Lima. Forinstance, supply to public transportation type (Traditional, Massive, and Corridor), and condition[3] . Metro line reduce in the north – South corridor are still disconnected form others bus network. about the likely public data collection, existing facilities. Requires a network-like connection, which is net-worked linked, Peruvian's ITS & regulation, and experience, etc. and also description of the theory with Peruvian's ITS supply is guided by the many kinds of considering it actually. it was need to strengthen replaced, and it was factor helped as an importantresult of study.

## 5. Methodology Sample date collection

[3] Distance between imposed bus stop were about 500m, which are around 400m (Wlaker & Basics, 2019). The metropolitan of lima 2013 were 13,600 combis, 14,700 minibuses, and 3,200 buses. With average used 22years and without functioning emissions control technology (Metropolitan Sistema, 2018). It is very important that there is a lack of control and regulation (Municipal, Lima). the metropolitan area plans in the field were reviewed. the first proposed BRT was proposed total was 26km, was 18district linked, was 35 stops, was two terminals, was

24feeder, and used LNG, (Caretas, Uno & Ojo, 2008-2049, 38-41). Metro Line-1, was opened, was extension of 36.8Km, was 11 districts, was 26 station, was composed feeder 6. 19 vehicles, 1,200 people. Line-2 on the construction, and was will be planning metro 5. (3 North, 2 East -West). to discovered a significant of the existence which is connection inform line 1,198 buses 9m busies 9,571. was 12m and was 614 buses, and was 18m supply, (Gerencia, 2018).

This paper is structured around answering these dates was collided using a singer self - report questionnaire that contained all the items used for measuring. In this study were obtained from structure questionaries' designed to the target those who form 20years to 70years (under or over) and interview schedule, with at least high this is basis for the sample material. We want to figure out about public transportation used those who are experience such as commuter, pedestrian and divers and related to public transportation service and the objectivity public transportation with that lima and Callao. It was applied as an empirical data. The period of the participation was May, 5th, 2021 to May 27th, 2021. Informing and obtaining the research purpose, cooperation of sampling. It was supposed by professor and experts joined UNI, and Students, at Lima in Peru, and by others foreigners stating in Lima. The target peoples those who frequently used public transportation service were chosen and experience tinLima. The language was made of the question English, and Spanish. It consisted of variables, contents of "Public Transportation Reality Problem", "Public Transportation use Commuter", "Peruvian's ITS supply Policy", and "Implement Policy", data was utilized. It was process, 256 participations, recalls, and unused 50, and 206 finally,research were adopted. Here are age specific participations. Here is age specific participation gender is male 155,and females 51. Here are by age. Age is under the 20 years old, (52.9%). From 20 to 30 years old is (16%). from 40 to 50 years old is (21.4%), from 60 to over 70 years old is (9.7%), as well as participations by commuter are shown. there are students 103 persons. there is worker office 15persons. There are professional 81persons, and others are 7 persons.

