IMPACT OF ROAD TRANSPORTATION ON THE CONTROL OF SMUGGLING OF AGRICULTURAL PRODUCTS IN SOUTHWEST NIGERIA

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ABSTRACT

The study examines the impact of road transportation on the control of smuggling of Agricultural products in Southwest Nigeria. Smuggling is smart movement of illegal importation and exportation of cargo. Nigeria has an estimated annual loss of 1.3 trillion naira due to smuggling of Agricultural produce. Specifically, the study examines the characteristic of the road networks, types of smuggling activities and assesses the extent to which road transportation has contributed to smuggling control of Agricultural product in southwest Nigeria. This research was carried out in all border towns of Lagos state, Ogun state and Oyo state. The sampling technique employed for the study was multi-stage sampling technique and 400 respondents were selected through primary data. Both descriptive and inferential statistical tools were employed. Findings revealed that most of the sampled respondents were educated energetic youth. The Gamma value for border towns in ogun, Oyo and Lagos state are 0.26, 0.31 and 0.19 respectively. There exists significant different in the road network connectivity of the border towns in south west Nigeria. The major smuggling activities in the border towns of south west Nigeria are smuggling of rice, poultry meat, Tyre, Motor Vehicle and Arms and ammunitions where Agricultural products takes the lead with prevalence factor of 55 percent. Extent to which road transportation contributes to smuggling control had R^2 of 0.671, F-value of 201.074 p of 0.000, which implies that the predicting variables (transportation safety, high speed vehicle capacity, high fuel tank capacity, state of road) explained 67.1 percent of the variation in the dependent variable (truncated smuggling). Furthermore, r of 0.708 and p-value was 0.000 implied that relationship exists between network connectivity and smuggling control. Conclusively, road transportation is useful in controlling crime of smuggling of Agricultural products in border towns of south west Nigeria, road network plays an important role in this.

Key Words: Road Transportation, Control of Smuggling, Agricultural Products

Introduction

Distance of separation does not hinder communication anymore, since the world is already turned to a global village through the use of information technology (Alexander, 2018). However, movement of goods, people and service from point of origin to destination still

remains a stringent issue because transportation still gulps resource utilization in terms of overcoming the friction of distance decay, time factor and psychological bottle neck (Aworemi and Adewole 2015). Human needs in terms of transportation service are diverse, for the fact that both tangible and non-tangible elements may need to change location before usage (Caroline and Alice 2017). Howbeit, transportation in the contemporary time is highly technology based and 'just in time' approach in transportation is coming to limelight.

According to Olagunju, Ololade, Ayinde, Oke and Babatunde, (2012), transportation infrastructure is crucial for overall economic development of an area without leaving security and safety issue. Smuggling is a type of crime that is transportation based and common among youth (ECOWAS 2011: Hassan, 2019). Criminals might not be able to perpetrate crime if they do not possess weapons like guns, ammunition, cutlass and so on. Smuggling can fuel other crimes, since transportation is life wire to economy (Olagunju, *et al.*, 2012) which has positive and negative effect. Smuggling is illegal importation and exportation of cargo like arms and ammunition, Agricultural products, etc.

Transportation is not demanded for its own purpose, rather to satisfy other purposes. This makes the demand for transportation a derived demand. Need to access food, shelter and cloth which are the most fundamental human need according to Maslow theory pushes human to seek transportation service. In Nigeria, the need for Agricultural products like rice, beans, poultry products etc. is on the high side, which create a strong smuggling enhanced trade at the detriment of the nation's economy. For instance, Nigeria Agricultural Quarantine Service (2020) and Agricultural Transformation Agenda (2011) put it forward that Nigeria has an estimated annual loss of 1.6 trillion naira due to smuggling of Agricultural products. Likewise, Food and Agriculture Organization (2019) affirmed the fact that 40 percent of Nigeria Agricultural products is smuggled out of the country. Corroborating this, they further assert that proportion of smuggled goods has 20 percent of Agricultural products. Rice, wheat, sugar, fish, and poultry products are frequently smuggled into Nigeria, undermining local production and threatening food security. Smuggling occurs through land borders, seaports, and airports, using various tactics such as false documentation, concealment, and corruption. This consequently undermines local production and farmers' livelihoods, threatens food security and self-sufficiency, results in significant revenue losses for the government and encourages corruption and organized crime

