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The relationship between resilience and organisational control systems in the South African aviation industry

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Background: Organisational control systems, such as quality assurance and corporate governance, configure an organisation's internal environment to manage the velocity of change and pro-actively stabilise disturbances. Resilience in a socio-technical system is a multi-disciplinary approach to instil a system's transformability and adaptive capacity to achieve desirable outcomes and continuous improvement. This study confirms theoretical postulations that detachment between the disciplines of quality assurance and corporate governance reduces resilience in a socio-technical system. Coherence between these disciplines in a complex socio-technical system is achieved through four components of organisational resilience: strategic management and company culture, monitoring and awareness, exposure management and responsive adaptation.

Objectives: This study aimed to explore stakeholders' perceptions of the relationship between the components of organisational resilience and organisational control systems in the South African aviation industry.

Method: A cross-sectional survey was used to collect data from 203 stakeholders in the South African aviation industry. The data set was subjected to descriptive and inferential statistical analyses.

Results: A strong positive linear relationship exists between organisational control systems and organisational resilience and its four components: Strategic management and company culture, Monitoring and awareness, Exposure management and Responsive adaptation.

Conclusion: This study revealed that a harmonised application of organisational control systems, such as quality assurance and corporate governance, stimulates organisational resilience in a socio-technical system through the autonomous advancement of four components of organisational resilience. Furthermore, the robustness of organisational control systems activates an organisation's capacity to adapt sustainably, whilst maintaining stakeholder value within complex socio-technical systems, such as the aviation industry.

Keywords: organisational resilience; quality assurance; corporate governance; aviation; socio-technical system; socio-technical resilience; South Africa.

Introduction

Social value

The aviation system consists of various interactive and interdependent components including manufacturing and engineering, the operation of aircraft, infrastructure, personnel licencing and organisational certification that enables organisations to provide a service to society (The Department of Transport 2017). This industry enables increased accessibility to fast and efficient transportation of goods and people on a personal and industrial level (Njoya 2013). The Department of Transport (2017) noted the symbiotic relationship between the aviation industry and society.

Continual growth in the international air transport system requires developing and implementing policies and practices to increase mutually beneficial value for all stakeholders (Njoya 2016). Consistent with this view, Chialastri and Pozzi (2008) argued that optimal performance and sustainable credibility amongst stakeholders (both internally and externally) originate from coherence between principled organisational management and the lower-level outcome-based functions.

The aviation industry remains a diverse environment where various components play a vital role in the overarching realisation of an efficient and reliable transportation solution (Lazur et al. 2014). Resilience in civil aviation maintains sustainable credibility amongst all stakeholders and emanates from unremitting coherence between an organisational and procedural structure focussing on error-avoidance within the extensive aviation system (Chialastri & Pozzi 2008).

Scientific value

Organisational resilience, as a desired capacity of an organisation's sustainability, supports the discourse to dynamically reinvent business models and organisational strategies in response to circumstantial changes before such adaptation becomes critical (Hamel & Välikangas 2003) and thus facilitates fluid adaptation to the high velocity of changes in the industry (Patriarca, Di Gravio & Constantino 2016).

The South African aviation industry provides scheduled and non-scheduled air transportation through the utilisation of all the components of the aviation system (eNCA 2019; Mabotja et al. 2019; The Department of Transport 2017). Despite the significant size of the South African aviation industry, commercial challenges such as high fixed costs, low-profit margins and significant impact from volatility and fluctuations in the external or macro-environment are omnipresent (Mhlanga 2018). Many organisations in the industry fail to operate sustainably because of these challenges and a misconstrued realisation of the stringent operational requirements (Wynbrandt 2017). Sustainability in a complex socio-technical system, such as the aviation industry, requires rapid adaptation to external fluctuations that may stimulate an imbalance between the demand of the organisation's service and the organisation's operating cost (Alexandra, Limnios & Schilizzi 2014; Mhlanga 2018; Mhlanga & Steyn 2016).

Literature review

The aviation industry can be described as a system of systems with interrelationships on multiple levels (Harris & Stanton 2010). This complex socio-technical system has interrelationships between different micro-, market- and macro-level elements that rely primarily on the interaction between people and organisations, institutions and technologies (Amir & Kant 2018; Grundgeiger, Sanderson & Dismukes 2014). The complexity and interdependence of components within the aviation system increased dramatically over the past two decades (Maurice & Burleson 2012). The industry is highly regulated worldwide and subjected to high velocities of changes and disruptions at an extraordinary rate (Wensveen 2018). As such, the capacity to rapidly adjust to external influences remains key to an organisation's resilience, competitiveness, sustainability and credibility amongst stakeholders (Alexandra et al. 2014; Amankwah-Amoah 2018).