**Operate variable direction**

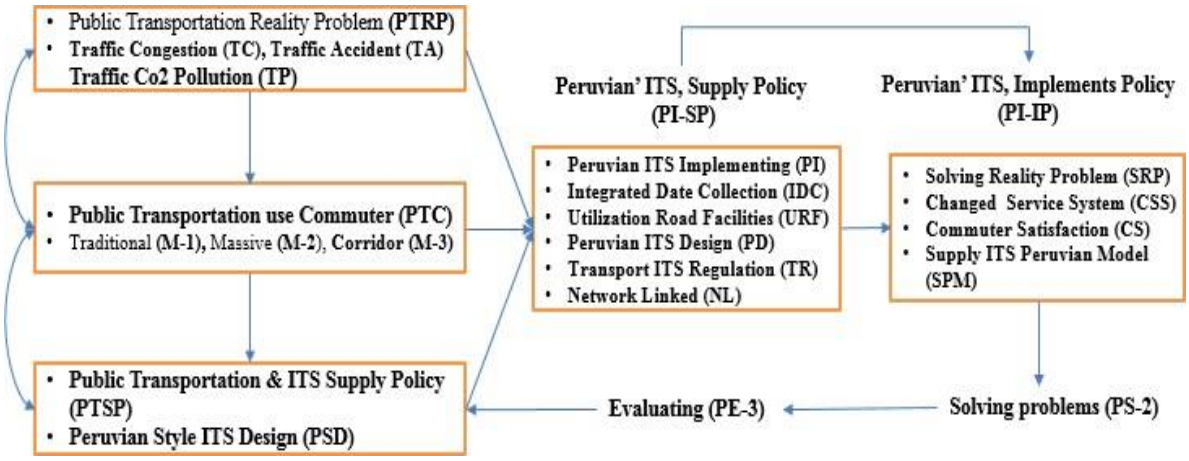
The model's variables, Public Transportation Reality Problem (PTRP)" based on were measured by transportation planning (Rasouli & Timmermans, 2012), transport shapes (Zahavi & Talvitie, 1976), travel-time (Marchetti, 1994; Newman et al., 2016), improved access to user (Alkharabsheh et al., 2021). Validities in public transportation. it consisted of each variable answered in a Likert -type 5point response scale. The questionaries' evaluate the eight variables of (transportation system, public bus transit system, traffic fee, waiting time, transpiration control, station extend, bus route extends, and safety). First, "PTRP": the "PTRP" variables is composed of explanation. 1) Reduction of the travel time. 2) Reduction of waiting time at the station. 3) Improvement of the station infrastructure (size, signage, location). 4) Increasing Metro bus size. 5) charge their cards everywhere. 6) integrated with other transport systems. 7) station increases of routes. 8) Traditional, Massive and Corridor Service for extension of service hours. There are public transportation reality problems with provision of perceived. Set it up in consideration of this. Seconds, Commuter based on ware composed. to improve service, and can be a reflection of the process understanding the object action (Bernick, 1996; Cervera, 2001). On the other hand, it can be explanted to explore and to influences of land-use, public transportation facilities, and shopping malls (Jacobs & Wilson, 1967; Helbing, 1998; Hall, 2012; Hoogendoorn & Bovy, 2001; Daamen, 2003; Rasouli et al., 2017). "Commuter variables is measured of explanation. 1) Frequency of passing public transportation. 2) Travel time. 3) Full scheduled predicted. 4) Link with other public transportation routes. 5) Information schedules, cost, and routes. 6) other. with this information commuter study the promotion of the traffic improvement and willbe changes. Third, in other to social issue solving and providing to changed and improving transfer condition Lima& Callao. Public transportation & ITS system will be design and changed that requirements defined and must be harmonized supply service system. "Peruvian's ITS Supply Policy (PI-SP)": The majority of the developed countries in the world have a built ITS such as America, Japan, Australia etc. (Šimunoviæ et al., 2009). The following separate are known of different countries (Yokota, 2004). "Peruvian's ITS Policy Implementing (PI-PI):For the future policy planning has to diverse equipment that is going to be used (European Commission and Projectpartners, 2002). "PI-SP" it was based on composed. 1) public date collection. 2) existing transport facilities. 3) Peruvian's ITS, 4) regional net-work. 5) ITS regulation. In addition, "PI-SP" policy and Implementation. 1) Reduce Traffic Congestion, traffic accident & traffic pollution. 2) Public Transportation Traffic Road System. 3) Public Transportation Vehicle Management System. 4) Public Transportation information network Facilities System. 5) Public Transportation information integration Management System. "PI-PI" (MTC. 2020). it was basedon composed. 1) Public transportation system changes of Infrastructure. 2) Public transportation & ITS supply installing. 3) ITS policy implementing of the Peruvian style decision making. 4) ITS operation & management. 5)ITS regulation & maintenance 6) Change & and ITS control. In other to this theory, Peruvian's ITS, supply was used as a theory, and measurement were either selected or modified on from previous studies. in considered for each scope used of transportation buses is 1) (Traditional: Bus, Coaster,

Combi). 2) (Massive: Metro bus, Metro-train). 3) (Corridor: Blue, Purple, Yellow, Red, Green). the range of transportation reginal is 1) in to 49 districts4,include (Central Lima, West Lima, East Lima, South Lima and North Lima, and Callao). the range of contents is ITS protocol (MTC, 2019)5. 1) Public data collection. 2) Road existing facilities utilization. 3) Net-work Linking.
4) Peruvian's ITS regulation. 5) ITS's operation & maintenance). to change to improve transportation service is 1)"PTRP" set of 3items. 2) "PTC" set of 3items. 3) "PSD" set of it. 4) "PI-SP", set of 6items. 5)" PI-IP" set of 4items. To obtain the result will be control it was independent variables, (PTRP, PTC, PSD). 2) were intervening variables (PI-SP). 3) dependent variables were acquisition. there is included is approached to improve service andcontinent for public transportation supply (Kim, 2020b).

## 6. Research Method

The structure of the proposal framework is shown <Figure 1> in total 3 independence variables are drawn from constructs of 3 independent variables, 7 of which include 3 as such sub-variable, and 1 as such sub variables. It consisted of intervening variables 6 of which including one as each sub variables. It consists of PI-IP's Peruvian's supply policy and Implementation policy. the dependent variables consisted of 4 factors. It was the sub variables of PI-IP were composed, which were PTRP, PTC, PTSP and PI-SP changing towards overview form. Study on the changing of PI-PI policy comparison intention for PI-SP for development and to improving and to changed.

