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EFFECT OF SAFETY MANAGEMENT SYSTEM ON PERFORMANCE OF KENYAN AVIATION FIRMS

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Abstract

The purpose of the study was to determine the effect of safety management systems and performance of the aviation firms in Kenya. This paper is anchored on system theory and adopted explanatory research design. Questionnaires were used to collect data from 50employees drawn form security departments in aviation firms in Nairobi Kenya. Findings indicated that safety policy, safety risk management and safety promotion have a significant effect on firms' performance. However, safety assurance has no significant effect on firms' performance due minimal external audits. The study concluded that the existence as well as the implementation of an effective safety policy improves performance of the firm especially in terms of increased employees' awareness which results in employees' confidence and productivity. The management of the firms should be encouraged to embrace aspects of safety policy and safety promotion in order to assure firms' performance improvement; more benefits of SMS can be realized through safety assurance by encouraging external audits.

Keywords: Safety Policy, Safety Management Systems, Performance of Aviation Firms, Safety Assurance, Safety Risk Management, Safety Promotion

INTRODUCTION

Airline businesses operate in an industry that employs a large number of personnel and which requires huge amounts of infrastructure and aircraft investment. Therefore, the fixed costs of airline companies are quite high (Morrell, 2007). In addition to these high fixed costs, they have to operate in an intensely competitive environment where many airline businesses offer similar services with minimal profit margins. Due to such a highly competitive environment, most operating airlines feel pressured to quickly respond to demands in order to survive (Doganis, 2002). Thus, performance management has become a vital issue for airline businesses, and the need for safety management for future performance (Khim et al., 2010).

Safety in a firm is an integral part of the performance of any job that must not be forced to compete with the profit motive and must receive constant attention (Benderly, 2013). Safety is the state in which the risk of harm to persons or of property damage is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and risk management (Sutton, 2015). Although air transport is among the safest means of transport, risk is a constant reality as is true of any human activity and in effect aviation operations are prone to accidents (McFarlane & Hills, 2013). The global nature of the aviation industry and the complex and dynamic aviation environment requires that aviation regulators, air operators, and service providers cooperate to maintain a safe air transport system (Dannatt, 2006).

In order to keep safety risks at acceptable level, modern safety management practices are shifting from a purely reactive to a more proactive and predictive (Kjellén, 2012). Effective safety requires adaptation, resulting into a safety management system (SMS) which focuses corporate management activity on loss control as part of the normal line management function (FAA, 2005). The safety management system is process-driven and proactive, and must be infused into the management system of air operators for desired effect on safety (Garland, 2011). According to ICAO (2006), SMS is an organized approach organizational structures, accountabilities, policies and procedures to achieve safe operations and compliance with the ICAO standards and regulations. SMS represents the next step in the evolution of safety processes in the aviation industry worldwide, at the organisational level (Velazquez & Bier, 2015). SMS complements the requirements and regulations in human or technical safety already implemented during the past decades (Hollinger, 2013). SMS is the formal systemic and pro-active approach to anticipating and managing safety risk, as well as to initiating and achieving the necessary transformation of organisational structures, accountabilities, policies, procedures, standard practices and regulations (Braband, 2011).

SMS is a structured process that requires organizations to apprehend possible safety issues with the same level of priority that other core business topics are managed, and to continuously analyze them, in conjunction with state institutions within their State Safety Program (SSP), as well as with their industry counterparts (Pisarek, 2015). SMS is comprised of four functional components, including an intangible, but always critical, aspect called safety culture. SMS concepts, processes, methods and operational management, either cross-domain or specific to the organizations, emphasize the necessity of enhancing or improving the organisation safety culture - the just culture, through a transformation of leadership, management and employees attitudes (Crutchfield & Roughton, 2014).

One of the greatest challenges facing international civil aviation organization is ensuring that all member states implement the set standards in a timely manner for uniform application, in order to enhance global aviation safety (Chen, 2010).Despite the Kenyan government recommending self-regulation of safety management systems (SMS) for Aviation industry with the hope of improving the situation, the successful implementation is questionable.

