Evaluating the effectiveness of vehicle tracking systems in reducing road traffic accidents: A case study of the Tanzania Police Traffic Headquarters in Dar es Salaam

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ABSTRACT

This study evaluated the effectiveness of Vehicle Tracking Systems (VTS) in supporting traffic monitoring and operational performance among traffic police officers at the Tanzania Police Traffic Headquarters in Dar es Salaam. The study was guided by the Technology Acceptance Model (TAM) and focused on perceived usefulness, perceived ease of use, attitude toward system use and continuous system usage. The study used a quantitative cross-sectional research design. Data were collected from 193 traffic police officers using a structured questionnaire with a five-point Likert scale. Descriptive statistics, Pearson correlation and multiple regression analysis were used to analyze the data. The findings showed that officers generally viewed the system as useful and easy to use in their traffic monitoring activities. The regression results showed that perceived ease of use had a positive and significant influence on operational performance (B = 0.186, p = 0.017), while attitude toward system use had a negative but significant influence (B = -0.164, p = 0.045). Perceived usefulness (B = -0.044, p = 0.532) and continuous system usage (B = -0.040, p = 0.607) did not have a significant influence on operational performance. The overall regression model was significant, F (4, 188) = 3.287, p = 0.012, with R^2 = 0.065. The study concludes that making the system easy to use can help in supporting operational performance. It also shows that using the system regularly or seeing it as useful may not be enough on their own to improve performance. The study recommends regular training, technical support and improvement of the system to help officers use it properly in their daily traffic monitoring activities.

Keywords: Operational Performance, Perceived Usefulness, Perceived Ease of Use, Technology Acceptance Model, Traffic Police, Road safety, Tanzania, Vehicle Tracking System

I. INTRODUCTION

Road Traffic Crashes (RTCs) are a major cause of mortality, morbidity and economic damage globally (World Health Organization [WHO], 2024; WHO, 2023). WHO states that each year around 1.35 million people are killed and millions more injured by road traffic crashes, and that many of those who survive suffer permanent disabilities (2024). In addition to the humanitarian toll, road traffic accidents also have significant economic costs due to a wide range of factors, such as health care expenses, property damage, lost productivity, and emergency response services (World Bank, 2017; WHO, 2024). As such, there is growing focus in the world on the safety of road transport, which has led to the use of innovative tools designed to enhance traffic management, monitoring and law-enforcement (WHO, 2023; African Development Bank, 2020).

Vehicle Tracking Systems (VTS) are one of these innovations, which, using Global Positioning System (GPS) technology and telecommunication networks, provide real-time location and speed data, as well as audit of route compliance and driving behavior (Motsi, 2023; Tavasoli et al. 2025). Digital vehicle monitoring technologies have proven to be effective in improving traffic surveillance, aiding timely enforcement, and boosting operational efficiency when integrated effectively into traffic-related processes (Tavasoli et al. 2025; African Development Bank, 2020). Some evidence, however, also indicated that these technologies' benefits are not only dependent on their availability, but also the acceptance, continuous use, and degree to which they are integrated into the daily operations (Almaiah et al., 2023; Matemba et al. 2020).

The Government of Tanzania has recently enhanced the use of VTS in the country by the Land Transport Regulatory Authority (LATRA) for better road safety and regulatory compliance. Thousands of Public Service Vehicles (PSVs) have had tracking devices fitted to them; allowing for real-time monitoring and assisting traffic law enforcement (Land Transport Regulatory Authority [LATRA], 2024). In the face of these efforts, road traffic collisions continue to be a major public health problem and it is unclear if the current technological infrastructure is being used effectively to

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monitor and enforce traffic. (WHO, 2020; LATRA, 2020). Previous research in Tanzania has concentrated on driver behaviour and compliance with regulations, with a limited amount of empirical research on the performance effectiveness of Vehicle Tracking Systems from the field of traffic police officers who employ the technology in their work (Moshi et al., 2023; Mollel & Mchopa, 2022).