There is replicate research works on transportation, smuggling control and smuggling occurrence. Nevertheless, same cannot be said on the impact of road transportation on smuggling control of Agricultural product. This work examines the impact road transportation on smuggling control of Agricultural products in southwest Nigeria. It specifically; examines the characteristic of the road networks in border towns of south west Nigeria, examine types of smuggling activities smuggling in southwest Nigeria, assess the extent to which road transportation has contributed to smuggling control of Agricultural products in southwest Nigeria.

LITERATURE REVIEW

The concept of transportation is all about how goods, human and services move to enhance purpose achievement. It tells the direction of journey, mode of transportation, resource utility and psychological issues like safety, comfort etc. Road transportation is an over-land transportation system. It has been described as the most important mode of transportation that completely satisfies the purpose of linkage to other modes of transportation (United Nations 2009).

Just in Time (JIT) Concept

The concept of Just-in-time (JIT) is a system that is concerned with materials management in such a way that work is done with zero or almost zero inventory and ensure materials utility when required. The concept of JIT, according to Ozalp, Suvaci and Tonus (2010), takes advantages of minimum resources and responses in minimum time to the customers with having minimum waste and using all the factors of production. JIT management concept proved effective in all sectors including the manufacturing sector in order to increase productivity, quality and efficiency, while at the same time decreasing costs, waste and improve communication (Kee-Hung and Cheng 2009). This concept makes objective achievement encouraging. All input needed for objective achievement is mixed in such a way that minimum input is yielding the possible maximum result. This is also possible when considering smuggling control. All needed input if mix in the right quantity might ensure high productivity by supporting adequate smuggling control. JIT started growing in the service sector around the mid-1990s (Yasin, Small and Wafa 2003).

Smuggling and Transportation in Nigeria

Kingsley *et al* (2019) opined that Nigeria's borders have been described as porous allowing all sorts of trans-border criminal activities such as arms smuggling and smuggling of other contra band goods. Border communities being the domain and hosting the border largely functions as entry, transit-resting point and exit for smuggled activities (Kingsley *et al* 2019). They often engage in illegitimate business of the sales of these unauthorized goods, in that way attracting negativity within and around the border areas, with their varied intents and purposes constituting high security risk for both states.

Crime Opportunity Theory

Marcus Ronald and Barry (1998) opined that crime opportunity theory included; The Routine Activity Approach, Crime Pattern Theory and The Rational Choice Perspective. Several approaches are adoptable in study related to crime. However, according to Marcus, Ronald and Barry (1998) there are ten principles of crime opportunity theory;

METHODOLOGY

This research was carried out in all border towns of Lagos state, Ogun state and Oyo state. The states are in south west geo-political zone of Nigeria, occupied majorly by the Yorubas. Each of the states is divided into three senatorial districts. The study population of the research refers to all residents of border towns in Lagos, Ogun and Oyo states. The population of the area under survey is 300,015 (Oyo, Ogun and Lagos state Town planning record 2021).The sampling technique employed for the study was multi-stage sampling which included; systematic sampling technique, proportionate sampling technique, incidental sampling technique and observation. Google earth was used to collect data on road network. Systematic sampling technique was used to identify the respondents whom the questionnaire were administered on. Furthermore, four hundred (400) respondents were chosen as determined through the Yaro Yamane formula of determining sample size, out of the buildings in the towns under survey 300,015 (Oyo, Ogun and Lagos state Town planning record 2021). The Yaro Yamane formula is very useful when researcher is confronted with very large sample population that is practically impossible to

capture. The formula reduces large population to small population without bias. The formula is represented mathematically as;

$$n = \frac{N}{1+N.(e)2} \dots \text{equa 1}$$

where;

N = total population, n = sample size and e = error allowed

$$n = \frac{300015}{1 + 300015.(0.05)2}$$

n = 399.5

n ≈ 400

This work used primary source of data.