**<Figure 1>.** Research model




In probability both kind of definition are used "PTRP" what is "PC", "TA", and "TP" tossing three, and are used 'PTS" what is "M-1", "M-2", and "M-3" listed at the possible "PTC" rule definition. In case of "PTSP", "PSD" and independent variable. Second product of two set is the all of the intervening variables enter of another

[4] As follows, 1) Central Lima are Brena, Jesus Maria, La Victoria, Rimac, Lima, Lince, Magdalena del Mar, Miraflores, Pueblo Libre, San Borja, San Isidro, Barranco, San Miguel, Santiago de Surco and Surquillo. 2) North Lima are Ancon, Carabayllo, Comas, Independencia, Los Olivos, Puente Piedra, San Martin de Porres, and Santa Rosa. 3) East Lima are Ate, Chaclacayo, Cieneguilla, El Agustino, La Molina, Lurigancho, Chosica, San Juan deLurigancho, San Luis and Santa Anita. 4) South Lima are Chorrillos, Lurin, Pachacamac, Pucusana, Punta Hermosa, Punta Negra, San Bartolo, San Juan de Miraflores, Santa Maria del Mar, Villa El Salvador, and Villa Maria del Triunfo. 5) Callo are Bellavista, Carmen de La Legua Reynoso, La Perla, La Punta, Mi Peru y Ventanilla.
[5] (MTC, Y.S, Kim, 2019): 1) Public date collection. Integrated Traffic Function, information date Collection its center, Public Transportation Standardization, Public transport information sharing, Personal mobile app sharing service, and ITS center linked possible, 2) Existing facilities utilizing identify usefulness unnecessary relocation and supplementation. Expand camera and information management, linked network, 3) Peruvian designed ITS system. CCTV, dashboard, & ITS standardization, and education user and drive, and supply convenient service, without limited. 4) Inter-networking, Regional, County, committee, and Main responsibility under the readership policy operation. in consideration of economic growth, and service for improving quality of life. Will be accessibility, and it has been done convenience, safety, efficiency and comprehensiveness city tragic quality mitigation.

set is “PI-SP” what is “PI”, “IDC”, “URF”, “PD”, “TR” and “NL” tossing six, and are used “PI-SP”. The third products of one set is “PI-IP” and “SRP”, “SCC”, “CS”, and “SPM”. dependent variables enter of the set. it can
<Figure-1 > generate of the product of this case. This study used the number of possible outcomes, with three “PTRP”, “PTC”, “PTSP”, and “PSD” first set. second Set ~ product can be “PI-SP” and “PI-IP”. Third set PS-2 product can be “PS-2” and “PE-3” in defining sample space actual.

**Tools analysis**

Data analysis were conducted the statistic package for social science SPSS 22.0 and analysis of moment structure software to achieve the purposed and to test analysis to this study. SPSS 22.0 was used for descriptive analysis to analyzed preliminary result and to figure out the demographic characteristics of the sample for detail review, with frequently, and regression was used to assess the adequacy of the measurement for conforming the reliability, convergent and divergent validation followed by using change of public transportation service change construction Peruvian’s ITS supply policy to installing and analysis of the date was extracted for the Peruvian’s ITS implementation policy creation. It was influence to effects on the public transportation and to provider transportation service that are changed and improved.

**Statistical analysis**

In Statistic related to “PTRP”, “PTSP”, “PSD” and “PI-SP”, “PI-IP”. It sees the different in the “PI-SP-IP” and “PI-SP-IP” creation by Peruvian’s ITS supply, and Implementation policy. in relation to this the impact on Peruvian’s ITS supply, and Implementation policy is indicated by statistics form regression analysis. General participation statistics are explained by frequently and analysis, in other to investigate the effects of “PTRP”, “PTSP”, “PSD” and changing the “PI-SP”, “PI-IP” on the intention, in accordance with four or five latent variables were specified in other to prove their validity as a casual model: PTRP (3items), PTC (3items), PTSP, PSD each is one. And others form the view PI-SP (6items) and PI-IP (4items) it was assumed 1) in dependent variables to the same. 2) frequency analysis has a normal distribution. 3) regression analysis assumes the influence of dependent variables. as a result of the analysis, it was important to increase the objective knowledge of individual.

The definition of variables was manipulated in this study, as follows.

a. Independent variables were defined and summaries “PTRP”, set up “TC” (traffic congestion), “TA” (traffic accidents), and “TP” (traffic $CO_2$ pollution).
b. Independent variables were defined and summaries “PTC”, set up “M-1” (Transitional), “M-2” (Massive), and “M-3” (Corridor).
c. Independent variables were defined and summaries “PTSP” & “PSD”, set up” (ITS & Protocol & Peruvian’ ITS type).
d. Intervening variables were defined and summaries “PI-SP”, set up “IDC” (integrate data collection), “URF” (utilized road facilities), “OD” (Peruvian’s ITS, Design), “TR” (Transport ITS Regulation), and“NL” (Network Linked).
e. Dependent Variables were defined and summaries” PI-IP”, set up” SRP” (Solving Reality Problem), CSS(Change Service System), “CS” (Commuter Satisfaction), and “SPM” (Supply of ITS Peruvian’s Model).
f. Policy suggestion were defined and summaries “PS-2” “PE-3” set up ”PS-2” (Problem Solving-2), and ”PE-3”(Problem Evaluation -3). to provider service will be changed for service.