Hickford et al. (2018:20) describe organisational resilience as 'the ability of an organisation to anticipate, prepare for, respond and adapt to incremental change and sudden disruptions to survive and prosper'. Resilient socio-technical systems are engineered by establishing robustness in policy development, organisational design, process design, application of resources and systematic evaluation through enterprise risk management, with quality assurance and corporate governance as the cornerstones (Braes & Brooks 2010).

A socio-technical system is not merely an aggregation of people, technology, organisations and institutions to produce outputs, but intentional hybrids (Amir & Kant 2018) through unique interdependencies and interactions amongst people, technology and the environment (Braes & Brooks 2010). Although the structure and complexity of socio-technical systems vary, the general characteristics of such systems remain constant (Grundgeiger et al. 2014). Complex socio-technical systems comprise critical processes that can rarely be interrupted, and these involve specialist technological equipment requiring specific technical procedures during the interface between human resources and such specialist technological equipment (Grundgeiger et al. 2014).

Reliability in the aviation system depends on the outcome and condition of all participating system components, the external environment and the critical complexity of interaction between the system elements and the environment (Patriarca et al. 2016). To Jafari et al. (2018), a complex system's overall resilience is a conscious and strategic mutation of organisational factors in three dimensions: organisational planning and control, human and technical dimensions.

Organisational resilience

Organisational resilience and competitive advantage in the marketplace are directly related to each other, and the relationship between organisational resilience and competitive advantage is embedded in an organisation's ability to 'maintain above-average returns even after absorbing the shocks of the competitive environment' (Teixeira & Werther 2013:335). To achieve this, the configuration of intellectual, financial, technological, human and other resources needs to be renewed and developed continuously (Teixeira & Werther 2013). Although organisational resilience is desirable, resistance to change is omnipresent in organisations (Edgeman 2015).

The characteristics of a resilient organisation include the ability to manage internal and external complexities and changes through holistic thinking, acknowledgement of multiple perspectives and reframing the complexities and changes as moving targets (Teixeira & Werther 2013). Leem, Vargo and Seville (2013) maintain that organisational resilience is a multidimensional approach to manage uncertainty facing organisations during business activities. Many possibilities exist to respond to uncertainties. Still, the centralisation of organisational controls (such as quality assurance and corporate governance) to manage such uncertainty yields increased organisational knowledge, creative problem solving and sustainable adaptation to better future responses to similar uncertainties (Lee et al. 2013).

Relationship between organisational controls and resilience

Although various definitions of corporate governance have been coined in the past three decades, its essence remains 'the system by which companies are directed and controlled' to ensure all-inclusive sustainability and value (Marx & Mohammadali-Haji 2014:234). The International Organization of Standardization (2015:vi) describes a quality management system as a multi-level organisational and strategic system 'to improve its overall performance and a sound basis for sustainable development'. Various theorists (Burnard, Bhamra & Tsinopoulos 2018; Lee et al. 2013) argue a strong theoretical resemblance between socio-technical resilience of an operational system and congruent application of corporate governance and quality assurance.

Dutta, Lanvin and Wunsch-Vincent (2017) propose that internal organisational controls associated with corporate governance and quality assurance increase the viability of innovation through strategic direction and leadership, knowledge and resource management, process control, conformance and customer satisfaction. The advantages of integrating internal controls within an organisation include profound value for stakeholders across geographic boundaries (Marx & Mohammadali-Haji 2014). Because of the complexity of the aviation system, the necessity for an inclusive and stringent governance framework that holistically addresses an organisation's technical performance and commercial integrity through improved accountability remains omnipresent in the aviation industry specifically (Tjørhom 2010).

Consistent with this view, Chialastri and Pozzi (2008) argued that coherence between principled organisational management and the lower-level outcome-based functions stimulates optimal performance and sustainable credibility. Despite the focus on holistic coherence between principled organisational management and the outcome-based functions within an organisation, various researchers (Amankwah-Amoah 2018; Mhlanga & Steyn 2016; Njoya 2013) identified detachment between outcome-based procedural supervision (or quality assurance) and the principled organisational management (or corporate governance) in the aviation industry.

The risks that emerge from detachment between quality assurance and corporate governance include reduced stakeholder reputation, reduced competitiveness and the inability to adapt to the rapidly changing macro-environment (Amankwah-Amoah 2018). This inability to rapidly adjust internal controls in a sustainable and reliable manner to enable rapid and autonomous metamorphosis, in response to the changing environment, points to a decline in an organisation's resilience capacity (Lazur et al. 2014; Lee et al. 2013; Patriarca et al. 2016; Teixeira & Werther 2013).