Problem Formulation

The performance of the African aviation industry is still lagging behind those of the rest of the world (African Development Bank AfDB, 2012). Air transportation in most Africa is almost nine times more dangerous as compared to the global industry's average level(African Development Bank AfDB, 2012).In addition, safety performance of the aviation industry in Kenya is questionable which has resulted to safety deficiencies and maybe low performance of some of the aviation firms in Kenya. Thus, this requires a robust safety management system that is integrated into the overall strategic business objectives of an organization within an expanded industrial business context that can anticipate changes in an operative environment while balancing safety with economic goals (Di Gravio, Patriarca, Mancini &Costantino, 2016). However, most studies in safety management have been conducted primarily on implementation of SMS without a great deal of how SMS affect performance of aviation firms (Snook, 2002; Gehman, 2003; Johnson, 2004). Moreover, Studies that have been done locally include Njeru (2016) who examined the determinants of aviation training performance, case of Kenya aviation training institutes, Mokaya and Nyaga (2009) assessed the factors that affect the successful implementation of safety management systems (SMS) in the Aviation industry in Kenya while Mokaya, Chocho and Kosgey (2009) sought to assess the performance of the aviation regulatory system in Kenya with specific reference to the Kenya Civil Aviation Authority, no study in Kenya has been carried out to the researcher's knowledge, to assess the relationship between safety policy, risk management, safety assurance and safety promotion and performance of the aviation firms in Kenya. It is against this background that this study sought to highlight pertinent issues influencing the relationship between safety management systems and performance of the aviation firms in Kenya. The study hypotheses that:

H_{01}: Safety policy has no significant effect on performance of the aviation firms

H_{02}: Safety risk management has no significant effect on performance of the aviation firms

H_{03}: Safety assurance has no significant effect on performance of the aviation firms

H_{04}: Safety promotion has no significant effect on performance of the aviation firms

THEORETICAL FRAMEWORKS

This paper is anchored on system theory by Ludwig von Bertalanffy. Systems theory has been proposed as a way to understand accident causation (Rasmussen, 1997; Nancy, 2004). Systems theory dates from the thirties and forties and was a response to the limitations of classic analysis techniques in coping with the increasingly complex systems being built (Checkland, 1981). The systems approach focuses on systems taken as a whole, not on the parts taken separately. It assumes that some properties of systems can only be treated adequately in their entirety, taking into account all facets and relating the social to the technical aspects (Ramo, 1973). These system properties derive from the relationships between the parts of systems: how the parts interact and fit together (Leveson, 2004). Thus, the systems approach concentrates on the analysis and design of the whole as distinct from the components or the parts. In systems theory, open systems are viewed as interrelated components that are kept in a state of dynamic equilibrium by feedback loops of information and control. Systems are not treated as a static design, but as a dynamic process that is continually adapting to achieve its ends and to react to changes in itself and its environment. For safety, the original design must not only enforce appropriate constraints on behavior to ensure safe operation (the enforcement of the safety constraints), but it must continue to operate safely as changes and adaptations occur over time.

LITERATURE REVIEW

Safety Policy

The policy statement describes in detail the operation of the entire organization and includes the roles, responsibilities and relationships between all individuals involved in the organization. It specifically includes the involvement of top management which is a key component to the success of SMS (Tzempelikos, 2015). Furthermore, the policy statement defines the procedural framework, which describes the responsibilities of all departments, including the training, processes measurement and the change in the system, if there should be one (Tzempelikos&Gounaris, 2015).

The organizational structure is the next element of the Safety Policy pillar which allows for the company to clearly see the responsibilities of fellow employees. The organizational structure is a part of SMS because it is needed in order for employees to follow the proper procedures for the organization (O'Toole, 2012). The procedure element of the Safety Policy pillar describes the way hazards are identified and mitigated. Should an accident or incident occur, this section discusses the proper protocol during that time (Pawłowska, 2015). The procedure element further defines who to contact, the order in which people are contacted, and are readily available to any person. Beach (2000), also revealed that management's commitment to safety is a major factor affecting the success of safety programmes in industries and this parameter is capable of discriminating between high and low accident rate organisations.