## 7. Analysis

**Frequently analyses**: assumed a good reason for including both of them our little and public transportation service A bit more strangled, however, may be formula will be more useful the result agrees with our previous sample resolving, if we make was follows, male was 75.2 %, female was 24.8 %. put result was the out. age was 20s, 52.9 %, was 30s, 16 %, was 40s 8.3 %, was 50s, 13.1 %, was 60s, 6.8 %, was over 70s, 2.9 %. the analysis result can be summarized and explained 20s was interesting condition problem ability them 40s, and 50s, 60s, andothers group. The detail of the result is shown. Students and professional groups were more interesting condition them office worker and others. Was improve in necessary system 89.3 %. therefore, public transportation & ITS supply will be necessary was more interesting of each variable are shown.

**Transportation type**: Inferring to the result the necessary of the public transportation & ITS supply policy. depending on look at the respondents by commuter was 25.2 %, pedestrian was 58.7 %, self-drive was 13.1 %, others was agreed 2.9 %. but are still stuffiness. According to the analysis of the transportation that commuters often used was traditional (Bus, Custer and Combi) type 58.3 %. Was Massive (Metro bus, Metro train) type 34

%,and Corridor type (Blue, Purple, Yellow, Red and Green) 7.8 %. the public transportation & ITS supply were to improve that commuter want to reduced waiting time 39.8 %. Was linked other transport route was 19.4 %, and was reduce raiding fee 8.3 %, and Increase bus station 8.3 %, and was changed discriminated against by distancewas 4.4 %. Generally, it is where public transportation should be increased directly, that place is if you look at theresult 57.8 % in the south and North in Lima.

**Transportation service change**: result analysis that call for improvement has shown that transits logistic system was 13.6 %, Traffic road system improve was 37.4 %, transportation Vehicle improve was 12.1 %, existing facilities system was 3.9 %, public transportation management improved was 29.1 %, and others improved was 3.9 %. Public transportation all the system change wants to the result public transportation bus system changed was 35.4 %, public transportation mobility was 15. %, road lane and signed was 8.3 %, reducing the price was 8.3 %, public transportation & ITS supply was 30.6 %, and others was 2.4 %. The result is shown in <Table 1>.

**<Table 1>** Satisfaction & Demand for change service

| Division | | Response person | Frequently | CumulativePercent |
|---|---|---|---|---|
| Extended service supplyduring rush hour | Waiting time | 76persons | 36.9 % | 36.9 % |
| | Station size | 26ersons | 11.6 % | 48.5 % |
| | Payment system | 26persons | 12.7 % | 61.2 % |
| | Transfer rout | 80persons | 38.8 % | 100 % |
| Demand for Consider change route | Transit logistic | 28 persons | 13.6 % | 13.6 % |
| | Traffic road | 77 persons | 37.4 % | 51.0 % |
| | Vehicle system | 25 persons | 12.1 % | 63.1 % |
| | Facilities | 16 persons | 7.8 % | 67.0 % |
| | Management | 60persons | 29.1 % | 100 % |
| Desired immediatelySolving Problem | Traffic Congestion | 157 persons | 76.2 % | 76.2 % |
| | Traffic accident | 25persons | 12.1 % | 82.5 % |
| | CO2 pollution | 24 persons | 11.7% | 100 % |
| Peruvian's ITS supply &Implementation | ITS supply policy | 76persons | 36.9 % | 36.9 % |
| | Peruvian Style | 33ersons | 16.0 % | 48.5 % |
| | Management | 42persons | 19.0 % | 68.9 % |
| | ITS regulation | 58persons | 28.1 % | 100 % |
| Basic Peruvian's ITS supply contents | Data collection | 37 persons | 18.0 % | 18.0 % |
| | Existing facilities | 23 persons | 11.2 % | 29.2 % |
| | New ITS system | 80persons | 38.8 % | 68.0 % |
| | Network linked | 66 persons | 32.0 % | 100 % |
| Consider Public Transportation Supplytype | Traditional | 120 persons | 58.2 % | 58.2 % |
| | Massive | 70 persons | 34.0 % | 92.2 % |
| | Corridor | 16 persons | 7.8 % | 100 % |
| Extension supplytransportation route | East Lima | 35 persons | 17.0 % | 17.0 % |
| | West Lima | 14 persons | 6.8 % | 23.8 % |
| | South Lima | 40 persons | 19.4 % | 40.8 % |
| | North Lima | 84 persons | 40.8 % | 81.6 % |
| | Central Lima | 33 persons | 16.0 % | 100 % |

Satisfaction reality public transportation service system was result. Response to transportation service satisfaction was good 5 %. was not good 47.3 %. Traffic system satisfaction was good 5.8 %. was not good 75. 8 %. Transit system satisfaction was good 9.9 %. was not good 60.7 %. transfer fee satisfaction was good 14.1 %. was not good 28.9 %. Bus waiting time satisfaction was good 10.2 %. was not good 53. 6%. Public transportation control satisfaction was good 8.8 %. was not good 49.6 %. also request to improve transport policy will be station extension 44.2 %, and route extension 46.7 %, and will be safety 59.7 % overall.

