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User-Oriented, Context-Specific Intelligent Transportation System Solutions for the Akure-Metropolis

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ABSTRACT

This paper aims to sensitize on the adoptable modern solutions that can improve the current traffic management system in Nigeria. Transportation users' viewpoints on intelligent transportation system applications that are desirable are sought in Akure metropolis. The study reveals that should the metropolis or country seek to systematically adopt Intelligent Transportation Systems (ITS) applications with candid appreciations by the transportation users, they could consider electronic fare payment in the advanced public transportation system category, followed by adaptive traffic signal control, an advanced traffic management system. Vehicle-to-vehicle collision avoidance system, an advanced vehicle communication system, is valued as much as real-time traffic information system, in the advanced traveler information system category. Trailed by electronic toll collection in the intelligent transport pricing system category. The study further reveals that there are more than often, perceptual differences in some of these ITS applications with respect to age groups, profession and most used means of transportation. The paper concludes that the State, and indeed, the country could develop context-specific evidence-based ITS policies toward the goal of deploying ITS solutions capable of intuitively adapting to the future traffic demands and inclusively improve transportation efficiency and safety. The paper also provides a conceptual ITS policy framework considering transportation users' needs as context-specific.

Keywords: ITS; Advanced Public Transport System; Advanced Traffic Management System; Advanced Travellers Information System; Advanced Vehicle Communication System; Intelligent Transport Pricing System; Traffic Management; People's needs considerations, its policy framework; Developing Country

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INTRODUCTION

Traffic control and management challenges have continued to be unimaginable in most parts of the world, specifically in Nigerian cities because of poor transportation infrastructural planning vis-à-vis sharp population growth (Faiyetole, 2020). These challenges may be well mitigated with the deployment and use of advanced and modern technologies. Advancements in data analytics, machine learning, pattern recognition, computer vision, electronics, sensors, artificial intelligence, artificial neural networks, telecommunication and global navigation satellite systems (GNSS) technologies have continued to impact on every facet of humans' wellbeing. In the context of mobility, these technological advances are integrated with transportation engineering, in what it is now termed Intelligent Transportation System (ITS) (IRFNET, 2017; Bhupendra and Ankit, 2015; Singh and Gupta, 2015; Singh *et al.*, 2014; EU, 2010). ITS provides innovative and intuitive services including traffic control and management that make for safer, more coordinated, smarter and sustainable use of transportation equipment and related infrastructure. Thus, ITS may help to save lives, time and money.

The intelligentation transport system is being researched, developed, deployed and used in industrialized countries for real-time navigation, traffic updates, lane discipline and predicting travel time. Thus, ITS technologies and policies have been successfully deployed in several industrialized countries like in the United States (Steve and Jeff, 2014; USDOT, 2016; 2010; 2008), Japan (JICA, 2015), South Korea (ITS Korea, 2008; Young, 2008), Singapore (LTA and ITSS, 2014; Chiang, 2008), Australia (Nowacki, 2012; Zabrieszach, 2013), Europe (IRFNET, 2017; EU, 2010) and United Kingdom (ITS Report, 2012; ITS UK, 2010). According to Sen *et al.* (2009), the deployment of ITS is distinctin different countries, but the motive is same, i.e. to improve the transportation system performance including reduced congestion, increased safety, andtravelers convenience. As a matter of fact, the International Road Federation (IRF) established a high-level Policy Committee on ITS way back in 2008 "to foster the deployment of ITS by educating and encouraging governments to integrate ITS as a major tool to achieve their transportation policy objectives." Thus, supporting and optimizing all modes of transportation, both individually and in cooperation with each other (IRFNET, 2017).

Sub-Saharan African (SSA) countries like South Africa, Ethiopia, Nigeria, and Zambia have indeed made efforts in deploying some levels of ITS technologies in their major cities (World Bank Group, 2017; JICA, 2015; Burnett *et al*., 2000). For example, the city of Lekki in Lagos State, Nigeria, operates an e-tag system along the Lekki-Epe expressway and Lekki-Ikoyi Bridge. According to JICA (2015), other deployed ITS services in Lekki include CCTV for safer roads and bus smartcards for fare collection on the public transportation systems, such as the Bus Rapid Transport (BRT) and Lagos Bus (LAGBUS).