Safety Risk Management

The third pillar in SMS is Safety Risk Management (SRM). The SRM pillar describes operation processes across all departments and agency boundaries, identifies key performance indicators and regularly measures them, methodically assesses risk, and exercises controls to mitigate that risk. The concept of risk management is about understanding the operational systems (Hwang, 2011). The SRM pillar analyzes systems, identifies risks, and conducts a risk analysis and hazard assessments. It further involves risk acceptance, causal analysis, controlling those risks and system operation (Lachlan & Spence, 2010).

The first element of the Safety Risk Management Pillar is hazard identification. This pillar allows for one to really dig deep and take a hard look at the hazards that the firm faces (Ericson, 2011). Often times it is hard for people to do this without being biased. The firm should have an external source perform an audit on the firm. The next step after all hazards are identified is to conduct a risk assessment. “In an SMS, all identified hazards are documented and analyzed to determine what action is required to eliminate or reduce the safety risk assessment associated with the hazard,” (Beguería, 2006). The final element of the third pillar in SRM is risk mitigation and tracking. When a hazard is identified and mitigated, that hazard should be thoroughly analyzed to ensure that the reason it was mitigated was in fact the cause of the hazard. This process is completed through a system that allows one to neutralize any risk that allows for a safe operation (Abu el Ata &Schmandt, 2016).

Safety Assurance

Safety Assurance is the fourth pillar of Safety Management Systems and is defined as “process management functions that systematically provide confidence that organizational products/services meet or exceed safety requirements” (Federal Aviation Administration, 2012). Fundamentally, it gives the organization assurance that what they are doing to identify, mitigate and track hazards are actually working. Safety Assurance consists of three elements: internal audits, external audits and corrective action (Stolzer, Halford&Goglia, 2011).

The first element of the Safety Assurance pillar is internal audits. It is important to note that not only should internal audits be conducted but external audits should be conducted as well (Transportation Research Board, 2012). The safety auditor should conduct both formal and informal audits across all departments. These audits should be conducted on a regular basis and should include both scheduled, and non-scheduled audits (National Archives and Records Administration, 2012). Internal Audits allow for the firm to use their own employees to complete an audit. This cannot only has positive effects, but negative as well. One of the positive, includes being familiar with the policies and procedures of the Firms, which then allows the person to quickly identify the hazards (Stolzer, Halford&Goglia, 2011). A negative effect is that the person could be biased and overlook issues to avoid causing trouble, or simply be used to seeing the hazard and not identify it as a discrete cause. Therefore, external audits should be completed, which is the second element in the Safety Assurance pillar.

External Audits mimic those of Internal Audits but have one difference; these audits must be completed by an external independent agency. This allows for the unbiased approach to identifying risks, but is also at the expense of the firm (Gingerich, 2010). Firms do not like to use this option because independent agencies often see other issues that the firm previously did not recognize. The third and final element of the Safety Assurance pillar is Corrective Action, which is the consequences bearing element. This pillars ensures they incur the proper penalties be enforced. The Corrective Action element is further used ensure that hazards are actually being addressed (LaFreniere, 2013).

Safety Promotion

Safety Promotion, as defined by the FAA (2007) is “a combination of safety culture, training, and data sharing activities that supports the implementation and operation of an SMS in an organization”. Safety Promotion consists of culture, training and communication. SMS should not only be the priority of management, but all employees (Transportation Research Board, 2007). Therefore, it is top management’s responsibility to not only release a policy statement advising the organization of their commitment to safety but they must also be proactively engaging themselves as well (Spencer, Adams &Yapa, 2013). It is imperative for top management to remain and exhibit a positive attitude about SMS. They must not only be on board in the beginning, but also remain committed because they are the fundamental and necessary requirement of building a positive safety culture.