In this regard, this study evaluates the effectiveness of Vehicle Tracking Systems in supporting traffic monitoring and operational performance at the Tanzania Police Traffic Headquarters, Dar es Salaam, as a contribution to the wider effort of reducing road traffic accidents. Guided by the Technology Acceptance Model (TAM), the study examines how perceived usefulness, perceived ease of use, attitude toward system use and continuous system usage relate to the operational performance of traffic police officers. The study brings an empirical contribution to the field by relating TAM constructs to operational performance in the context of public law enforcement, and provides evidence that can inform policy, regulation and law-enforcement practice with a view to improving the implementation and use of digital traffic management technologies.

1.1 Research Objectives

i. To examine the influence of perceived usefulness on the operational performance of traffic police officers.
ii. To examine the influence of perceived ease of use on the operational performance of traffic police officers.
iii. To examine the influence of attitude toward system use on the operational performance of traffic police officers.
iv. To examine the influence of continuous system usage on the operational performance of traffic police officers.

II. LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model was developed by Davis (1989) to explain why users accept or reject information technology. Drawing on the Theory of Reasoned Action (Fishbein & Ajzen, 1975), the model proposes that two beliefs determine acceptance: perceived usefulness, the degree to which a person believes that using a system will enhance job performance, and perceived ease of use, the degree to which a person believes that using the system will be free of effort. These beliefs shape the user's attitude toward using the system, which in turn influences behavioural intention and actual system use (Davis, 1989; Davis et al., 1989). Perceived ease of use also influences perceived usefulness, since a system that demands less effort is more likely to be seen as useful. Meta-analytic evidence has found TAM to be a valid and robust model across a wide range of settings (King & He, 2006).

In this study, TAM is used to explain how officers' beliefs about the Vehicle Tracking System (VTS) and their use of it relate to operational performance. Perceived usefulness refers to the extent to which officers believe that the VTS improves their traffic monitoring and enforcement work; perceived ease of use refers to the extent to which they find it easy to learn and operate; attitude toward system use refers to their favourable or unfavourable evaluation of using the system; and continuous system usage refers to the sustained use of the system in daily duties. Operational performance, the outcome variable, refers to how effectively officers carry out traffic monitoring and enforcement activities with the support of the system.

2.1.2 Extensions and critiques of TAM

Later work extended the original model. TAM2 added social influence and cognitive instrumental processes as determinants of perceived usefulness (Venkatesh & Davis, 2000), and the Unified Theory of Acceptance and Use of Technology integrated eight earlier models to explain intention and use (Venkatesh et al., 2003). Attitude was retained in the original TAM but omitted from these parsimonious versions, because Davis et al. (1989) found that attitude only partially mediated the effect of beliefs on intention, perceived usefulness having a direct effect on intention. Critics argue that TAM is too narrow and that its repeated application has drawn attention away from other determinants and from outcomes (Benbasat & Barki, 2007), and that it should be integrated into broader models that account for human and social change processes (Legris et al., 2003). The task–technology fit perspective adds that a system improves individual performance only when its capabilities match the requirements of the task and the system is actually used (Goodhue & Thompson, 1995). For the present study, TAM therefore supplies the constructs through which officers' acceptance of the VTS is examined, while the extent to which these constructs explain operational performance is treated as an empirical question rather than an assumption.

2.2 Empirical Review

2.2.1 Perceived usefulness and operational performance (SO1)

Perceived usefulness has repeatedly been found to play a central role in technology acceptance (Davis, 1989; King & He, 2006). Studies in policing follow this pattern. In a survey of 209 Turkish police officers, perceived usefulness, perceived ease of use and attitude toward using were all significant determinants of the acceptance of an

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electronic performance support system (Sumuer & Yildirim, 2015). In a study of vehicle tracking and monitoring systems in the Kenya Police Service, perceived usefulness was a significant antecedent of intention to use in the structural model, although its effect was not significant in the corresponding regression on intention (Ngumbi, 2016). Beyond initial acceptance, Bhattacherjee (2001) showed that perceived usefulness also shapes the intention of existing users to continue using a system. However, in these studies usefulness is related to acceptance or intention rather than to operational outcomes. Evidence from public organisations suggests that the benefits of technology depend on how it is used and supported in the working environment (Almaiah et al., 2023; Matemba et al. 2020). Officers may therefore regard a tracking system as useful without this necessarily improving their performance, a possibility that has not been tested for traffic police in Tanzania.