The research work adopted both descriptive and inferential statistical tools.

RESULTS AND DISCUSSION

Socio-demographic characteristics of sampled residents in border towns of south west Nigeria

Socio demographic characteristics of sampled residents in border town of south west Nigeria was presented in Table 1. It was observed that out of the 400 sampled respondents, 6.5 percent were less than 20 years of age, 30.5 percent were between the age range of 21-30years, 32.5 percent within 31-40 years, 21 percent within 41-50 years and 9.5 percent within 51-60 years considering the range of the sampled respondent. Furthermore, it was observed that 49.5 percent were male and 50.5 percent were female. The education distribution of the respondents reveals that 11 percent had primary education, 23.8 percent had secondary education, 12.2 percent had ND/NCE, 44.8 percent had HND/B.Sc. and 8.2 percent had post graduate degree. Hence, it was deduced that majority of the sampled residents in border towns of south west Nigeria were educated energetic youth. By implication, if opportunities to involve in smuggling persist, they might be involved.

Table 1 Socio-demographic characteristics of sampled residents in border town of south west Nigeria

Variable	Measure	Frequency	Percent
Age			
	less than 20 years	26	6.5
	21-30 years	122	30.5
	31-40 years	130	32.5
	41-50 years	84	21.0
	51-60 years	38	9.5
	Total	400	100.0
Gender			

	Male	198	49.5
	Female	202	50.5
	Total	400	100.0
Education level			
	primary education	44	11.0
	secondary education	95	23.8
	ND/NCE	49	12.2
	HND/B.SC	179	44.8
	post graduate degree	33	8.2
	Total	400	100.0

Source; Field survey (2021)

Road network connectivity for Ogun State border towns using Gamma index

In an attempt to determine the road network connectivity of Ogun State border towns, Gamma index was employed. The road network was presented in Plate 1. The gamma index for Ogun State border towns was obtained via equation1

$$Gamma = \frac{e}{3(v-2)} ----- eqn. 1$$

Where; v =40, e = 30, Therefore,

$$Gamma = \frac{30}{3(40-2)}$$

Gamma = 0.26

The condition of interpreting Gamma index is that; Gamma value of less than 0.49 or 49 percent has low level of road network connectivity, Gamma value of 0.5 or 50 percent is averagely connected and Gamma value of 0.60 or 60 percent and above has a high level of road network connectivity. Where gamma value has a value range of

$$0.1 \leq \gamma \leq 1$$

Hence, Ogun state border town had low level of road network connectivity.
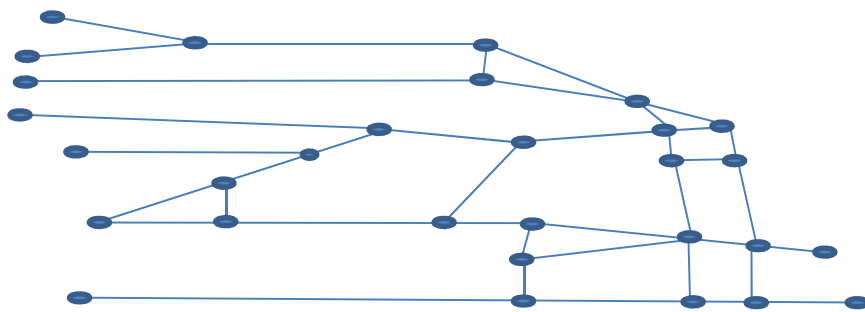
Plate; 1. Road network connectivity of Ogun State border towns

Source; Google earth Image calligraphy (2021)
Road network connectivity for Oyo State border towns using Gamma index
To determine the road network connectivity of Oyo State border towns, Gamma index was used. The road network was presented in plate 2.