The Safety Promotion pillar is about fostering that safety culture, which has proven to be one of the most difficult and challenging aspects of the entire SMS process (Stolzer*et al,* 2008). Safety culture is the first element under the safety promotion pillar. Having management involved gives the employees assurance that they need and seek (Stolzer*et al,* 2008). This is where communication is vital, which is another part of the safety promotion pillar. Training is the second element of Safety Promotion which allows for the organization to properly demonstrate

SMS. After promoting a positive safety culture, the next step is to properly train all employees on the policies of the organization, the procedures on how to respond to certain situations and to discuss their roles and responsibilities and how it relates to SMS (Daalmans, 2013). It is important to note that training not only occurs as part of implementation training, but it also involves recurrent training.

In addition to written communication, it is important for employees to witness evidence of the commitment of top management to safety," (Transportation Research Board, 2012). The communication process allows for identifying what went wrong, how issues can be fixed, and what lesson each member of the team can take away to ensure that the lessons learned will not recur. Communication must be open and employees must feel like they are contributing to the operation because information has no value unless employees learn from it (Krasman, 2015).

The Safety Promotion pillar is the foundation of SMS because each element affects the other profoundly; without having a solid foundation SMS will not be successful (Käppler *et al.,* 2014). Often companies already have their policies, procedures, and organizational structure, so all they need to do is revamp and put these in one location, creating a safety manual. But actually properly training and communicating with all employees can be difficult. If this pillar is not at its best, then the success of SMS at that organization is jeopardized. An organization must have the best possible safety manual, training, and communication.

RESEARCH METHOD

The study adopted Explanatory research design. A census survey was utilized to select the target respondents for the study. Questionnaires were used to collect data from 50employees drawn form security departments in aviation firms in Nairobi Kenya. Reliability assessment of internal consistency of the items was determined using Cronbach alpha coefficient. According to (Sekeran, 2003; Ventura *et al*.,2013; Waithaka *et al*.,2014; Cooper & Schindler, 2001), the general reliability coefficients around 0.9, was considered excellent, values around 0.8 as very good and values around 0.7 as adequate (Nunnally,1978).Quantitative data was analyzed using descriptive statistical method; the statistical tools such as mean, mode and standard deviation were used. Inferential statistic such as Pearson correlation coefficients r and multiple regression models were used. Multiple regression analysis was employed to test the hypotheses.

$y = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \varepsilon$

Where, α was the intercept

$\beta_1 \dots \beta_4$ are regressions coefficients

Y= firm Performance.x_1=Safety promotion,x_2=Safety risk,x_3=Safety assurance, x_4=Safety policy

ε = Error Term

ANALYSIS AND FINDINGS

Descriptive statistics and Factor analysis results

This section of the analysis focused descriptive statistics of the study item and factor loadings together with reliability results.

Table 1: Firm Performance

Statements	Mean	Std. Deviation	Loadings	Cronbach
Growth in sales in relation to your expectations	4.02	0.553	0.728	0.899
Growth in sales in relation to your competitors	4.18	0.661	0.899	
Growth in profits in relation to your expectations	4.04	0.570	0.877	
Growth in profit level in relation to your Competitors	4.02	0.622	0.851	
Increase in number of employees	4.12	0.718	0.661	
Increased market size in new markets in relation to your	4.18	0.691	0.904	
Increased market size in new markets in relation to your Competitors	4.30	0.789	0.735	
Growth in capital from operations	4.22	0.679	0.948	
Improvement in efficiency	3.94	0.550	0.691	
High level of new customers	4.16	0.650	0.908	
KMO and Bartlett's Test				
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	*0.573*			
	744.7			
	12.00			
Bartlett's Test of Sphericity, Approx. Chi-Square	*0*			
df	*45*			
Sig.	*0.000*			

Rotation Method: Varimax with Kaiser Normalization.