Akure is the capital city of Ondo State in Southwestern Nigeria, the same geopolitical region as Lagos State. Akure is however, a modest metropolis with less vehicular volume. It is imperative to investigate the state of traffic control and management in the metropolis regarding the user-oriented ITS applications deployable for improved transportation in the metropolis. The objectives of this paper, therefore, are to assess the adequacy of the existing ITS-related infrastructure in Akure metropolis, examine the different ITS technologies that can be implemented in the city, and to evolve a user-oriented ITS policy framework for the metropolis.

Section 1 of this paper introduces the subject of intelligent transportation system, while section 2 discusses the modernization theory and decision-oriented approach as it relates to the transportation users. Section 3 deals with the methods and materials; section 4 reveals the results, while section 5 discusses the results within the context of the problem being examined. Finally, section 6 concludes the paper.

Modernization Theory and Technology Transfer

Modernization theory is founded on how industrialization, urbanization, rationalization, mass consumption, and adoption of technology evolved in North America and Western Europe (Crossman, 2019). Democracy and economic development as well are integral to modernization. Indeed, modernization is linked to development as a uniform evolutionary route that societies follow, from pre-industrial societies to post-industrial, urban and modern forms (Ynalvex and Shrum, 2015; Shrum, 2000;

Escobar, 1995). In fact, Przeworski and Limongi (1997), show that the probability of democratization is directly proportional to purchasing power parity (PPP). Modernization therefore follows a predetermined sequence of development: traditional economies, transition to take-off, take-off itself, drive to maturity, age of high consumption, and post-industrial societies (Chirot and Hall, 1982). This implies that countries develop predictively until they become increasingly complex. In fact, according to Crossman (2019), through the process of modernization, transportation and communication become more sophisticated and population become increasingly urban and mobile.

In the industrialized societies, the core countries or the developed nations, modernization theory emphasizes internal mechanisms such as formal education, market-based economy, democratic and political structure, for its evolution (Jenkins and Scanlan, 2001; Shrum, 2000). On the other hand, for the developing countries, the mechanisms strongly driving the evolutionary process of modernization are more of external forces with more influences from the foreign countries, especially the industrialized ones. Most prominent of these external mechanisms is science, by way of knowledge and technology transfer from developed countries. In other words, developing countries like Nigeria can fast-track their development by acquiring and deploying 'western technical capital' and science and technology (Ynalvex and Shrum, 2015; Shrum, 2000). The deployment of these scientific principles and technologies are critical at the 'transition' to 'take-off' stage of development, Chirot and Hall (1982) assert. This implies that science and technology transfer to the developing countries will go a long way in placing these countries in the industrialized categoryof countries.

In the context of catalyzing development in the developing countries in ease of mobility through travel time conservation, and reduction in accidents on the roads, energy use, emission of greenhouse gases (GHGs) and pollution (Faiyetole, 2019; Faiyetole, 2018; Faiyetole and Adesina, 2017), advances in transportation technologies such as the ITS could be adopted. ITS will thus, help to reduce both the negative environmental and economic externalities due to the clogging of transportation systems in the developing countries.

Modernization has impacted on the industrialized countries, developing and implementing ITS technologies from the first phase of its development. ITS research, development and project deployments in industrialized continents like North America, Western Europe, and the Asia Pacific have taken place in virtually all the user-service areas through the first phase to the current phase of its development (Faiyetole, 2020; Ezell, 2010). ITS in Africa, in contrast, is facing a slower development. However, Africa stands the chance to acquire and deploy these ITS technologies from the developed countries, to the benefit of its citizenries, especially the transportation users, and the environment in general.

Decision-oriented approach and the transportation users

"Transportation planning should focus on the information needs of decision-makers and should recognize the often limited capability of individuals unfamiliar with technical analysis to interpret the information produced" (Meyer and Miller, 1984). Thus, the decision-oriented approach could encompass a system-oriented approach plus people's (transportation users) needs in order to provide an evidence-based and holistic standard for decision makers in transport infrastructural planning (Faiyetole, 2020). The transportation users who are provided with information on the ITS applications that are obtainable, in this context, are better positioned to proffer the solutions that better fit their economic and social change trajectory. To a large extent however, the proffered solutions could still be subjected to the decision-oriented approach that incorporates the transportation users' preferred application with the system-oriented approach, which considers the technicalities in terms of techniques or technologies.