$$Gamma = \frac{e}{3(v-2)}$$

Where; v =33, e = 29, Therefore,

$$Gamma = \frac{29}{3(33-2)}$$

Gamma = 0.31
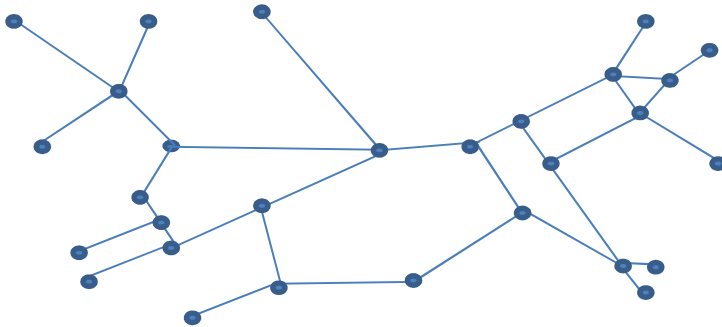Thus, Oyo state border town had low level of road network connectivity.

Plate 2. Road network connectivity of Oyo State border towns
Source; Google earth Image calligraphy (2021)
Road network connectivity for Lagos State border towns using Gamma index
To determine the road network connectivity of Lagos State border towns, Gamma index was used. The road network was presented in plate 3.

$$Gamma = \frac{e}{3(v-2)}$$

Where; v =127, e = 60, Therefore,

$$Gamma = \frac{60}{3(106-2)}$$

Gamma = 0.19

Gamma value for Lagos state border towns is 0.19, therefore, Lagos state border town had low level of road network connectivity. The Gamma value for Lagos is the lowest among the three states sampled. This is as a result of water bodies in Lagos state which made it too expensive for government to construct road in some areas of Lagos state.
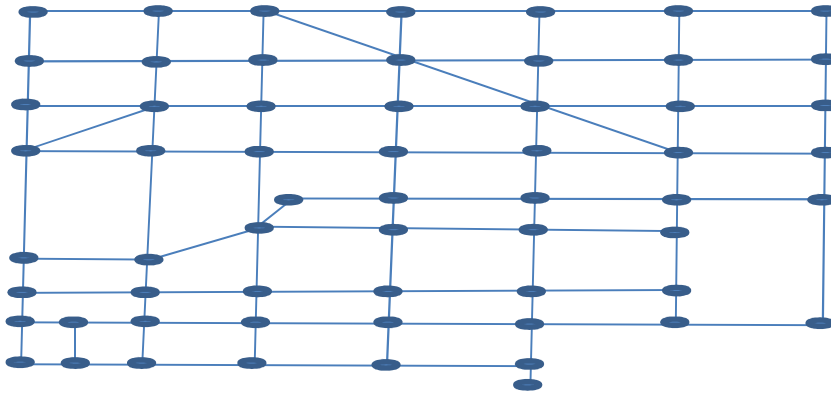
Plate3. Road network connectivity of Lagos State border towns
Source: Google earth Image calligraphy (2021)
Difference in road network connectivity for border towns in south west Nigeria

In a bit to test for the difference in road network connectivity of border towns in south west Nigeria, one sample T-test was employed and presented in Table 2. Road network index was proxy by Gamma value. It was observed that the T value for Gamma was -3.448 and the critical p value was 0.001. This implied that there existed statistically significant different in the road network connectivity of the sampled border towns in south west Nigeria. Based on Cesar Jean-Paul, (2020), gamma index was adopted.

Table 2 One-Sample t-Test of the difference in road network connectivity for border towns in south west Nigeria

	N	Mean	Std. Deviation	Std. Error Mean
Gamma	93	.4629	.10374	.01076
			One sample Test	

	Test Value = 0.5				95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Gamma	-3.448	92	.001	-.03710	-.0585	-.0157

Source; Researcher computation (2021)