As evidenced in Table 1, all the means were above 3.5 indicating all respondents agreed on the elements of performance. Hence, there was high performance. The highest indicator of firm performance was in relation to the growth in sales in relation to your expectations and increased market size in new markets in relation to the firm (mean = 4.18 respectively) while the lowest was improvement in efficiency (mean = 3.94). A Cronbach alpha which is a measure of internal consistency reliability was computed for each scale of the instrument separately and the value of 0.899 was found to be favorable. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's test of Sphericity were computed. KMO measure was 0.573. KMO measure of 0 indicates that the sum of partial correlations is large relative to the sum of correlations. Values greater than 0.5 are deemed acceptable and hence the value of 0.573 is acceptable. The Bartlett's test of Sphericity showed a chi-square value of 2.000 which was significant, p-value = 0.000 (df = 45). The significant test value indicated that the correlation matrix is not an identity matrix which implies that there are some relationships between variables and factor analysis was appropriate in this case.

Table 2 presented the results regarding the factor loadings as well as the consistency of the data and the test for sampling adequacy and Sphericity regarding safety policy.

Table 2: Safety Policy

Statements	**Mean**	**Std. Deviation**	**Loading**	**Cronbach**
High ability to develop new products	3.66	0.626	0.865	0.744
The firm has an Emergency Response Plan	3.94	0.682	0.856	
The firm's safety management policy is transparent	3.58	0.499	0.876	
The firm management is committed to the safety program	3.50	0.580	0.899	
The firm management policy is easily understood	3.62	0.635	0.656	
The firm's safety policy is approved by authorities	3.50	0.580	0.891	
The safety objectives are well spelt out	4.06	0.767	0.860	
The firm has a clear SMS implementation plan	3.60	0.535	0.673	
The firm has a supportive organization structure	4.06	0.793	0.802	
KMO and Bartlett's Test				
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	*0.589*			
Bartlett's Test of Sphericity, Approx. Chi-Square	*543.637*			
df	*36*			
Sig.	*0.000*			

Rotation Method: Varimax with Kaiser Normalization.

The findings in Table 2 revealed that all the means were 3.5 and above with the lowest mean shown to be related to the firm management is committed to the safety program and the firm's safety policy is approved by authorities and the highest mean regarding safety objectives being well spelt out and the firm having a supportive organization structure (mean = 4.06). A Cronbach alpha value of 0.744 was found to be favorable and can be concluded that data gathered were reliable and have obtained the acceptable level of internal consistency.

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's test of Sphericity were computed. The KMO measure of sampling adequacy was 0.589 and was found to be acceptable while the Bartlett's test of Sphericity showed a chi-square value of 543.637 which was significant, p-value = 0.000 (df = 36). All the factor loading values were greater than 0.800 except for firm management policy is easily understood item and the firm has a clear SMS implementation plan item.

Table 3 presented the results regarding the factor loadings as well as the consistency of the data and the test for sampling adequacy and Sphericity regarding safety risk assessment.

Table 3: Safety Risk Assessment

Statements	**Mean**	**Std. Deviation**	**Loadings**	**Cronbach**
The firm has a highly qualified risk assessment process	3.40	0.495	0.727	0.748
The firm has a hazard identification process	4.02	0.553	0.893	
The firm has risk control measures	3.46	0.503	0.702	
The firm carries out a thorough risk analysis	3.84	0.650	0.837	
The firm has a comprehensive Correction Action Plan	3.72	0.497	0.684	
The firm maintains a Hazard Log	3.94	0.712	0.901	
The firm encourages accident/incident reporting	3.92	0.665	0.936	
Event investigation is adequate	3.96	0.832	0.720	
The firm has a confidential reporting system	3.86	0.700	0.751	
The firm has an on-going hazard identification program	3.98	0.553	0.874	
KMO and Bartlett's Test				
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		*0.792*		
Bartlett's Test of Sphericity, Approx. Chi-Square		*486.732*		
	df	*45*		
	Sig.	*0.000*		

Rotation Method: Varimax with Kaiser Normalization.