**Peruvian's ITS supply policy**

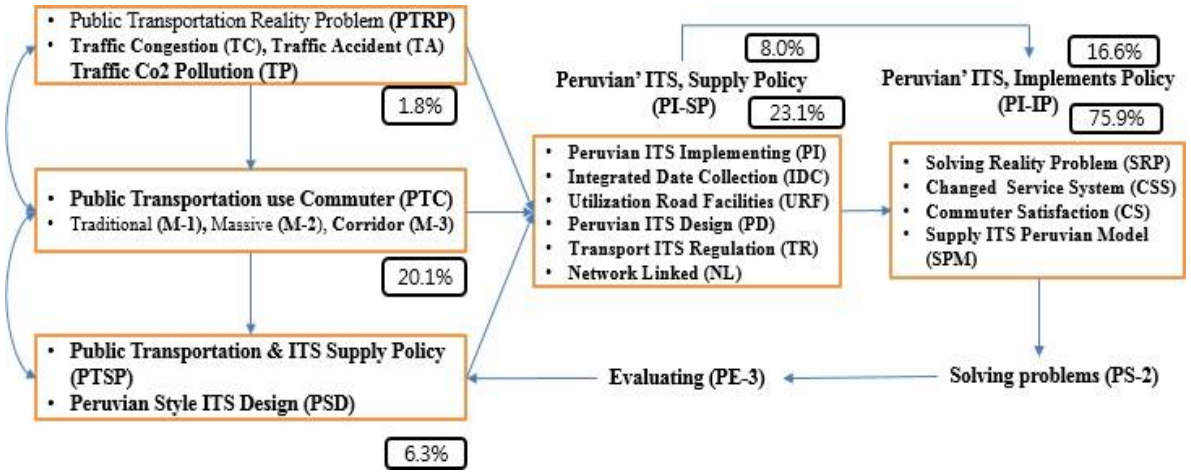
Where is the management should be ITS control that is the answer to basic responded MTC was 11.7 %, ATU was 4.4 %, Municipal Lima was 77.3 %, SUTRANT was 4.4 %. Municipal Callao was 1.9 %, and Protransporte was 1.5 %. As well as was corporation 15 %. If want to change all the system as a ITS supply was 53.9 %. Partially, was responded that its transit logistic system was 14.1 %, Traffic road system was 37.4 %, transportation vehicle was 9.7 %, facilities system was 6.8 %, Management system was 27.2 %. New public transportation beginning ofthe policy was proposed as an alternative ITS supply that it will be proposed public transportation which was public data collection was 16 %, utilization of existing facilities was 19.9 %, new system construction was 35.9 %,central and regional linked networking was 26.2 %, others was 1.9 %. The urgent solution to the problem is that was traffic congestion 76.2 %. was CO2 pollution 11.7%, and was traffic accident 2 5%. the policy would like tosuggest is that Peruvian's ITS supply was 36.9 %. was Peruvian 16.0 %. transportation management was 19.0 %,and ITS regulation was 28.1 %. New ITS system was 38.8 %. Peruvian's ITS Necessary is that public data collection was 18.0 %. was utilizing existing facilities was11.2 %. new ITS system was 38.8%. was network linking 32.0 %. It was show in <Table 2>.

**<Table 2>** Regression analysis

| Contents | R Square | $R^2$ Squares | Adjusted $R^2$ | Coefficients Beta | Change Statistics | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | $R^2$ Change | F Change | Df2 | Sig. F |
| PTRP | .425a | .181 | .152 | 1.0442 | .181 | 6.250 | 197 | .000 |
| PTS | .449a | .201 | .160 | 1.0391 | .201 | 4.914 | 195 | .000 |
| PTSP | 252a | .063 | .025 | 1.1196 | .063 | 1.663 | 197 | .109 |
| PSP | .282a | .080 | .017 | 1.3551 | .080 | 1.280 | 192 | .228 |
| PI-SP | .482a | .231 | .154 | 1.0431 | .232 | 2.961 | 186 | .000 |
| PI-IP | .408a | .166 | .150 | 1.0455 | .166 | 10.036 | 201 | .000 |
| Total | - | 75.9 | - | - | - | - | - | - |

Regression analysis support the degree of impact definition are used <Figure 2>, "PTRP" what is "PTRP" independent variable was explained, which were reality transportation problem (TC, TA, and TP), were 1.8%. "PTC" (M-1, M-2, and M-3), were 20.1%. "PTSP" were 6.3%. intervening variables was explained 8.0%. and "PI-SP" were 23.1%. Dependent Variables "PI-IP" were 16.6%, and "PS-2" were 75.9%. to impacted total policy implement improve and service convenient, p < 000 had significant positive effectives on Peruvian's ITS's supply supporting " PI-SP" and "PI-IP" it showed to explain purpose effects on the was impacted of devised of the topic $R^2$ p < 000 had significant positive effect on supporting.