ITS applications and categorizations

Essentially, ITS applications categorizations are five, namely, advanced traffic management system (ATMS), advanced travellers' information system (ATIS), advanced vehicle communication system (ACVS), advanced public transportation system (ATPS) and intelligent transportation pricing system (ITPS) (Faiyetole, 2020). ATMS are traffic control devices, such as adaptive traffic signals control, ramp metering, and the dynamic (or "variable") message signs on highways that provide drivers with real-time messaging about traffic or highway status. Traffic operations centres (TOC) are an integral part of

ATMS, which are centralized traffic management centres run by cities and states worldwide that rely on information technologies to connect sensors and roadside equipment, vehicle probes, cameras, message signs, and other devices together to create an integrated view of traffic flow and to detect accidents, dangerous weather events, or other roadway hazards (Faiyetole, 2020; Ashley *et al*., 2016; Amadi *et al.*, 2014; Singh *et al*., 2014; Bertini and El-Geneidy, 2002). The most effective ATIS are able to provide drivers real-time traffic information, inform them of current traffic or road conditions on their surrounding roadways, accidents, road weather conditions or road repair works, and empower them with optimal route selection and navigation instructions, ideally making this information available on multiple platforms, both in-vehicle and out (Faiyetole, 2020; Ashley *et al*., 2016; Amadi *et al.*, 2014; Singh *et al*., 2014).

Advanced vehicle communication system is hinged on technologies that bring about communication between transportation equipment such as vehicle-to-vehicle (V2V), vehicle-to-road infrastructure (V2I), vehicle-to-users devices (V2U) and vehicle-to-everything (V2X). They are the archetype for a comprehensively integrated intelligent transportation system. For example, IntelliDrive enables cooperative intersection collision avoidance system (CICAS) in which two or more dedicated short-range communication (DSRC) equipped vehicles at an intersection would be in continuous communication either to vehicles or to transportation infrastructure that could recognize when a collision between the vehicles appears imminent (based on the vehicles' speeds and trajectories) and would warn the drivers of an impending collision or even communicate directly with the vehicles to brake them (Singh *et al*., 2014; Vanajakshi *et al*., 2010). AVCS applications include intelligent speed adaptation, adaptive signal timing, dynamic re-routing of traffic through variable message signs, lane departure warnings, curve speed warnings, and automatic detection of roadway hazards, such as potholes, or weather-related conditions such as icing (Faiyetole, 2020; Ashley *et al*., 2016; Amadi *et al.*, 2014).

Advanced public transportation system includes applications such as automatic-vehicle-location (AVL), which enables transit vehicles, whether bus or rail, to report their current location, making it possible for traffic operations managers to construct a real-time view of the status of all assets in the public transportation system. APTS helps to make public transportation a more attractive option for commuters by giving them enhanced visibility into the arrival and departure status of buses and trains. This category also includes electronic fare payment systems for public transportation systems, which enable transit users to pay fares from their smartcards or mobile phones (Faiyetole, 2020; Ashley *et al*., 2016; Amadi *et al.*, 2014; Singh *et al*., 2014). ITPS most common applications are electronic toll collection (ETC), commonly known as "road user charging," through which drivers can pay tolls automatically via a DSRC-enabled onboard device or e-tag placed on the windshield. The most sophisticated countries have implemented a single national ETC standard, obviating the need to carry multiple toll collection tags on cross-country trips because various highway operators' ETC systems lack interoperability. Others are variable parking fee and fee-based express (HOT) lanes. Another ITPS is a vehicle-miles-traveled (VMT) fee system that charges motorists for each mile driven. VMT fee systems represent an alternative to the current fuel taxes and other fees that many countries and states use to finance their transportation systems (Faiyetole, 2020; Ashley *et al*., 2016; Amadi *et al.*, 2014; Singh *et al*., 2014).

There exists some traffic control and management furniture in Akure metropolis, for example, traffic signals, streetlights, route directional signs, speed display signs and overhead route signboards. It is however evident that the industrialized world has adopted the use of ITS technologies (Ashley et al., 2016; Amadi et al., 2014; Nowacki, 2012; Ezell, 2010), informing the need for the developing countries to adopt same in order to benefit from these technologies,.