2.2.2 Perceived ease of use and operational performance (SO2)

Perceived ease of use influences acceptance both directly and indirectly through perceived usefulness (Davis, 1989; Venkatesh & Davis, 2000). Chang and Tung (2008) found that perceived ease of use and perceived usefulness influenced students' behavioural intention to use online learning websites, and Sumuer and Yildirim (2015) reported ease of use among the significant determinants of acceptance among police officers. In the closest vehicle-tracking study identified, perceived ease of use was the significant predictor of intention to use tracking and monitoring systems in the Kenya Police Service regression, and the study recommended training for officers (Ngumbi, 2016). Taken together, the evidence suggests that ease of use is an important condition for the acceptance of tracking technologies by police. Yet the studies reviewed measure intention or acceptance rather than performance, and none of them examined whether an easier-to-use system translates into better operational performance among traffic police.

2.2.3 Attitude toward system use and operational performance (SO3)

Attitude toward use, the user's evaluative response to using a technology, is a core element of the Theory of Reasoned Action from which TAM derives (Fishbein & Ajzen, 1975; Davis, 1989). Empirical support is mixed. Davis et al. (1989) found that attitude only partially mediated the effect of beliefs on intention, which led later models to drop it (Venkatesh & Davis, 2000; Venkatesh et al., 2003), whereas a study of police officers reported attitude as a significant determinant of acceptance (Sumuer & Yildirim, 2015). In the work reviewed here, attitude is treated as an antecedent of intention or use; its direct relationship with operational performance is rarely tested, and the direction of that relationship cannot be assumed to be positive once other beliefs are taken into account. This leaves open the question of whether officers' attitude toward the VTS is associated with how well they perform.

2.2.4 Continuous system usage and operational performance (SO4)

TAM treats actual use as the outcome of acceptance, and many studies assume that use produces performance benefits. Bhattacherjee (2001) explained continued use in terms of satisfaction and perceived usefulness after initial adoption. Yet frequency of use may not capture how well a system is used: Burton-Jones and Straub (2006) argued that system usage should be conceptualised more richly than frequency or duration, taking account of the user, the system and the task, and Goodhue and Thompson (1995) argued that utilisation improves performance only when the technology fits the task. In the transport and tracking domain, Motsi (2023) modelled the adoption of transport management systems using TAM, and Nyamawe and Mbosso (2014) examined the adoption of ICT for tracking over-speeding vehicles in Tanzania and proposed a real-time tracking model to support road safety enforcement. Both focus on adoption or system design rather than on whether continued use improves the performance of the officers who enforce traffic rules.

III. METHODOLOGY

3.1 Research Design

The study adopted a quantitative approach with an explanatory cross-sectional design. The design was appropriate because the study sought to explain the relationships between officers' perceptions of usefulness and ease of use, their attitude toward system use, continuous system usage and operational performance, using data collected from respondents at a single point in time (Creswell & Creswell, 2023; Saunders et al., 2011). The Technology Acceptance Model provided the theoretical basis for selecting and measuring the study variables.

3.2 Study Area

The study was conducted at the Tanzania Police Traffic Headquarters in Dar es Salaam. The area was selected because the Vehicle Tracking System has been in operation there as part of ongoing traffic monitoring and enforcement activities, so the officers had practical experience of the system and could assess its usefulness, ease of use and contribution to their work.

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3.3 Target Population

The target population consisted of 400 traffic police officers at the operational, supervisory and management levels. Officers at all three levels were included so that perceptions from across the command structure were captured.

3.4 Sampling Techniques and Sample Size

Stratified random sampling was used. The three levels of officers (operational, supervisory and management) formed the strata, so that each level was represented in the sample. The sample size was determined using the formula of Yamane (1967), $n = N / (1 + Ne^2)$, where N is the target population (400) and e is the margin of error (0.05). This gave $n = 400 / (1 + 400 \times 0.05^2) = 200$ officers at a 95% confidence level.