**<Figure 2>** Regression Analysis



## 8. Conclusion

In the present study a methodology was developed incorporating sustainability concept for evaluating levels of integration, the study a methodology qualitative and quantitative indicator to measure the level of integration. This study considers the multi-criteria analysis which involves homogenizing the selected sustainability indicators of public transportation and value with appropriate weights for every indicator. Subsequently, the developed method applied to estimate the present levels of integration between metro rail and buses for Lima, and Callao. The results of the empirical investigation to be desired immediately. 1) was traffic congestion 76.2%, and was traffic accident 6.3%, and was traffic CO2 pollution 11.7%. 2) bus service was supply Traditional type 58.2%, and was Massive type 34%, and was Corridor type 7.8%. 3) Peruvian's ITS supply policy it's about Utilization of Existing Facilities 35.4%, and was Net-work Link 32 %, and Public Date Collection 18%. In addition, it' public transportation service wants to change was Peruvian's ITS supply policy 36.9%, and was ITS's management 20.4%, and was regulation 28.1%, and was Peruvian's style supply 11.7%. it was structure model and standard indicated positive effects among the construct were support. The result of regression had significant positive p <0.000 indicate. thus, was supported that the "PTRP" was support It showed the ability to explain 1.8%. Peruvian's ITS was p <0.000 indicate that the "PTS" was support to explained 20.1%. was p <0.109 indicate that the "PTSP "was support to explained 6.3%. was p < 0.228 indicated that the "PSP" was support to explained 8.0%. was p < 0.000 indicated that the "PI-SP" was support to explained 23.1%. was p < 0.000 indicated that "PI-IP" was support to explained 16.6%. toimpact of perceived Peruvian's ITS supply policy and implementation could be control adjusted $\boldsymbol{R^2}$ Total 75.9%.p < 000 had significant effective on Peruvian's ITS supply policy and implementation policy. "PTRP", "PTC", "PTSP", & "PSD" It shows the to explained purposed was to impacted $\boldsymbol{total\ R^2}$ 75.9%. p < 000. had significantpositive effects on Peruvian's ITS supply policy response. Each showed significant positive influences on PTRP:1.8%, PTS: 20.1%, PTSP: 6.3%, PSP:8.0%. to words the "PI-SP: 23.1%. PI-IP: 16.6% total was 75.9%.

however, it had indirect effects through "PTRP", "PTC", "PTSP", and "PSP", "PI-SP" toward product and creative.Assuming Peruvian's ITS supply policy and implementation creation was support. the ITS supply policy scenarios were policy solving "PS-2" had significant positive responded. It was support "PS-2" the positive estimate of between PI-SP and PI-IP for "PS-2" changed precuts has significant positive effect 75.9%. "PS-2" was support the impact of empirical approach. "PS-2" concerned had significant positive "PE-3" the evaluation and towards Peruvian's ITS supply creation effect on and others ITS implementation change more and more effective improving is possible.

In this way, policy realization inferences can be made based on the research results. It intends to make recommendations, in the form of policy design, management and implementation. As it is below. First. for solving the real problem, 1) Urgent policy implementation is to reduce traffic congestion, 2) Request during rush hour byimproving transportation policy service, 3) Expansion of the supply of traditional public buses as a means of transportation, management and operation. 4) In particular, the expansion of traditional public bus routes should consider the north and south directions. Second, Peruvian policy alternatives can be selected. 1) It is the collection of data, 2) It is an existing transportation facility, 3) It is a Peruvian's system design a system, 4) It is a central andregional network connection, 5) It is the regulation and management of transportation policy. Third, in this study,policy implementation can be done. 1) Policy implementation should be focused on solving real problems, 2) It isto improve the transportation service system, 3) Transportation policy implementation must consider pedestrian satisfaction, 4) Implementation of transport policy is carried out in a sustainable Peruvian model. In addition, statepreparations and strategies for policy implementation are required. It includes transportation infrastructure, economic growth rate, laws, technical level and education and all the surrounding environment, etc. Finally, the result of this study includes, lack of discourse and academic and theatrical instability. I would like to finish with suggestion, the necessary detail follow up studies to overcome the theories limited between the scope of traditionalsocial research knowledge showed insufficient impact significant influence on performance time.

## References

[1] Ackermann and von Neumann. (1920). Hilbert's "Verungleckter Beweis" the first epsilon theorem, andconsistency proofs. Apr. v1., v2.

[2] Aguirre, Carlos, and Panfichi, Aldo. (2013). Cultura, socialización y cambio. Fondo Editorial de la PontificiaUniversidad Católica del Perú, Lima, Siglo XX.