RESEARCH METHODOLOGY

Primary data was sourced using structured questionnaire backed up with direct observations of the Akure metropolis. Due to literacy consideration of the potential respondents, only a small sample of the target population as determined conveniently using purposive-clustered sampling technique on the criteria of education, job type, and workplace. The questionnaire was structured in a manner that defined and explained the ITS terms used. However, the sample is populated by educated individuals selected from the Federal University of Technology, Akure, and the civil servants working in the Akure metropolis i.e. Ondo State ministries, departments and agencies (MDAs). The population size of these three clusters amounts to 1,840. Using Taro Yamane's formula with an error margin of 0.1, the sample size was approximately 95. The study, however, has 55 out of the 95 sample population, making approximately 58% of the population who completed and returned the questionnaire on the final timeline.

The questionnaire was designed to elicit information from the transportation users on the adequacy of the existing traffic management facilities in Akure metropolis, and further, to reveal their dispositions to deploying or adopting particular ITS applications in the city.

RESULTS AND DISCUSSION

Adequacy of Precursory ITS Facilities in the Metropolis

The existing traffic management facilities, otherwise termed here as the precursory ITS facilities, are obsolete, and at best, analogue when compared with the standard ITS facilities found in developed countries. Provided answers to the questionnaire on these precursory installations were evaluated to elicit information on their level of adequacy in the Akure metropolis.

Table 1a shows the results of a 4-scale Likert-type or weighted mean (W.M.) analysis and one-sample t-test. Traffic signals are reckoned best at 3.43/4 with p = .00, which could be explained by the fact that they are operational and control the traffic flow efficiently at various intersections, hence adequately being used. Dilapidation, poor placement and poorly kept route directional signs can be ascribed to its low adequacy rating of 2.38/4. It however, shows a significant p (.00), which reveals its import. Speed display signs can only be found on federal roads and government reserve areas (GRA), which is a likely reason for its low (2.23/4) rating but with a significant (.00) *p-value* that unveils the respondents recognize the importance of this road furniture in cautioning over-speeding drivers. The lowest rated facility (1.19/4) but also with high significance (p = .00) was overhead route signboard because it is underutilized or for its misplaced use i.e. either for advertisement or left bare.

Table 1a: Adequacy of Existing Traffic Management Facilities in Akure Metropolis

Existing facilities	**W.M.**	**Standard Deviation (S.D.)**	**t**	***p***
Traffic signals	3.43	.71	13.23	.00*
Streetlights	2.73	.78	-1.51	.13
Route directional signs	2.38	.93	-2.97	.00*
Speed display signs	2.23	.65	3.52	.00*
Overhead route signboard	1.19	.46	-28.78	.00*

From Table 1a, streetlights rank high at 2.73/4 showing it is adequately being used where installed. The insignificant p = .13 from the one-sample t-test result can be explained, as the installed streetlights are mostly situated on major highways, hence not available on most access roads that equally need good lighting facility, and where available, they are sometimes not functional due to poor electricity supply in the metropolis. The one-way analysis of variance (ANOVA) test for the facilities only shows significance (F = 2.68, p = .05) for streetlight as captured in Table 1b. Revealing further that respondents between the ages of 20 and 60 have significantly different opinions (F = 2.68, p = .05) compared with respondents from 61 and above, who seem to have, over the years, been used to the status quo.

Table 1b: ANOVA Result for Adequacy of Existing Traffic Management Facilities

Existing facilities	**Age Group**	**Mean**	**F**	***P***
Streetlights	</=20	3^{a}	2.68	.05*
	21-40	2.68^{a}		
	41-60	2.87^{a}		
	61=/>	2.36^{ab}		

Desirability of Deployable ITS Applications in the Metropolis

The respondents' perceptions of the various standard ITS categories (ATMS, ATIS, ACVS, ITPS, and APTS) and specific application types were examined to determine which applications are desirable for deployment in the Akure metropolis. The Likert analysis and ANOVA results are shown in Table 2, based on the respondents' understanding of the different ITS systems vis-à-vis their technological development, economic status, political will, electricity supply, maintenance culture and current status of the road infrastructure.