Types of smuggling activities in the border towns of Southwest Nigeria

The type of smuggling activities in the border towns of Southwest Nigeria was examined using rank and presented in figure 1. It was observed that smuggling of rice ranked highest with 31 percent followed by smuggling of poultry meat 24 percent. Smuggling of Tyre had 21 percent, smuggling of motor vehicles had 18 percent, arm and ammunitions had 3 percent and other had 3 percent. It was deduced that the major smuggling activities in the border towns of south west Nigeria are smuggling of rice, poultry meat, Tyre, Motor Vehicle and Arms and ammunitions. In other words, smuggling of Agricultural product takes the lead with prevalence factor of 55 percent.
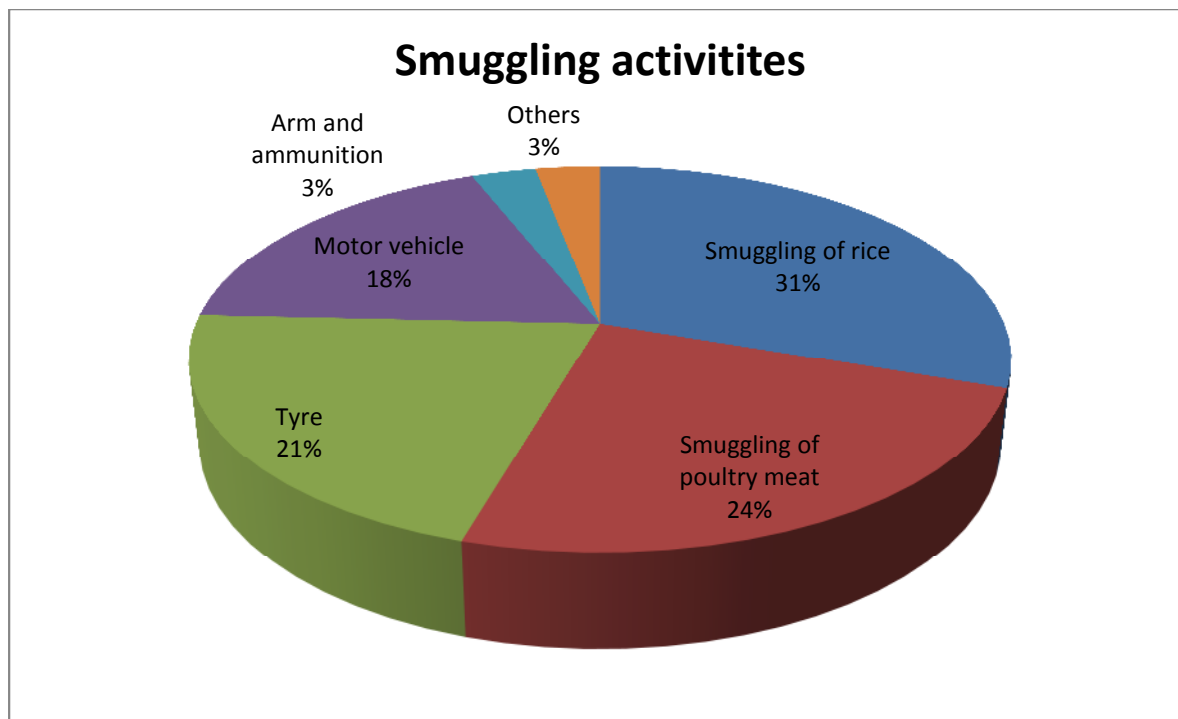
Figure 1. **Types of smuggling activities in the border towns of Southwest Nigeria**

Source; Researcher's Field survey (2021)