3.5 Data Collection Instruments and Procedures

3.5.1 Data collection method and instrument

Primary data were collected using a structured, self-administered questionnaire with closed-ended questions measured on a five-point Likert scale from Strongly Disagree (1) to Strongly Agree (5). In line with the Technology Acceptance Model, the questionnaire measured perceived usefulness (five items), perceived ease of use (five items), attitude toward system use, continuous system usage (four items) and operational performance outcomes (five items). A questionnaire was chosen because the variables are perceptions and behaviours that could be measured on a common scale from a large number of officers.

3.5.2 Validity and reliability

The questionnaire was pretested by research experts to determine the relevance, clarity and appropriateness of the items, thereby ensuring content validity. Internal consistency was then tested using Cronbach's alpha coefficient, with 0.70 taken as the minimum acceptable threshold (Creswell & Creswell, 2023; Hair et al., 2019; Taber, 2018). As shown in Table 3, all constructs exceeded this threshold, with coefficients ranging from 0.79 (continuous system usage) to 0.87 (operational performance outcomes), which indicates good internal consistency and confirms the reliability of the measurement scales.

Table 1

Reliability of research instruments

Study Variable	Number of Items	Cronbach's Alpha
Perceived Usefulness	5	0.81
Perceived Ease of Use	5	0.84
Continuous System Usage	4	0.79
Operational Performance Outcomes	5	0.87

3.5.3 Data collection procedures

A total of 200 questionnaires were distributed to the sampled traffic police officers at the Tanzania Police Traffic Headquarters, and 193 were returned and used in the analysis, giving a response rate of 96.5%.

3.6 Data Analysis

The data were coded and analysed using the Statistical Package for Social Sciences (SPSS). Descriptive statistics (frequencies, percentages, means and standard deviations) were used to summarise the characteristics of respondents and the study variables. Pearson correlation analysis was used to assess the relationships among the variables, and multiple regression analysis was used to determine the effect of perceived usefulness, perceived ease of use, attitude toward system use and continuous system usage on operational performance, according to the model:

$$OP = \beta_0 + \beta_1 PU + \beta_2 PEOU + \beta_3 ATT + \beta_4 CSU + \varepsilon.$$

Statistical significance was evaluated at the 5% level ($p < 0.05$). Table 2 shows how each objective was matched with its variables and analysis.

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Table 2

Alignment of research objectives, variables and analysis

Objective	Independent variable → dependent variable	Analysis	Reported in
SO1	Perceived usefulness → Operational performance	Descriptive statistics, Pearson correlation, multiple regression	Sections 4.2.1, 4.3, 4.4 and 4.5.1
SO2	Perceived ease of use → Operational performance	Descriptive statistics, Pearson correlation, multiple regression	Sections 4.2.2, 4.3, 4.4 and 4.5.2
SO3	Attitude toward system use → Operational performance	Multiple regression	Sections 4.4 and 4.5.3
SO4	Continuous system usage → Operational performance	Descriptive statistics, Pearson correlation, multiple regression	Sections 4.2.3, 4.3, 4.4 and 4.5.4

3.7 Ethical Considerations

Permission to conduct the study at the Tanzania Police Traffic Headquarters was sought before data collection. Participation was voluntary, and respondents were informed of the purpose of the study and of their right to decline or withdraw without any consequence. Anonymity and confidentiality were protected by not requesting names or other identifying information, and the responses were used only for academic purposes and reported in aggregate form.

IV. FINDINGS & DISCUSSION

4.1 Response Rate and Respondents' Characteristics

Of the 200 questionnaires distributed, 193 were returned, a response rate of 96.5%, which was considered satisfactory for statistical analysis. Most respondents were male (80.3%), while female respondents accounted for 19.7%. The majority of the respondents (85.5%) were aged between 31 and 40 years, indicating that the officers were mainly in the active working age group. In addition, 62.7% of the respondents were operational officers and over half (53.4%) had between 11 and 15 years of experience, indicating that the respondents had considerable experience in traffic monitoring and enforcement activities.