[3] Akhmouch, Aziza, and Nunes Correia, Francisco. (2016). The 12 OECD principles on water governance. *UtilitiesPolicy, 43*, 14-20. https://doi.org/10.1016/j.jup.2016.06.004
[4] Alegre. (2016). Public Transportation; Sustainable Mobility; Public Services de los ciudadanos y que debe sergarantizada por el Estado.
[5] Alkharabsheh, A, and Duleba, S. (2021). Public Transportation Service Quality Evaluation during, the COVID-19Pandemic in Amman City Using Integrated Approach Fuzzy AHP-Kendall Model. *Vehicles, 3(3)*, 330–340. https://doi.org/10.3390/vehicles3030020
[6] Alkharabsheh, A., Moslem, S., Oubahman, L, and Duleba, S. (2021). Integrated Approach of Multi-Criteria Decision-Making and Grey Theory for Evaluating Urban Public Transportation Systems. *Sustainabilit, 13(5)*, 2740. https://doi.org/10.3390/su13052740
[7] Allan, J., Macdonald, B., Marsh, E, and Wilson, D. (1996). A Study of Recycling, Revitalizing, and Restructuring"Gray Area" Transportation Corridors. University of California Transportation Center Faculty Research banner, UC Berkeley. *Complex Systems, 6*, 391-415.
[8] Bean, C.E., Kearns, R, and Collins, D. (2008). Exploring Social Mobilities: Narratives of Walking and Driving in Auckland, New Zealand. *Urban Studies, 45(3)*, 2829-2848. https://doi.org/10.1177/0042098008098208
[9] Bielich Salazar, C. (2009). La guerra del centavo : una mirada actual al transporte público en Lima metropolitana.Working Paper, Type of publication narrower categories Non-commercial literature.
[10] Bernick, M.S. (1996). Transit Villages in the 21st Century First Edition.
[11] Bernick, M, and Cervero, R. (1997). Find a library where document is available. New York, NY United States, p.400.
[12] CAF. (2016). Development of Latin America. Metro de Lima: el caso de la Línea 1 Socio Teac an open knowledgesite, Region, Peru.
[13] Casana-Jara, K.M. (2020). Characteristics of women's death by violence according to necropsies carried out in theCallao morgue. *Rev Peru Med Exp Salud Publica, 37(2)*, 297-301.
[14] Cervera, R. (2001). Walk-and-Ride Factors Influencing Pedestrian Access to Transit. University of California, Berkeley. *Journal of Public Transportation, 3(4)*, 1-23. https://doi.org/10.5038/2375-0901.3.4.1
[15] Cohen, E., Dearnaley, J, and Hansel, C. (1955). The risk taken in crossing a road. Handbook of TransportationScience.
[16] CSP. (2018). Peru Country Strategic Plan 2018–2022.
[17] Daamen, W. (2003). Controlled experiments to derive walking behavior. Delft University of Technology. Daamen, W., Hoogendoorn, S.P, and Bovy, P. (2005). Transportation Research Record: Transportation Research Board.
[18] Droste, N. (2017) GR Lima, Municipal del Lima. Municipal responses to ecological fiscal transfers in Brazil: amicro-econometric panel data approach. Environmental Policy. online library.
[19] European Commission and Project partners. (2002). Information on project partnerships, including search services,signature.
[20] Ganin, A.A., Kitsak, M, and Marchese, D. (2017). Resilience and efficiency in transportation networksScienceadvances.sciencemag.org. Dec, Vol. 3.
[21] Hall, R. (2012). Handbook of Transportation Science. 2012 – 532.
[22] Harry, J.P. and Timmermans, H. (2014). Using ensembles of decision trees to predict transport mode choice decisions: Effects on predictive success and uncertainty estimates. VOL. 14 NO. 4.
[23] Rasouli, S, and Timmermans, H. J. P. (2014). Using ensembles of decision trees to predict transport mode choicedecisions: Effects on predictive success and uncertainty estimates. *European Journal of Transport and Infrastructure Research, 14(4)*, 412-424.
[24] Havarda, C, and Willis, A. (2012). Effects of installing a marked crosswalk on road crossing behavioral and perceptions of the environment. *Traffic Psychology and Behaviour, 15(3)*, 249-260. https://doi.org/10.1016/j.trf.2011.12.007
[25] Helbing, D. (1998). A Fluid Dynamic Model for the Movement of Pedestrians. *Journal reference: Complex Systems, 6*, 391-415.
[26] Hermoza-Moquillaza. (2016). Automedicación en un distrito de Lima Metropolitana, Perú. *Rev Med Hered, 27*, 15-21.
[27] Hoogendoorn, S.P, and Bovy, P. (2001). Pedestrian Models for Autonomous Driving Part II: High-Level Modelsof Human Behavior. Journal of Systems and Control Engineering, Proceedings of the Institution of Mechanical Engineers, Part I. 215, 283-303.
[28] IRE Honors Shockley. (1952). American Institute of Physics. Physics Today 5, 1, 28.