Aim and objective

Previous research suggests the need to further interrogate the relationship between management control processes that address commercial management and technical outcomes (Lazur et al. 2014; Njoya 2016). Furthermore, Alexandra et al. (2014) argued that a lack of knowledge on the connection between resilience and organisational control systems contributes to the inability to maintain agility.

This study aimed to explore the relationship between organisational control processes, such as quality assurance and corporate governance, and organisational resilience in the South African aviation industry through stakeholders' perception.

Research design and methodology

This article represents the quantitative survey of a more extensive mixed-method study that was conducted to explore the interface between organisational control systems (quality assurance and corporate governance) and organisational resilience properties in the South African aviation industry (Serfontein & Govender 2020). Because quantitative research dominates the realm of management and business research, it remains a credible method to examine the relationships that manifest in this environment (Jogulu & Pansiri 2011).

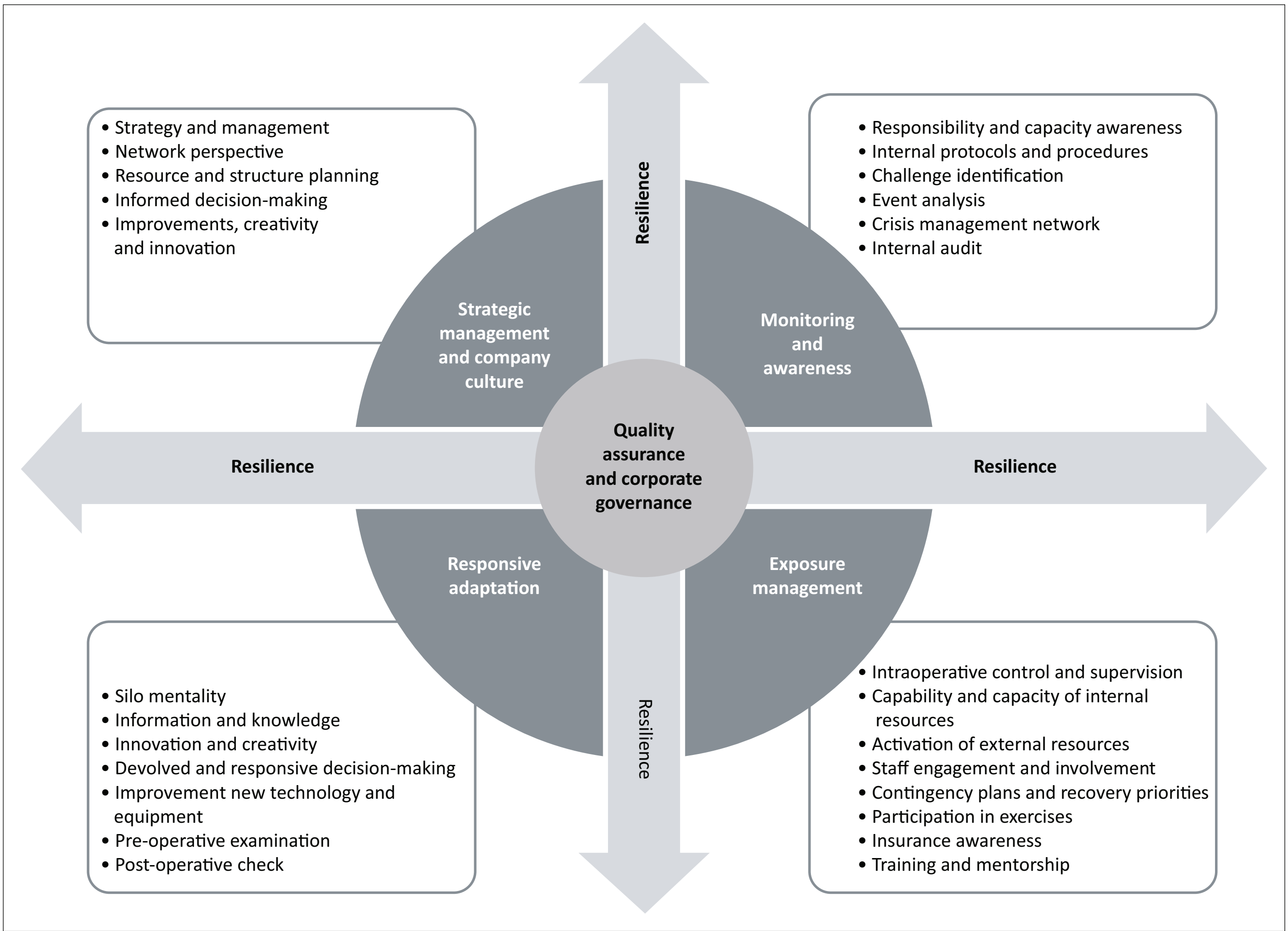
Determination of variables

The qualitative phase of the larger sequential mixed-method study by Serfontein and Govender (2020) introduced a four-pronged framework of resilience properties embedded in organisational control frameworks such as quality assurance and corporate governance in the South African aviation industry. These components are Strategic management and company culture, Monitoring and awareness, Exposure management and Responsive adaptation as depicted in Figure 1.