The findings in Table 3 showed that all the means were above 3.5 except for the firm has risk control measures (mean = 3.46) and the firm has a highly qualified risk assessment process (mean = 3.40) items. The highest mean was found for the firm has a hazard identification process item. In addition, a Cronbach alpha value of 0.748 was found to be favorable and thus it can be concluded that data gathered were reliable and have obtained the acceptable level of internal consistency.

The findings also showed results relating to the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's test of Sphericity. From the findings, a KMO measure of sampling adequacy was 0.792 and was found to be acceptable while the Bartlett's test of Sphericity showed a chi-square value of 486.732 which was significant, p-value = 0.000 (df =

45). The highest factor loadings were for the firm encourages accident/ incident reporting and the firm maintains a hazard log items.

Table 4 presented the results regarding the factor loadings as well as the consistency of the data and the test for sampling adequacy and Sphericity regarding safety assurance.

Table 4: Safety assurance

Statements	**Mean**	**Std. Deviation**	**Loadings**	**Cronbach**
The firm is committed to implement corrective action	3.52	0.505	0.786	0.911
The firm's safety performance is reliable	3.86	0.670	0.857	
The firm complies with standards and recommended practices	3.46	0.542	0.890	
The firm's SMS management is functional	3.82	0.691	0.707	
The firm conducts internal safety audits	3.80	0.639	0.937	
The safety audits are documented	3.98	0.795	0.908	
Safety review is communicated to the top management	3.82	0.629	0.915	
External audit is carried out	3.96	0.781	0.862	
Change management assures safety	3.70	0.789	0.657	
The firm seeks continuous safety improvement	3.94	0.793	0.893	
KMO and Bartlett's Test				
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		*0.755*		
Bartlett's Test of Sphericity, Approx. Chi-Square		*756.453*		
	df	*45*		
	Sig.	*0.000*		

The findings in Table 4 revealed that all the means were above 3.5 except for the firm complies with standards and recommended practices (mean = 3.46) item. The highest mean was found for the safety audits are documented (mean = 3.98), the external audit is carried out (mean = 3.96) and the firm seeks continuous safety improvement (mean = 3.94) items. In addition, Cronbach alpha values of 0.911 was found to be favorable and showed that the data gathered were reliable and have obtained the acceptable level of internal consistency.

The findings also showed results relating to the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's test of Sphericity. From the findings, a KMO measure of sampling adequacy was 0.755 and was found to be acceptable while the Bartlett's test of Sphericity showed a chi-square value of 756.453 which was significant, p-value = 0.000 (df = 45). The highest factor loadings were for the firm conducts internal safety audits and the safety review is communicated to the top management items.

Finally, Table 5 presented the results regarding the factor loadings as well as the consistency of the data and the test for sampling adequacy and Sphericity regarding safety promotion.

Table 5: Safety promotion

Statements	Mean	Std. Deviation	Loadings	Cronbach
The firm provide safety training to it employees	3.76	0.744	0.821	0.801
The firm advocates for a positive safety culture	4.04	0.947	0.878	
The firm offers safety training measures to its customer	3.78	0.648	0.792	
The firm assures safety communication to all employees	3.96	0.781	0.876	
The firm promotes a positive safety culture	3.98	0.769	0.896	
The firm distributes safety lessons learnt	4.00	0.571	0.830	
New employees are trained sufficiently prior to work	3.74	0.527	0.676	
Employees are given adequate training in SMS policy	3.92	0.829	0.859	
The firm encourages employees to attend safety seminars	3.76	0.687	0.774	
The firm keeps staff training records	4.14	0.639	0.921	
Safety Promotion	3.91	0.599		
KMO and Bartlett's Test				
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		*0.730*		
Bartlett's Test of Sphericity, Approx. Chi-Square		*703.235*		
	df	*45*		
	Sig.	*0.000*		

The results in Table 5 revealed that all the means were above 3.5 for all the items with the highest mean for the firm keeps staff training records (mean = 4.14) item. In addition, Cronbach alpha value of 0.801 was found to be favorable and showed that the data gathered were reliable and has obtained the acceptable level of internal consistency.