Nigeria Custom Service's transportation system

Considering the Nigeria custom service's transportation system captured for the study, percentage frequency was employed to present the variables used in table 3. Security agency vehicles for anti-smuggling patrol are safe had 17 percent strongly agreed, 66.2 percent agreed, 11.8 percent disagreed and 5 percent strongly disagreed. Furthermore, security agencies vehicle for anti-smuggling operation have higher speed than those of smugglers had 31.8 percent strongly agreed, 57.5 percent agreed, 4.2 percent indifference, 4.8 percent disagreed and 1.8 percent strongly disagreed. Tolling similar trend, 12.5 percent, 60 percent, 20.8 percent and 6.8 percent accounted for strongly agreed, agreed, disagreed and strongly disagreed respectively. Considering security agencies vehicle for anti-smuggling patrol are of high fuel tank capacity. State of road plied by smugglers is terrible had 13.5 percent, 64.5 percent, 4.2 percent, 11 percent and 6.2 percent strongly agreed, agreed, Indifference, disagreed and strongly disagreed respectively. Security agencies have vehicle for all mode of transportation concerning anti-smuggling patrol had 9 percent, 12.8 percent, 37.2 percent and 41 percent agreed, indifference, disagreed and strongly disagreed respectively. As such it was deduced from the respondents opinion that Nigeria Custom Service's transportation system was safe, of high speed, high fuel tank capacity and plied terrible roads.

Table 3. Nigeria Custom Service's transportation system

S/N	Variables	SA	A	I	D	SD
1	Security agencies' vehicle for anti smuggling patrol are Safe	68 (17.0)	265 (66.2)		47 (11.8)	20 (5)
2	Security agencies' vehicle for anti smuggling patrol have higher speed than those of smugglers	127 (31.8)	230 (57.5)	17 (4.2)	19 (4.8)	7 (1.8)
3	Security agencies' vehicle for anti smuggling patrol are of high fuel tank capacity	50 (12.5)	240 (60.0)		83 (20.8)	27 (6.8)
4	State of road plied by smugglers is terrible	54 (13.5)	258 (64.5)	17 (4.2)	44 (11.0)	27 (6.8)
5	Security agencies' have vehicle for all modes of transportation (land, air and water) concerning anti smuggling patrol		36 (9.0)	51 (12.8)	149 (37.2)	164 (41.0)

Source; Field survey (2021)

Extent road transportation contribute to smuggling control

The extent to which road transportation contributes to smuggling control was examined with the adoption of multiple regression analysis and presented in Table 4. Smuggling control was proxy by rate of truncated smuggling while transportation was proxy by transportation safety, high speed vehicle capacity, high fuel tank, state of road. The coefficient of determinant R^2 was 0.671, which implies that the predicting variables (transportation safety, high speed vehicle capacity, high fuel tank capacity , state of road) explained 67.1 percent of the variation in the dependent variable (truncated smuggling). Furthermore, the multiple correlation coefficient was 0.819 which implied that there is a strong correlation between independent variable combined (transportation safety, high speed vehicle capacity, high fuel tank capacity, state of road) and the dependent variable (truncated smuggling).

Testing for the hypothesis, the F-value was 201.074 and the critical p-value was 0.000. The Golden rule was that, if critical p-value is lower than the significance level reject the null hypothesis. Since critical p equal 0.000 which was lower than the level of statistical significance, the null hypothesis was rejected. The null hypothesis stated that road transportation does not have significant contribution to smuggling control. Thus, the implied alternate hypothesis which was road transportation does have significant contribution to smuggling control was accepted. Also the equation 2 is valid

$$TRS = 0.375 + 0.321TS + 0.878HSVC - 0.024HFTC - 0.233SR - - - -equ.2$$

The beta coefficient revealed that high speed vehicle capacity HSVC (0.878), had the highest contribution, followed by transportation safety TS (0.321), high speed vehicle capacity HFTC (-0.024), state of road SR(-0.233)

Table 4 Extent Road Transportation Contribute to Smuggling Control

	Model Summary				
Model	R		R Square	Adjusted R Square	Std. Error of the Estimate
1	.819[a]		.671	.667	.49377
				ANOVA	
Model	Sum of Squares		Df	Mean Square	F	Sig.
1	Regression	196.093	4	49.023	201.074	.000
	Residual	96.304	395	.244		
	Total	292.398	399			
				Coefficients		
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	T	Sig.
1	(Constant)	.375	.076		4.904	.000
	TS	.268	.034	.321	7.936	.000
	HSVC	.903	.041	.878	22.073	.000
	HFTC	-.017	.032	-.024	-.539	.590
	SR	-.188	.034	-.233	-5.619	.000

    a. Predictors: (Constant), TS, HSVC, HFTC
    b. Dependent Variable: TRS

Source; Researcher's computation (2021)

Relationship between road connectivity and smuggling control
The relationship between road network connectivity and smuggling control was examined by the adoption of correlation analysis. This was presented in Table 5. Network connectivity was proxy by gamma value while smuggling control was proxy by rate of truncated smuggling. The correlation coefficient between the two variables (Gamma index and rate of truncated smuggling) was 0.708 and the critical p-value was 0.000 which was lower than the 0.05 level of significance. As such it was inferred that there is significant relationship between network connectivity and smuggling control in the study area.