Table 2

Respondents' Characteristics (N=193)

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	155	80.3
	Female	38	19.7
Age (years)	18-30	22	11.4
	31-40	165	85.5
	41-50	6	3.1
Position	Operational	121	62.7
	Supervisory	50	25.9
	Management	22	11.4
Work Experience (Years)	5-10	46	23.8
	11-15	103	53.4
	Above 15	44	22.8

4.2 Descriptive Findings

4.2.1 Perceived usefulness of the vehicle tracking system (SO1)

Table 5 shows that officers' responses on the usefulness of the vehicle tracking system were positive.

Table 3

Perceived usefulness of the vehicle tracking system

Statement	Mean	SD
The Vehicle Tracking System improves my job performance.	4.35	0.64
The Vehicle Tracking System improves traffic monitoring.	4.18	0.70
The Vehicle Tracking System facilitates faster detection of traffic violations.	4.15	0.73
The Vehicle Tracking System improves decision-making.	4.07	0.85
The Vehicle Tracking System improves accident monitoring.	4.25	0.72

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The mean scores for all items were above 4.00, reflecting agreement that the system improves job performance, traffic monitoring, the detection of traffic violations, decision-making and accident monitoring. The highest mean was recorded for improved job performance (M = 4.35, SD = 0.64), followed by improved accident monitoring (M = 4.25, SD = 0.72), while the lowest was for improved decision-making (M = 4.07, SD = 0.85); even this was still within the agreement range. Overall, officers perceived the system as a useful operational tool for supporting traffic enforcement activities.

4.2.2 Perceived ease of use of the vehicle tracking system (SO2)

As displayed in Table 6, officers' perception of the ease of use of the vehicle tracking system was positive.

Table 4

Perceived ease of use of the vehicle tracking system

Statement	Mean	SD
The Vehicle Tracking System is easy to learn.	4.18	0.63
The system interface is clear and understandable.	4.27	0.66
The Vehicle Tracking System is easy to operate.	4.08	0.69
The system requires minimal effort to use.	4.03	0.78
I can use the system without major technical difficulties.	3.96	0.75

The mean scores ranged from 3.96 to 4.27, which indicates that most officers found the system easy to learn, understand and operate. The clarity of the system interface recorded the highest mean (M = 4.27, SD = 0.66), while using the system without major technical difficulties recorded the lowest (M = 3.96, SD = 0.75). In general, traffic police officers perceived the Vehicle Tracking System to be user-friendly.

4.2.3 Continuous system usage and operational performance (SO4)

Table 7 shows that usage of the Vehicle Tracking System was high among the traffic police officers.

Table 5

Continuous system usage and operational performance

Statement	Mean	SD
I regularly use the Vehicle Tracking System in my daily duties.	4.34	0.58
I rely on the Vehicle Tracking System during traffic monitoring activities.	4.13	0.67
I intend to continue using the Vehicle Tracking System.	4.25	0.60
The Vehicle Tracking System has improved accident monitoring.	3.98	0.74

The mean scores for all statements were near or above 4.00, indicating that officers had integrated the system into their normal traffic enforcement practices. The highest mean was recorded for regular use of the system (M = 4.34, SD = 0.58), and the lowest for the contribution of the system to accident monitoring (M = 3.98, SD = 0.74). Overall, officers used the system often and regarded it as a valuable asset for traffic monitoring and enforcement.

4.3 Correlation Analysis

Pearson correlation analysis was used to explore the relationships among the study variables (Table 8).

Table 6

Correlation analysis of the study variables

Variables	Perceived usefulness	Perceived ease of use	Continuous system usage	Operational performance
Perceived usefulness	1			
Perceived ease of use	0.120	1		
Continuous system usage	0.145*	0.329**	1	
Operational performance	-0.044	0.187**	0.099	1

Source: Field Data (2026), **Note:** *p < 0.05; **p < 0.01.

Perceived usefulness was weakly and positively related to continuous system usage ($r = 0.145$, $p < 0.05$). Perceived ease of use was significantly and positively related to operational performance ($r = 0.187$, $p < 0.01$) and to continuous system usage ($r = 0.329$, $p < 0.01$). The relationship between continuous system usage and operational performance was positive but not statistically significant ($r = 0.099$). The findings indicate that perceptions such as ease

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of use were linked with higher acceptance and use of the system, but that use itself was not significantly associated with operational performance.