Through the application of quantitative data analysis, a variable, or individual identifiable attribute of a subject, can be examined and explained (Agresti & Finlay 2009; Creswell 2014). Organisational resilience and its respective properties, namely Strategic management and company culture, Monitoring and awareness, Exposure management and Responsive adaptation, thus manifest as variables to organisational control systems (quality assurance and corporate governance).

Variables are structured according to temporal order and observatory measurement (Creswell 2014) and can display a consequential relationship to another variable (Kothari 2004). In such a cause-and-effect relationship, the variable that stimulated the consequential change in the other variable is denoted as the dependent variable (DV) (Beckett et al. 2014). The independent variable (IDV) measures a behavioural variation in response to the DV (Saunders, Lewis & Thornhill 2009). Organisational resilience in a complex sociotechnical system, and its respective indicators were identified as the IDV(s).

As such, organisational control systems are denoted as the IDV and organisational resilience as the DV. The DV consisted of four subcategories, namely Strategic management and company culture (DV1), Monitoring and awareness



Source: Adapted from Serfontein, E. & Govender, K., 2020, 'Embedded resilience properties identified in quality assurance and corporate governance in the South African Aviation Industry', *African Journal of Hospitality, Tourism and Leisure* 9(2), 86–100. https://doi.org/10.46222/ajhtl.19770720-6.

FIGURE 1: Organisational resilience properties embedded in organisational control systems.

(DV2), Exposure management (DV3) and Responsive adaptation (DV4).

Study population and sample

Yin (2018) asserts that studies concerned with a business environment should consider contextual elements such as the industry at large, policy and regulatory conditions to set the contextual boundaries. This study was embedded in the South African aviation industry within a contemporary timeframe and considered the Department of Transport's (2017) policy to categorise stakeholders to the study's setting.

The shared characteristic of the target population was based on The Department of Transport's (2017) definition and categorisation of stakeholders to the South African civil aviation system, as indicated in Table 1.

Considering the accessibility of possible participants from the population (Martínez-Mesa et al. 2014), the target population consisted of an estimated 11 697 stakeholders to the South African aviation industry. As the Department of Transport (2017) classified this homogenous group of stakeholders into the subcategories defined in Table 1, the homogenous group of stakeholders to the South African civil aviation system presents a stratified population with different strata of shared characteristics (Creswell 2014).

Because Alvi (2016) recommends that a quantitative study generally needs 100–150 respondents to reach data saturation indicative of the population's perception, the target sample of 200 participants was selected from the target population, by using non-probability convenience sampling (Rahi 2017).

Survey development and pilot study

To maintain the applicability of the survey in relation to the phenomenon of interest, the questionnaire design and content mirrored the embedded organisational resilience properties that the authors (Serfontein & Govender 2020) identified in organisational control systems in the South African aviation industry through prior qualitative research.

The questionnaire embodied a Likert-type rating scale to realise numeric values associated with the level of agreement to each survey item (Greener 2008). The scale of agreement ranged from 1 = strongly disagree to 5 = strongly agree.

TABLE 1: Categories of stakeholders to the South African civil aviation system.

Stakeholder category	Description
Governance stakeholder	Responsible for policy and regulation development to simultaneously maintain economic viability and technical operating standards compliant to municipal, governmental and international requirements.
Commercial stakeholder	Associated with scheduled and/or non-scheduled economic activity and supply chain within the aviation system, inclusive of entities that provide or procure services/goods such as fuel, aircraft maintenance services, air travel services, training and staff certification, airports, air traffic organisations, etc.
Support stakeholder	Direct and indirect facilitation of commercial stakeholders' operation and service provision, such as insurance organisations, financing institutions, travel agents, cargo and shipment organisations, etc.
Society stakeholder	Stakeholders who do not directly participate in the civil aviation system's service provision activities but who have a direct interest in the civil aviation system's economic, safety, security and environmental performance.
Security stakeholder	Responsible for the development and implementation of policy that enables regulating instruments relating to national security. Security stakeholders also include the South African Police Service and military veterans.