The findings also showed results relating to the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's test of Sphericity. From the findings, a KMO measure of sampling adequacy was 0.730 and was found to be acceptable while the Bartlett's test of Sphericity showed a chi-square value of 703.235 which was significant, p-value = 0.000 (df = 45). The highest factor loadings were for the firm keeps staff training records item.

Table 6 illustrates the findings of the regression model and the model summary of multiple regression model.

Table 6: Regression model results

	Unstandardized Coefficients		Standardized Coefficients			Correlation	Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Zero-order	Tolerance	VIF
(Constant)	-0.284	0.249		-1.144	0.259			
Safety Policy	0.533	0.073	0.529	7.336	0.000	0.709	0.513	1.950
Safety risk management	0.328	0.085	0.305	3.878	0.000	0.716	0.431	2.319
Safety assurance	0.020	0.084	0.023	0.241	0.811	0.518	0.293	3.409
Safety promotion	0.279	0.081	0.327	3.445	0.001	0.582	0.297	3.370
summary statistics								
R	0.938a							
R Square	0.880							
Adjusted R Square	0.869							
Durbin-Watson	1.771							
F	82.345							
Sig.	0.000b							

a Dependent Variable: firm performance

The results showed that all the four predictors (safety policy, safety risk management, safety assurance and safety promotion) explained 88.0% variation of firm performance. This showed that considering the four independent variables, there is a probability of predicting form performance by 88.0% (R squared =0.880, adjusted R-square = 0.869).

Multiple regression analysis was conducted so as to determine the relationship between firm performance and the four independent variables. The findings of the multiple regression analysis were presented in relation to the stated hypothesis. The tolerance levels do not exceed the rule of thumb of 1.0 as well as the VIF which do not exceed the rule of thumb value of 10. This means the hypothesis of the absence of multicollinearity is not rejected.

The regression equation was;

$$\text{Firm performance} = 0.529\text{Safety Policy} + 0.305\ \text{Safety Risk Managemtn} + 0.327\text{Safety Promotion}$$

H_{01}: Safety policy has no significant effect on performance of the aviation firms

The first hypothesis stated that safety policy has no significant effect on performance of the aviation firms. Findings in Table 6 showed that safety policy had an estimated coefficient (0.529, standardized coefficient), p-value = 0.000 which indicated that it was significant and carried the largest significant effect with a correlation of 0.709. This implied that the null hypothesis was rejected and it was concluded that safety policy has a significant effect on firm performance. This suggested that there was up to 0.529 unit increase in firm performance for each unit increase in safety policy. The effect of safety policy was more than 7 times the effect attributed to the error, this was indicated by the t-test value = 7.336.The findings are in line with O'Toole (2012) and Pawlowska (2015) who highlight importance of various aspects of safety policy especially their effect on the employees and how this would influence the performance of the organization and in general, safety policy, with its various aspects has a positive influence on the performance of the firm.

H_{02}: Safety risk management has no significant effect on performance of the aviation firms

The second hypothesis stated that safety risk management has no significant effect on performance of the aviation firms. The findings in Table 6 showed that safety risk management had an estimated coefficient (0.305, standardized coefficient), p-value = 0.000 which indicated that it was significant with a correlation of 0.716. This implied that the null hypothesis was rejected and it was concluded that safety risk management has a significant effect on firm performance. This suggested that there was up to 0.305 unit increase in firm performance for each unit increase in safety risk management. The effect of safety risk management was more than 3 times the effect attributed to the error, this was indicated by the t-test value = 3.878. Based on these findings, Hwang (2011) point out that the concept of risk management is about understanding the operational systems. Furthermore, the positive effect of safety risk management is highlighted by Beguería (2006) who notes that it allows for the elimination or reduction of the risk while Abu el Ata &Schmandt (2016) note that such a system where there is proper attention given to safety risk management, allows one to neutralize any risk that allows for a safe operation.