4.4 Multiple Regression Analysis

Multiple regression analysis was conducted to examine the influence of perceived usefulness, perceived ease of use, attitude toward system use and continuous system usage on operational performance outcomes. The ANOVA results together with the R and R^2 values are presented in Table 9.

Table 7

ANOVA results and model fit

Model	Sum of Squares	df	Mean Square	F	Sig.	R	R^2
Regression	3.405	4	.851	3.287	.012	.256	.065
Residual	48.688	188	.259				
Total	52.093	192					

Dependent variable: Operational Performance Outcomes

Predictors: (Constant), Continuous system usage, Perceived ease of use, Perceived usefulness, Attitude toward system use

The results in Table 9 show that the regression model had an R value of 0.256, showing the overall relationship between the predictor variables and operational performance outcomes. The R^2 value was 0.065, meaning that perceived usefulness, perceived ease of use, attitude toward system use and continuous system usage together explained 6.5% of the variation in operational performance outcomes; the remaining 93.5% may be explained by other factors not included in this study. The overall regression model was statistically significant, $F(4, 188) = 3.287$, $p = 0.012$, which means that the four predictors, considered together, had a significant relationship with operational performance. Although the model was significant, its explanatory power was low, so the findings should be interpreted with caution because the model does not provide a strong explanation of differences in performance among officers.

Table 8

Multiple regression analysis

Predictor Varble	B	β	t	p-value
Constant	4.807	—	7.562	<0.001
Perceived Usefulness	-0.044	-0.045	-0.626	0.532
Perceived Ease of Use	0.186	0.171	2.397	0.017
Attitude Toward System Use	-0.164	-0.152	-2.021	0.045
Continuous System Usage	-0.040	-0.039	-0.516	0.607

Dependent Variable: Operational Performance

The results in Table 10 show that perceived ease of use had a positive and significant influence on operational performance ($B = 0.186$, $\beta = 0.171$, $p = 0.017$); that is, when officers found the system easy to use, operational performance was likely to be higher. Attitude toward system use had a negative but significant influence on operational performance ($B = -0.164$, $\beta = -0.152$, $p = 0.045$). Perceived usefulness had a negative but insignificant influence ($B = -0.044$, $\beta = -0.045$, $p = 0.532$), and continuous system usage likewise had a negative and insignificant influence ($B = -0.040$, $\beta = -0.039$, $p = 0.607$). Perceived ease of use and attitude toward system use were therefore the only variables with a significant relationship with operational performance.

4.5 Discussion

4.5.1 Perceived usefulness and operational performance (SO1)

Officers generally considered the Vehicle Tracking System useful (means of 4.07 to 4.35), yet perceived usefulness did not have a significant influence on operational performance ($B = -0.044$, $p = 0.532$). This differs from the central role of usefulness reported in the TAM literature (Davis, 1989; King & He, 2006) and in policing studies in which usefulness was a significant determinant of acceptance (Sumuer & Yildirim, 2015). The difference may be explained by the outcome examined: those studies relate usefulness to acceptance or intention, whereas this study relates it to operational performance. The result is closer to Ngumbi (2016), in whose regression perceived usefulness was not a significant predictor of intention to use vehicle tracking systems in the Kenya Police Service, and it supports the view that the benefits of technology in organisations depend on how the technology is used and supported (Almaiah et al., 2023; Matemba et al. 2020). Because most officers agreed with the usefulness statements, limited variation in responses may also have weakened the statistical relationship. Perceived usefulness is therefore important to TAM, but on its own it does not explain operational performance.