Source: Adapted from Department of Transport, 2017, *White Paper on National Civil Aviation Policy*, Government Gazette No. 40847, The Government Printing Works, Pretoria, viewed 18 June 2018, from http://www.transport.gov.za/documents/11623/51141/GOVERNMENT_GAZETTE_NCAP_December2017.pdf.

A preliminary pilot study is advisable to validate the instrument in support of criterion validation and benchmarking (Brough 2009; Kothari 2004). The pilot study sample should be representative of the study sample (Saunders et al. 2009), and a sample size of 12 participants is appropriate (Junyong 2017). Twenty-two purposively selected participants from the study sample were approached to participate in the pilot study, and 18 individuals participated. Following the completion of the survey, informal engagement with each participant took place to identify and correct weaknesses in the survey. The survey was condensed, and various criteria reworded to avoid ambiguity.

The layout of the survey used for data collection purposes consisted of eight sections. The first section included ethical considerations and obtained informed consent from the participants. The second section included general instructions on the completion of the questionnaire. The third section included a screening question not only to ensure that participants represent the study sample, but also to classify the participant into the stratified sample described in Table 1. Thereafter, a section on organisational controls (IDV) in the South African aviation industry followed, and a section for each of the organisational resilience categories (DV1, DV2, DV3 and DV4) was included. The survey was designed on an online platform that could only be accessed through a unique identifier code available to purposively selected participants. The design of the survey included electronic controls to ensure that informed consent is obtained before the remainder of the survey could be accessed. An electronic control was also activated to ensure that each question is answered before a participant could proceed to a subsequent section.

Data collection

Because the respondents were purposively selected from the study population, participants were knowledgeable on the phenomenon of interest and committed to the voluntary completion of the survey. For increased accessibility, this study used the online platform SurveyMonkey to host the survey questionnaire between 28 January and 11 February 2020. After 14 days, the survey's unique identifier provided to voluntary research participants was deactivated to cease data collection.

Data were extracted from the online platform, retained in an electronic database and reworked to remove redundant information by isolating participant responses to the survey questions. This sanitised version of the database was provided to a statistical consultant for analysis. Data collected from 203 respondents were analysed by using Microsoft Excel 2016 and STATA 15 (software for statistical and data science). This data set exceeded the intended sample size.

Data analysis

The measurement and analysis of each item in a survey questionnaire are not advisable if there is not a specific methodological rationale for the detailed and cumbersome approach (Boone & Boone 2012). Because the survey used for this study grouped items associated to each variable together, it is advisable to rather measure the scale score for each variable (or category) in the survey (Boone & Boone 2012; Willits & Theodori 2016). The practice to report categorically on the scale score for the different variables, instead of each item constituting such categories, is known as composite scoring (Joshi et al. 2015).

The Cronbach alpha was applied to determine internal consistency through value measurement (Saunders et al. 2009). In exploratory research, a Cronbach alpha above 0.6 indicates satisfactory internal consistency (Beckett et al. 2017). The factor analysis method was employed to indicate the validity of the questionnaire's constructs (Bolarinwa 2016). With specific reference to a sample size of above 200, as is the case with this study, a factor loading of 0.4 is an acceptable indication of validity (Taherdoost 2016).

Data analysis followed a two-dimensional approach to address descriptive and inferential statistics. Whilst descriptive statistics allow numeric description and comparison of quantitative data (Saunders et al. 2009), the inclusion of inferential statistics in the analytical approach permits identifying correlations to predict relationships between variables (Hahn 2015).

Ethical considerations

The introductory page of the survey questionnaire included pertinent information about anonymity and voluntary participation. Participants could only proceed to the subsequent sections of the survey once informed consent was acknowledged (Yin 2018). In addition, ethical clearance was obtained from the Da Vinci Institute of Technology Management as part of the doctoral research.

Results

Descriptive results

Data were collected from 203 participants representing the different strata of the homogenous study population defined in Table 1. The frequency of the data collected between the different strata of the study population is reflected in Table 2.

This study followed a composite approach to report aggregated descriptors for each variable in the relationship structure. Table 3 indicates the descriptive outcomes for the IDV organisational control systems (IDV) as a portmanteau for the nature of the aviation industry (IDV1) and quality assurance and corporate governance (IDV2).

The factor loading results for the IDV yielded an acceptable level of construct validity (Beckett et al. 2017) and indicate that the measurement tool employed for this study examined the construct as intended for a sample size exceeding 200 participants (Taherdoost 2016). As a Cronbach alpha above 0.6 in exploratory research indicates satisfactorily reliability (Beckett et al. 2017), the survey addressing the IDV is an accurate and reliable reflection of the phenomenon of interest within its context.