Table 2: Desirability of Deployable ITS Applications in the Metropolis

						ANOVA		
ITS	W.M	S.D.	Specific ITS Applications	W.M.	S.D.	Age	Profession	Most used means of Transport
			Electronic fare payment	2.2/3	.83			
APTS	3.6/4	.76	Real-time information for buses & taxis	2.0/3	.82	F=3.1, p=.03*		F=2.5, p=.05*
			Automatic vehicle location	1.7/3	.83			
			Adaptive traffic signal control	3.5/4	.690			
			Traffic operation centre	3.1/4	.87	F=6.7, p=.00*	F=3.4, p=.01*	F=3.4, p=.01*
ATMS	3.5/4	.77	Electronic message board	1.8/4	.81	F=7.3, p=.00*		
			Ramp meter	1.6/4	.83	F=2.7, p=.05*		F=4.2, p=.00*
			V2V collision avoidance system	1.9/2	.23	F=3.8, p=.01*	F=3.1, p=.02*	
AVCS	3.1/4	.85	Intelligent speed adaptation	1.1/2	.32	F=3.2, p=.03*		
			Real-time traffic information system	3.6/4	.71	F=4.4, p=.00*		F=2.7, p=.04*
			Route guidance information system	3.0/4	.77		F=6.8, p=.00*	
ATIS	3.1/4	.81	Parking guidance information system	1.8/4	.76			
			Road weather information system	1.7/4	.84	F=2.6, p=.05*	F=3.9, p=.01*	
			Electronic toll collection	4.0/5	1.20		F=2.7, p=.03*	
			Electronic road pricing	3.9/5	.85			F=3.4, p=.01*
ITPS	2.2/4	1.06	Variable parking fees	3.5/5	1.03	F=3.9, p=.01		
			Fee based express lanes	2.2/5	.83			F=3.2, p=.02*
			Vehicle miles traveled	1.5/5	1.10			

The advanced public transport system has the highest weighted mean of 3.6/4, and could be explained by the respondents' positive disposition to public transportation in Akure metropolis, justified by its relatively good road networks, convenient carpooling system, and a low-cost taxi fare. Electronic fare payment at 2.2/3 is perceived would be the most beneficial APTS application if deployed in the metropolis according to the respondents. The ease of use of electronic cards such as the automatic teller machine (ATM) cards within the metropolis may have accounted for the high rating ascribed to electronic fare payment by the respondents. Advanced traffic management system is arguably at par with APTS at 3.5/4 on the Likert scale. Further insight based on the ANOVA result reveals there is a perceptual difference with respect to real-time information for buses and taxis for both the age groups and means of transportation. This was skewed toward the 21-40 (2.25/4) and 60+ age groups (2.29/4); buses (2.27/5) and tricycle (2.71/5), which are congruous to this advanced public transport system category of ITS.

The high ranking of ATMS category of ITS could be linked to the potential import as understood by the respondents in helping to mitigate accident and traffic congestion issues within the metropolis of which its specific application of an adaptive traffic signal control could have been immensely appraised at 3.5/4 seeing the effectiveness of the existing analogue traffic signals which was rated 3.5/4 as shown Table 1a. The ANOVA results, however, reveal that perceptual difference in traffic operation centeris recorded for age group, type of profession and major means of transportation. Electronic message board and ramp meter only show a difference in respondents' opinions in the age group category. Revealing that more than often, the age of respondents is related to their opinion on advanced traffic management systems. The exception of adaptive traffic signal board, which was unanimously considered, could have been seen as a relatable technology from the existing traffic signals road furniture. The advanced vehicle communication system is deemed deployable at 3.1/4. The respondents felt well-disposed to AVCS applications with an understanding that they are capable of averting potential accidents that could lead to loss of lives, mostly caused by human factors. Thus, of the two considered specific AVCS applications, which are V2V and intelligent speed adaptation, the V2V is favored very highly at 1.9/2. Perceptions are however, seen to be different for conclusions on AVCS applications with respect to the age group and type of profession, while it is just age group for intelligent speed adaptation. These perceptions skew toward the younger age groups, the students and business person.