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4.5.2 Perceived ease of use and operational performance (SO2)

Perceived ease of use had a positive and significant influence on operational performance (B = 0.186, p = 0.017), and it was also the construct most strongly correlated with continuous system usage (r = 0.329). This agrees with TAM, in which ease of use is an important factor in technology acceptance (Davis, 1989; Venkatesh & Davis, 2000), and with studies that found ease of use to be a significant determinant of acceptance among police officers and other users (Chang & Tung, 2008; Sumuer & Yildirim, 2015). It is particularly consistent with Ngumbi (2016), where ease of use was the significant predictor of intention to use vehicle tracking systems. The finding is further supported by Almaiah et al. (2023) and Matemba et al. (2020), who showed that systems that are easy to use support technology use and work performance. Making the system easy to operate and providing sufficient support to users can therefore help officers to use it better in their daily traffic monitoring activities.

4.5.3 Attitude toward system use and operational performance (SO3)

Attitude toward system use had a negative but significant influence on operational performance (B = −0.164, p = 0.045). In TAM, attitude is expected to support acceptance (Davis, 1989; Fishbein & Ajzen, 1975), and Sumuer and Yildirim (2015) found it to be a significant determinant of acceptance among police officers, but those studies did not relate attitude to performance. The negative sign here shows that a favourable attitude does not necessarily lead to better performance when the other variables are held constant, which is consistent with the finding of Davis et al. (1989) that attitude only partly mediates the effect of beliefs and with the later decision to drop attitude from parsimonious models (Venkatesh & Davis, 2000; Venkatesh et al., 2003). The negative coefficient may reflect overlap among the predictors or other conditions that were not measured, but the study did not test these explanations. Since the effect is only marginally significant, it should be interpreted cautiously and examined further in future research.

4.5.4 Continuous system usage and operational performance (SO4)

Continuous system usage had a negative and insignificant influence on operational performance (B = −0.040, p = 0.607), even though officers reported using the system regularly. This means that frequent use alone was not enough to improve operational performance. The result is in line with the argument that system usage should be understood in terms of how well and for which tasks a system is used rather than how often (Burton-Jones & Straub, 2006), and that utilisation improves performance only when the technology fits the task (Goodhue & Thompson, 1995). It also matches the observation that organisational benefits depend on how technology is used and supported (Almaiah et al., 2023; Matemba et al. (2020). What may matter, therefore, is not only how often the system is used but how well it is used, and officers may still need proper skills and technical support to make better use of it.

4.5.5 Overall explanatory power of the model

Together, the four TAM constructs explained only 6.5% of the variation in operational performance. This low explanatory power agrees with the criticism that TAM explains acceptance better than performance and should be complemented by other determinants (Benbasat & Barki, 2007; Legris et al., 2003), such as task fit, organisational conditions and technical support.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

The study evaluated the effectiveness of the Vehicle Tracking System in supporting operational performance among traffic police officers at the Tanzania Police Traffic Headquarters. In relation to the specific objectives, the findings were as follows. Regarding SO1, perceived usefulness was rated highly but did not have a significant influence on operational performance. Regarding SO2, perceived ease of use had a positive and significant influence on operational performance. Regarding SO3, attitude toward system use had a significant but negative influence. Regarding SO4, continuous system usage did not have a significant influence on operational performance.

The study therefore concludes that the effectiveness of the Vehicle Tracking System does not depend only on whether officers consider the system useful or use it regularly. Ease of use and other conditions surrounding the use of the system play an important role in operational performance, and the four TAM constructs together explained only 6.5% of the variation in performance.

5.2 Recommendations

Transport authorities and police management should make the system easy to operate, through a clear interface, ongoing user training and accessible technical support, since ease of use was the strongest positive predictor of operational performance. Positive perceptions and regular use should not be taken as evidence of effectiveness. Investment in Vehicle Tracking Systems should be accompanied by operational policies that integrate system outputs into supervision, decision-making and performance review, so that use translates into better performance.

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Police management should seek officers' feedback on the reasons behind the negative association between attitude and performance before designing attitude-related interventions, rather than assuming that more favourable attitudes will raise performance. Policy makers and regulators should pair investment in digital traffic management technologies with training, technical support and clear operational guidelines, in order to improve the effectiveness of traffic monitoring and enforcement and the overall safety of roads.

Declaration of Interest

The authors declare that they do not have any known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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REFERENCES

African Development Bank. (2020, April). *Road safety framework and guidelines*. Infrastructure and Urban Development Department.