The valid and reliable research instrument indicates a scale score of 8.55 out of 10 for the statements that constituted the IDV. The scale score indicates the degree of agreeability of the participants to the questionnaire statements (Kothari 2004). Therefore, research participants indicated an 85.50% agreement level to the statements presented to them during quantitative data collection.

Table 4 reflects the descriptive outcomes for the components of the composite DV organisational resilience (DV). This variable consists of Strategic management and company culture (DV1), Monitoring and awareness (DV2), Exposure management (DV3) and Responsive adaptation (DV4).

The descriptive results for the DV yielded an acceptable construct validity as indicated by the respective factor loading results (Beckett et al. 2017) and suggest that this section of the data collection instrument is an accurate measurement of the subject matter within its setting (Taherdoost 2016). The Cronbach alpha measurement indicates admissible reliability of the data collection instrument (Beckett et al. 2017).

Therefore, the survey content associated with the IDV is an accurate and reliable reflection of the topic analysed. The valid and reliable data collection tool yielded a scale score of 17 out of a maximum of 20 for the IDV and indicates an 86.55% of respondent agreement with the statements included in this section of the survey.

The above-mentioned results form the basis on which the relationships between the variables were analysed through inferential statistics. The inferential statistics methods used are correlation and regression analysis.

TABLE 2: Stakeholder response frequency from the study sample.

Stakeholder type	Frequency (N = 203)	%
Commercial	121	59.61
Governance	21	10.34
Security	3	1.48
Society	43	21.18
Support	15	7.39
Grand total	**203**	**100**

TABLE 3: Organisational control systems (independent variable) descriptors.

Variables	Mean	Standard deviation	Minimum	Maximum	Factor loading
IDV1: Nature of the aviation industry	4.31	0.43	2.83	5	0.43
IDV2: Quality assurance and corporate governance	3.78	0.45	2.17	5	0.43

Note: Scale score = 8.55 out of a maximum of 10 and Cronbach alpha = 0.66.
IDV, independent variable.

Inferential results

As a prerequisite to correlation and regression analysis, statistical assumptions such as normality, multicollinearity, heteroskedasticity and autocorrelation must be tested (Zaid 2015). To determine the stability of the data set, the Shapiro-Wilk W test for normal data was performed. As the p-value for this test returned a result of 0.23244 below the 0.5 threshold, the data set presents a normal distribution (Agesti & Findlay 2009).

This study employed the variance inflation factor (VIF) to assess collinearity, and the VIF results were 3.55 (DV1), 5.07 (DV2), 3.85 (DV3) and 4.80 (DV4), respectively. As none of the variables indicated a VIF above 10, the possible adverse effects of significant multicollinearity can be eliminated (Agresti & Findlay 2009), and the different effects of individual variables can be determined from the data set (Saunders et al. 2009).

Heteroskedasticity, or the 'extent to which data values for the dependent and independent variable have unequal variance' (Saunders et al. 2009:592), can be diagnosed by the White test (Coenders & Saez 2000). Where the White test indicated a p-value above the 0.05 threshold, the variance of the residuals is homogenous (Agresti & Findaly 2009). The p-value indicated a measurement of 0.3669, and no further diagnostic tests to correct heteroskedasticity were required.

Reliability in regression analysis results can also be impacted by autocorrelation, which refers to the degree of similarity

TABLE 4: Organisational resilience (dependent variable) descriptors.

Variables	Mean	Standard deviation	Minimum	Maximum	Factor loading
DV1: Strategic management and company culture	4.43	0.38	3.05	5	0.86
DV2: Monitoring and awareness	4.33	0.38	3.26	5	0.92
DV3: Exposure management	4.24	0.38	3.29	5	0.87
DV4: Responsive adaptation	4.31	0.39	3.25	5	0.91

Note: Scale score = 17.31 out of a maximum of 20 and Cronbach's alpha = 0.94.
DV, dependent variable.

between the different values of variables (Saunders et al. 2009). The Durbin-Watson tests to detect autocorrelation yield a result between zero and four, where a value of two indicates no autocorrelation, a value of zero indicates a positive result and towards four a negative autocorrelation. (Saunders et al. 2009). As results between 1.5 and 2.5 do not require further investigation, the Durbin-Watson statistic of 1.951636 indicates the acceptability of the data set (Agresti & Findlay 2017).

The above-mentioned analytical outcomes indicate the appropriateness of the data set for correlation and regression analysis (Zaid 2015). The Pearson correlation method was used to examine the relationship between the variables. This method yields a coefficient (*r*-value) indicating the strength of the linear relationship between the IDV and DV (Boone & Boone 2012). The level of certainty through which deductions on these relationships can be made is indicated by the statistical significance, or the *p*-value, of the data set (Beckett et al. 2017).