H_{03}: Safety assurance has no significant effect on performance of the aviation firms

The third hypothesis stated that safety assurance has no significant effect on performance of the aviation firms. The findings in Table 6 showed that safety risk management had an estimated coefficient (0.023, standardized coefficient), p-value = 0.811 which indicated that it was not significant with a correlation of 0.518. This implied that the null hypothesis was not rejected and it was concluded that safety assurance has no significant effect on firm performance. This suggested that although there was up to 0.023 unit increase in firm performance for each unit increase in safety assurance, this effect was not significant. The effect of safety risk management was more less 0.5 as indicated by the t-test value = 0.241.

Safety assurance is implemented through audits and the Transportation Research Board (2012) notes that not only should internal audits be conducted but external audits should be conducted as well. The findings have shown that safety assurance has no significant effect on firm performance which ideally indicates that there are aspects of audits that are overlooked such as external audits and Gingerich (2010) notes that external audits allow for the unbiased approach to identifying risks, but is also at the expense of the firm and as such firms do not like to use this option because independent agencies often see other issues that the firm previously did not recognize and thus avoid this pillar. Thus, effect of safety assurance is not significant.

H_{04}: Safety promotion has no significant effect on performance of the aviation firms

The fourth hypothesis stated that safety promotion has no significant effect on performance of the aviation firms. The findings in Table 6 showed that safety risk management had an estimated coefficient (0.327, standardized coefficient), p-value = 0.001which indicated that it was significant with a correlation of 0.582. This implied that the null hypothesis was rejected and it was concluded that safety promotion has a significant effect on firm performance. This suggested that there was up to 0.327 unit increase in firm performance for each unit increase in safety promotion. The effect of safety risk management was more less 3 times the effect attributed to the error as indicated by the t-test value = 3.445. In line with these findings, Käppler *et al,* (2014)noted that without a solid foundation SMS will not be successful. As such, an organization must have the best possible safety manual, training, and communication.

CONCLUSION

From the findings, the safety policy carries the most significant and positive effect on firm performance with an effect size exceeding 7 units compared to the residuals. This indicated that the existence as well as the implementation of an effective safety policy increases the performance of the firm especially in terms of the increased awareness of the employees of the policy which results in the employees being more confident at work and eventually increasing their level of performance.

Furthermore, the findings have revealed that safety risk management has a significant and positive effect on firm’s performance and was the third most influential variable. This aspect allows for the elimination or even reduction of the risk since any risk is neutralized allowing the workforce to work in a safe environment which results in increased levels of performance which positively affects the overall firm’s performance.

The findings have also revealed that the pillars of safety assurance are not utilized fully by the firms with absence of external auditing as a result of the related costs, hence safety assurance was found to have no significant effect on firm's performance. Finally, safety promotion through the availability of safety manuals, training of the workforce and effective communication of the same to the workforce has the second most significant influence on firm's performance; the absence of safety promotion means that the firm will not be successful.

The study limited to only four dimensions of Safety Management System (safety policy, safety risk management, safety assurance and safety promotion). Thus, future study should explore more dimensions of Safety Management System. The study had small sample size of 50 employees from security departments in aviation firms in Nairobi Kenya

RECOMMENDATIONS

Investing on having a better foundation for safety risk management and safety promotion by utilizing various elements of these pillars would have an increased effect on firm performance. Furthermore, the management of the firms should be encouraged to embrace aspects of safety assurance such as external auditing in cost effective ways in order to ensure that the positive effects are tapped and utilized in improving the performance of the firm. Furthermore, the involvement of the workforce in the structuring and implementation of the safety policy as well as the pillars of safety risk management, safety assurance and safety promotion is critical towards the realization of the positives on the success of the firm.

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