An advanced travelers information system is evaluated at 3.1/4, a user-oriented ITS application in contrast to ATMS. ATIS most favored specific application is its real-time information system that gives the user handy information on traffic conditions within its region of use. The ANOVA results show a difference in opinion for real-time traffic information with respect to the age group and means of transportation while showing a significant difference in opinions for respondents in different professions who considered route guidance information. Further, for road weather information system, the difference in opinions is noticeable choosing road weather information system. The intelligent transport pricing system is comparatively adjudged a less beneficial ITS category of applications for deployment in Akure metropolis at 2.2/4. The reason could be the citizen's indisposition to paying for road infrastructure, believing it is the government's responsibility to supply and maintain road infrastructure. ETC is evaluated at 4/5 and rated the most beneficial ITPS to be deployed in the metropolis. As a matter of fact, the collection of tolls on major highways have ceased due mismanagement of revenues and institutional corruption. However, ITPS being an intelligent system can cut off the influence of the third party in the tolls collection, for instance. Further insight from the ANOVA results shows that ETC is viewed differently by the respondents where public/civil servants (4.21/5), private/corporate (4.11/5) and business persons (4.24/5) seemingly have the same opinion on this application. Electronic road pricing, however, reveals a significant difference in opinion with respect to means of transport where the private car, taxi and bus, and motorcycle users, show similar and stronger opinions than the tricycle users (2.43/5). Other applications with a perceptual difference are variable parking fees with respect for age group, and fee-based express lanes for means of transport.

ITS Policy Framework considering Transportation Users' Needs as Context-Specific

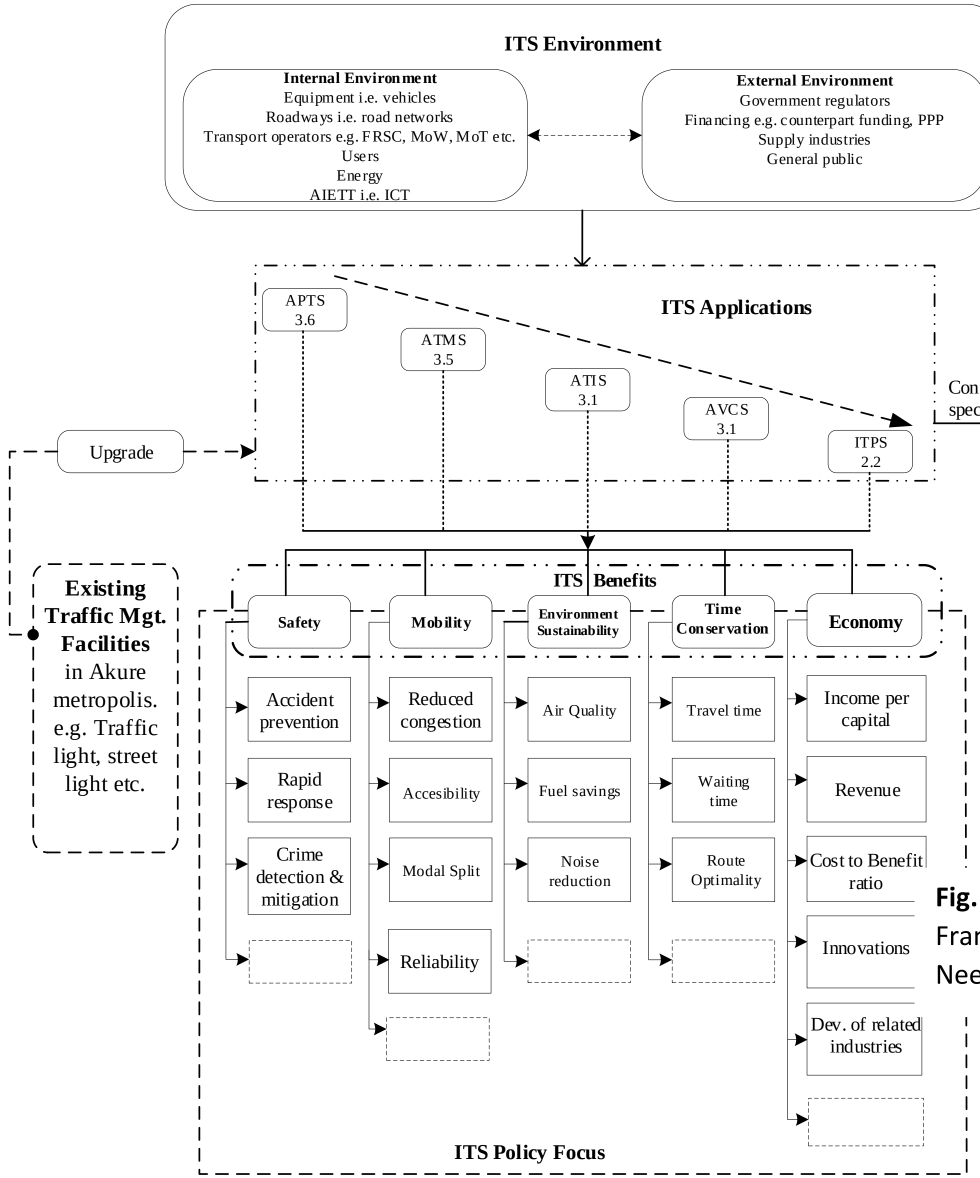
The survey in this paper captures the transportation users' needs angle, and the results show that the existing traffic management infrastructure in the metropolis are not modern and ineffective for the growing commuting population, therefore, inadequate and that the people show a preference for the deployment of specific ITS applications. Evidence shows that if a well-planned out ITS infrastructure is installed, considering the benefits of the technologies or specific applications vis-à-vis the transportation users' needs the cost to benefit ratio would swing towards benefits.