To indicate the intensity of the relationship between variables, Cohen (1988) postulates that a correlation coefficient (*r*-value) between 0.1 and 0.3 indicates small correlations, a value between 0.3 and 0.49 implies a moderate correlation and a value of 0.5 or above indicates a strong correlation. Agresti and Finlay (2009) emphasise that the *r*-value (coefficient) and the *p*-value (significance level) must be compared to determine if a statistically significant relationship exists. Where the data return a correlation coefficient (r) > significance level (*p*-value), a statistically significant relationship exists between the variables (Agresti & Finlay 2009).

The relationship between the IDV of organisational control systems (IDV) and the DV of organisational resilience in a socio-technical system (DV) was tested. Also, the relationship between organisational control systems (IDV) and each of the four composite categories of the DV, namely organisational resilience (DV1, DV2, DV3 and DV4), were subjected to the same examination. Calculations from Pearson's correlation method revealed the results reflected in Table 5.

The results indicate a significance (*p*-value) below 0.001 for each of the combinations of variables subjected to examination. As this indicates the statistical significance of the deductions made (Beckett et al. 2017), this study carries a probability in excess of 99% to make an accurate deduction. Where the significance of the relationship between the IDV and compounded DV was tested, the results indicate a >99% certainty that a statistically significant relationship between organisational control systems (IDV) and organisational resilience (DV) exists.

TABLE 5: Pearson's correlation results indicating significance.

Independent variable	Dependent variable	*R*	Significance (*p*)
IDV: Organisational control systems	DV: Organisational resilience	0.59	< 0.001
	DV1: Strategic management and company culture	0.63	< 0.001
	DV2: Monitoring and awareness	0.51	< 0.001
	DV3: Exposure management	0.53	< 0.001
	DV4: Responsive adaptation	0.52	< 0.001

IDV, independent variable; DV, dependent variable.

Through the same criteria, the data also indicate a >99% certainty that a statistically significant relationship exists between the IDV (organisational control systems) and each of the individual DVs, namely Strategic management and company culture (DV1), Monitoring and awareness (DV2), Exposure management (DV3) and Responsive adaptation (DV4). This not only indicates that a statistically significant relationship was identified between organisational control systems (quality assurance and corporate governance) and organisational resilience in the South African aviation industry, but it also indicates a relationship between organisational control systems (quality assurance and corporate governance) and each of the components of organisational resilience.

Following the determination that a statistically significant relationship exists between the IDV and each of the DVs, the collective data set was further examined to determine the nature of these relationships by conducting regression analysis (Zaid 2015). This method indicates a straight regression line as an indicator of the behavioural trend observed in the interrelationship of two variables (Brough 2019). The regression line can intuitively predict future behaviour of the DV through adjustment of the IDV's value (Lane 2017) and is of value in this study to further understand the nature of the relationships identified.

The linear relationship between a combination of a DV and IDVs can be positive or negative (Joshi et al. 2015). A negative relationship implies a decline in the behavioural measurement of the DV in response to an increase in the behavioural indicator value of the IDV (Harpe 2015). The rate of change is predicted by the regression coefficient (r) that presents a gradient indication to simulate predicted behaviour of the DV (Bonett & Wright 2015).

Table 6 indicates the regression coefficient results for the relationship between the IDV and each of the DVs.

Through the application of analytical rules, the data revealed a positive relationship between the IDV and DV in all the variations examined (Harpe 2015; Joshi et al. 2015; Lane 2017). Therefore, the results shown in Table 6 indicate a definitive

TABLE 6: Nature of relationship between variables.

Independent variable	Dependent variable	Nature of correlation	Coefficient
IDV: Organisational control systems	DV: Organisational resilience	Positive	0.62
	DV1: Strategic management and company culture	Positive	0.62
	DV2: Monitoring and awareness	Positive	0.50
	DV3: Exposure management	Positive	0.52
	DV4: Responsive adaptation	Positive	0.49
Constant coefficient	-	-	1.62

IDV, independent variable; DV, dependent variable.

expected increase in the behavioural measurement value of organisational resilience (DV) when the measurement for organisational control systems (IDV) strengthens.

Similarly, an increase in the behavioural measurement of organisational control systems is expected to stimulate an elevation of the measurement values for each of the components of organisational resilience (Strategic management and company culture – DV1, Monitoring and awareness – DV2, Exposure management – DV3 and Responsive adaptation – DV4). The degree of the expected change is informed by the value of the coefficient (Bonett & Wright 2015), and the highest anticipated increase was identified in the relationship between the IDV and the DV of Strategic management and company culture (DV1).