Almaiah, M. A., Al-Otaibi, S., Shishakly, R., Hassan, L., Lutfi, A., Alrawad, M., et al. (2023). Investigating the role of perceived risk, perceived security and perceived trust on smart m-banking application using SEM. *Sustainability, 15*(13), Article 9908. https://doi.org/10.3390/su15139908

Benbasat, I., & Barki, H. (2007). Quo vadis TAM? *Journal of the Association for Information Systems, 8*(4), 211–218.

Bhattacherjee, A. (2001). Understanding information systems continuance: An expectation-confirmation model. *MIS Quarterly, 25*(3), 351–370.

Burton-Jones, A., & Straub, D. W., Jr. (2006). Reconceptualizing system usage: An approach and empirical test. *Information Systems Research, 17*(3), 228–246.

Chang, S.-C., & Tung, F.-C. (2008). An empirical investigation of students' behavioural intentions to use the online learning course websites. *British Journal of Educational Technology, 39*(1), 71–83.

Creswell, J. W., & Creswell, J. D. (2023). *Research design: Qualitative, quantitative, and mixed methods approaches*. SAGE Publications.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science, 35*(8), 982–1003.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Addison-Wesley.

Goodhue, D. L., & Thompson, R. L. (1995). Task–technology fit and individual performance. *MIS Quarterly, 19*(2), 213–236.

Hair, J. F., Babin, J. B., Anderson, R. E., & Black, W. C. (2019). *Multivariate data analysis* (8th ed.). Cengage Learning. https://www.cengage.uk/c/multivariate-data-analysis-8e-hair-babin-anderson-black/9781473756540/

King, W. R., & He, J. (2006). A meta-analysis of the technology acceptance model. *Information & Management, 43*(6), 740–755.

Land Transport Regulatory Authority. (2024). *Annual performance report 2023/2024*.

Legris, P., Ingham, J., & Collerette, P. (2003). Why do people use information technology? A critical review of the technology acceptance model. *Information & Management, 40*(3), 191–204.

Matemba, E. D., Li, G., Gogan, I. C. W., & Maiseli, B. J. (2020). Technology acceptance model: Recent developments, future directions, and proposal for hypothetical extensions. *International Journal of Technology Intelligence and Planning, 12*(4), 315–348.

Motsi, L., Chipangura, B., & Musanhi, N. (2023). A model for the adoption of transport management systems in the South African taxi industry. *South African Journal of Information Management, 25*(1), Article a1713. https://doi.org/10.4102/sajim.v25i1.1713

Ngumbi, D. N. (2016). *A model for vehicle tracking and monitoring systems adoption in the Kenya Police Service* [Master's thesis, Strathmore University]. https://su-plus.strathmore.edu/handle/11071/4845

Nyamawe, A. S., & Mbosso, E. C. (2014). Road safety: Adoption of ICT for tracking vehicles' over-speeding in Tanzania. *International Journal of Computer Applications, 96*(16), 12–15. https://doi.org/10.5120/16877-6876

Saunders, M., Lewis, P., & Thornhill, A. (2011). *Research methods for business students* (4th ed.). Pearson.

Sumuer, E., & Yildirim, S. (2015). Exploring user acceptance of an electronic performance support system. *Performance Improvement Quarterly, 27*(4), 29–48. https://doi.org/10.1002/piq.21178

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Taber, K. S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education, 48*(6), 1273–1296.

Tavasoli, M., Sarrafzadeh, A., Khaleghi, M., Zakaria, M., Barahouei Pasandi, H., & Karimoddini, A. (2025). Data communication challenges of connected and automated vehicles in rural areas. *IEEE Access, 13*, 29220–29251. https://doi.org/10.1109/ACCESS.2025.3539598

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science, 46*(2), 186–204.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*(3), 425–478.

World Bank. (2017). *The high toll of traffic injuries: Unacceptable and preventable*. https://hdl.handle.net/10986/29129

World Health Organization. (2023). *Global status report on road safety 2023*. https://www.who.int/publications/i/item/9789240086517

Yamane, T. (1967). *Statistics: An introductory analysis* (2nd ed.). Harper and Row.

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