Table 5 Correlations of the relationship between road connectivity and smuggling control

		Gamma	TS
Gamma	Pearson Correlation	1	.708[**]
	Sig. (2-tailed)		.000
	N	93	93
TS	Pearson Correlation	.708[**]	1
	Sig. (2-tailed)	.000	
	N	93	93

. Correlation is significant at the 0.01 level (2-tailed).

Source; Researcher's computation (2021)

Discussion and Conclusion of Result

The study unveiled the influence of road transportation on the control of smuggling of Agricultural product in border towns of south west Nigeria. The socio demographic characteristics of the sampled respondents made it clear that energetic and educated youth are more in the study area which is in line with Eamonn *et al* (2009) and Kingsley *et al* (2019), who opined that smuggling is a type of crime that is transportation based and common among youths. Probing the Nigeria Custom Service's road transportation system, her means of road transportation was discovered to be safe, of high speed, high fuel tank capacity and plied terrible roads. These expand the work of Iwebi (2017), Polis and Ozkan (2011) and Kingsley *et al* (2019) who opined that opportunity plays an important role on crime occurrence like smuggling.

Types of prominent smuggling activities in the area under were smuggling of rice, poultry meat, Tyre and Motor Vehicles which made smuggling of Agricultural products a center focus for smuggling activities. The extent transportation safety, high speed vehicle capacity, high fuel tank capacity, state of road all explained the variation of rate of truncated smuggling was 67.1 percent. This means road transportation accounted for a large portion of the Nigeria Custom Service ability to arrest, distract, curb, subdue or reduce smuggling activities. This agreed with Adeola (2012) who opined that poor road transport reflected in the increasing spread and sophistication of criminal networks coupled with nefarious smuggling activities. High speed vehicle capacity is of the highest importance among the variable tested while it must be safe and be of high fuel capacity.

The degree road transportation influences smuggling was discovered to be high with coefficient of determinate R^2 of 0.557. By implication, 55.7 percent of the variation in the rate of smuggling was accounted for by road transportation in the study area. This supported the work of Adeola (2012) and Kingsley *et al* (2019). Interestingly, the correlation between road network connectivity and rate of smuggling control was moderate. This pinpointed the fact that areas with high road network connectivity provide better chance to control smuggling. This further explained the work of Anderson and Wilson (2013) who opined that, the prevalent spread of arms to unmannerly persons within Nigeria in particular significantly contributes to advance mayhems thereby making the attainment of peace very difficult.

Based on the findings of the research exercise, it is apposite to conclude that road transportation is useful in controlling crime of smuggling of Agricultural products in border towns of south west Nigeria. Also, road transportation influences control of crime of smuggling of Agricultural products in the border towns of south west Nigeria. Smuggling activities in the border towns are majorly Agricultural products. In a positive way, extent road transportation contributes to smuggling control was high. However, road transportation does have significant influence on smuggling. Furthermore, road network connectivity and smuggling control are in the same direction. For example, the higher the road network connectivity the better the control of smuggling of Agricultural products in the study area. In same vein, the Nigeria Custom Service's transportation system does not compromise safety, while her vehicles were of high speed with high fuel tank capacity and the route are bad. Arising from the findings and conclusion of the study, it is recommended that Technological device capable of informing movement of contraban goods should be made available for the Nigeria Custom Service. Adequate vehicle for patrol purpose be made available. Satellite image coverage should cover the forest area of the border line in real time.

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