[29] Jacobs, G.D. and Wilson, D.G. (1967). A study of pedestrian risk in crossing busy roads in four towns, Road Research Lab/UK.
[30] Jauregui-Fung, F., Kenworthy, J., Samar Almaaroufi, N., Pulido-Castro, S, and Golda-Pongratz, K. (2019). Anatomy of an Informal Transit City: Mobility Analysis of the Metropolitan Area of Lima. *Urban Sci, 3(3),67. 1-39.* https://doi.org/10.3390/urbansci3030067
[31] Jose, J. (2013). Mención en artículo: Las combis: más de 20 años de un mal que debe desaparecer del transporte público, El Comercio.
[32] Kim, Y.S. (2020b). The study on the social science methodology: Focusing on change in the behavior of Policymakers. *Technium Social Sciences Journal, 6(1)*, 1-17.
[33] Kim, Y. S., & Michael May. (2013). A comparative study of the energy policy making od the South Korea & Germany: With focused on to hermeneutics Methodology. *Korea Comparative Government Review, 17(1),95-124.*
[34] Marchetti, C. (1994). Anthropological Invariants in Travel Behavior. *Technological Forecasting and Social Change, 47(1)*, 75–88. https://doi.org/10.1016/0040-1625(94)90041-8
[35] Marsden, G. R., McDonald, M, and Brackstone, M. (2003). A comparative assessment of driving behaviours at three sites. *European Journal of Transport and Research, 3(1),* 5-20. https://doi.org/10.18757/ejtir.2003.3.1.4206
[36] Mosahab, R., Mahamad, O, and Ramayah, T. (2010). Service Quality, Customer Satisfaction and Loyalty: A Testof Mediation. *International Business Research, 3(4)*, 72-80.
[37] MTC. (2018). Decreto Supremo N 019 2018-MTC. Modifica el Reglamento Nacional de Vehículos el Texto Ú nico Ordenado del Reglamento Nacional de Tránsito - Código de Tránsito y dicta otras disposiciones.
[38] MTC. (2019a). ITS manual of Infrastructure. Peru.MTC. (2019b). Global CO2 emissions.
[39] MTC. (2020). Handbook of Intelligent Transportation Systems for Road Infrastructure. General Direction of Policies and Regulation in Multimodal Transport.
[40] Newman, P, and Kenworthy, J. (2006). Urban Design to Reduce Automobile Dependence. *Opolis, 2(1),* 35-52.
[41] Newman, P., Kosonen, L, and Kenworthy, J. (2016). Theory of urban fabrics: planning the walking, transit/publictransport and automobile/motor car cities for reduced car dependency. *Town Planning Review, 87(4)*, 429-458.
[42] New York Times. (1973). See the article in its original context from February 11, 234.
[43] Prodi, R. (2002). The European Commission A Wider Europe - A Proximity Policy as the key to stability "Peace, Security & Stability International Dialogue and the Role of the EU" Sixth ECSA-World Conference. JeanMonnet Project. Brussels, 5-6 Dec.
[44] Rasouli, S, and Timmermans, H. J. P (2012). Uncertainty in travel demand forecasting models: literature review and research agenda. *Transportation Letters, the International Journal of Transportation Research, 4*, 55-73. https://doi.org/10.3328/TL.2012.04.01.55-73
[45] Rasouli, A., Kotseruba, I, and Tsotsos, J. K. (2017). How drivers and pedestrians communicate. *Intelligent VehiclesSymposium (IV), 12 Feb*, 264-269.
[46] SINIA. (2020). Sistema Nacional de Información Ambiental. Peru.
[47] Schulz, A. T, and Stiefelhagen, R. (2015, Sept). A Controlled Interactive Multiple Model Filter for Combined Pedestrian Intention Recognition and Path Prediction. Conference: Intelligent Transportation Systems (ITSC), IEEE 18th International Conference on At: Gran Canaria, Spain. IEEE 18th, 15-18. https://doi.org/10.1109/ITSC.2015.37
[48] Šimunoviæ, L.J., Bošnjak, I, and Mandãuka, S. (2009). Intelligent Transport Systems & Pedestrian Traffic.
[49] *Promet – Traffic &Transportation, 21(2)*, 141-152.
[50] Tapia, V., Carbajal, L., Vásquez, V., Espinoza, R., Vásquez-Velásquez, C, and Steenland, K. (2018). Reordenamiento vehicular y contaminación ambiental por material particulado (2,5 y 10), dióxido de azufre y dióxido de nitrógeno en Lima Metropolitana, Perú. *Rev Peru Med Exp Salud Publica, 35(2),*190-197.
[51] Thet Hein Tun, B.W., Hidalgo, D., Albuquerque, C., Castellanos, S., Sclar, R, and Escalante, D. (2020). Informaland Semiformal Services in Latin America: An Overview of Public Transportation Reforms. Inter-American Development Bank. http://dx.doi.org/10.18235/0002831
[52] Vickers, H. (2016). Expert Systems with Applications. *An International Journal, 45*, 471.
[53] Yokota, T., Weiland, R. J, and Yamagata, H. (2004). Approaches for Introducing Intelligent Transportation Systems into Developing Countries. Transportation Research Record: Journal of the

TransportationResearch Board. Published By: Sage Publications, Inc.
[54] Yokota, T. (2004). ITS for Developing Countries. ITS Technical Note. For Developing Countries. NRI. July, 22.4.
[55] Zahavi, Y, and Talvitie, A. (1976). Regularities in Travel Time and Money, Expenditures. *TransportationResearch Record, 750*, 13-19.