In order to determine a policy framework for ITS infrastructural planning that could benefit all, it is expected to capture the transportation system environment, which consists of the internal and external environment. The internal environment of the system is integral to transportation, and they include the equipment such as vehicles, guide ways, road networks, operators and operating plans. Further, energy sources such as renewable or non-renewable technologies that are particularly integral to enabling ITS could be holistically considered.

The external environment shows that the internal transportation environment is subject to many influences derived from constant interactions between the system and stakeholders such as the decision makers. It could include government, financing, supply industries, and the general public. A holistic consideration of these transportation environments, ITS technologies and applications, and their associated benefits in tandem with transportation users' needs is shown in Figure 1. The ITS technologies and applications' benefits are generic items. For example, ATMS, and ATIS could aid safety either in Akure metropolis or Lagos Megacity. The transportation users' needs, however, are context specific, for instance, what is ITS users' needs for Akure metropolis may definitely be different for Lagos Megacity and so on. These two concepts of ITS technologies and applications benefits and transportation users' needs are to be synched adequately well. Therefore, with specific policy focus such as safety, mobility, environmental sustainability, time conservation or economic impact, Figure 1, could be considered, as an ITS policy framework considering transportation users' needs as context specifics (i.e. in Akure metropolis).

CONCLUSION

Modern transportation technologies such as the integration of information, electronics, sensors and telecommunications technologies on transportation engineering have been developed and widely deployed in the industrialized countries. These ITS technologies and applications can be acquired and deployed in sub-Saharan Africa, to help alleviate mobility challenges in the region. This study, therefore, considered transportation users' needs regarding specific ITS applications in Akure metropolis in Southwestern Nigeria. Preferences were made for electronic fare payment, adaptive traffic signal control, vehicle-to-vehicle collision avoidance system, real-time traffic information system and electronic toll collection. The paper, therefore, concludes that the State, and indeed, the country, could develop context-specific evidence-based ITS policies toward the goal of deploying ITS solutions that would be better appreciated by the citizenries.



a

ITS category	ITS applications	High	Average	Low	None
APTS	Electronic fare payment				
	Real-time information for buses				
	Automatic vehicle location				
ATMS	Adaptive traffic signal control				
	Traffic operation centre				
	Electronic message board				
	Ramp meter				
ATIS	Real-time information				
	Route guidance information				
	Parking guidance information				
	Road weather information				
AVCS	V2V collision avoidance system				
	Intelligent speed adaptation				
IPTS	Electronic toll collection				
	Electronic road pricing				
	Variable parking fees				
	Fee based express lanes				
	Vehicle miles travelled				

Overview of the people’s needs of ITS applications in Akure Metropolis

Fig. 1: Intelligent Transport System’s Policy Framework considering Transportation Users’ Needs as Context Specifics

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