The predictive value of a regression model is dependent on its confidence and significance levels (Beckett et al. 2017). As a measurement of central tendency, the standard error informs the confidence level of the predictive power embedded in a regression model (Beckett et al. 2017). The confidence level (*t*-value) indicates the degree of certainty that a regression relationship exists (Zaid 2015). To predict the probable range of a variable's measurement in a regression model, the confidence interval informs the upper and lower limits of the expected range (Zaid 2015). Table 7 shows confidence and significance indications for the data set.

The *t*-value of < 0.001 indicates >99% confidence that the regression model has predictive power (Beckett et al. 2017). The deduction can be made that the application of this regression model will forecast the behaviour of the causal relationships examined with accuracy. The confidence interval's upper and lower limits indicate, to a degree of confidence, the range in which the predicted regressed value of the DV will present itself (Zaid 2015). The standard error value for all regression combinations does not exceed 1. As such, it indicates a marginal expected deviation from the predicted data observations and increases the significance of the regression model (Beckett et al. 2017).

TABLE 7: Regression results of organisational resilience and organisational control systems.

Variable to IDV: Organisational control systems	Coefficient	Standard error	|*t*|	Confidence interval	
				Lower limit	Upper limit
DV: Organisational resilience	0.62	0.60	< 0.001	0.50	0.73
DV: Constant coefficient	1.62	0.26	< 0.001	1.11	2.14
DV1: Strategic management and company culture	0.62	0.54	< 0.001	0.52	0.73
DV1: Constant coefficient	1.52	0.24	< 0.001	1.05	1.99
DV2: Monitoring and awareness	0.50	0.06	< 0.001	0.38	0.61
DV2: Constant coefficient	2.13	0.26	< 0.001	1.62	2.63
DV3: Exposure management	0.52	0.60	< 0.001	0.40	0.64
DV3: Constant coefficient	2.08	0.25	< 0.001	1.58	2.57
DV4: Responsive adaptation	0.49	0.57	< 0.001	0.37	0.60
DV4: Constant coefficient	2.19	0.25	< 0.001	1.70	2.68

IDV, independent variable; DV, dependent variable.

Discussion of results

Resilience aids in managing uncertainty in a complex socio-technical system (Lee et al. 2013). Research on resilience indicates that it increases an organisation's ability to withstand disruptions of various magnitudes and frequencies (Burnard et al. 2018; Hamel & Välikangas 2003; Lee et al. 2013; Patriarca et al. 2016). Research revealed that a centralised approach to internal management control increases an organisation's ability to autonomously reconfigure intellectual, financial, technological, human and other related resources to survive and thrive despite uncertainty (Edgeman 2015; Patriarca et al. 2016; Teixeira & Werther 2013). Similarly, Lazur et al. (2014) promote the effective implementation of a quality assurance system as a contributing factor to an organisation's inherent ability to autonomous reconfiguration without disruption to stakeholder value. The value that corporate governance adds to sustainability through the adequate application of internal organisational controls to manage resources and complexities is recognised by Harris (2017) and the Institute of Directors Southern Africa (2016). In addition to sustainability, Govuzela and Mafini (2019) argue that the deliberate alignment of organisational controls and business practices increases organisational agility.

This study explored the relationship between the IDV organisational control systems (quality assurance and corporate governance) and the indicators of organisational resilience (DV) in the South African aviation industry through the perception of the stakeholder defined in Table 1. The results presented in Table 5 identified a statistically significant relationship between organisational control systems (IDV) and organisational resilience (DV) in a complex socio-technical system. The study also revealed a statistically significant relationship between organisational control systems (IDV) and each of the four indicators of organisational resilience, namely Strategic management and company culture (DV1), Monitoring and awareness (DV2), Exposure management (DV3) and Responsive adaptation (DV4). As reflected in Table 5, these deductions were drawn with a 99% statistical significance.

The nature of these relationships identified by correlation analysis was also examined to verify previous research that the effective application of organisational control systems autonomously promotes organisational resilience (Govuzela & Mafini 2019; Harris 2017; Lazur et al. 2014). In support of this verification and to provide additional insight into the phenomenon of interest, regression analysis was applied to the data set. Table 6 shows resultant measurement values, which revealed a positive linear relationship between the IDV organisational control systems (quality assurance and corporate governance) and organisational resilience (DV). In addition, a positive linear relationship was identified between organisational control systems (IDV) and each of the four indicators of organisational resilience in the South African aviation industry (DV1, DV2, DV3 and DV4). These results are reflected in Table 6 and indicate that an increase in the behaviour of organisational control systems (IDV) will stimulate linear growth in the organisation's inherent resilience capacity.

Therefore, Strategic management and company culture (DV1), Monitoring and awareness (DV2), Exposure management (DV3) and Responsive adaptation (DV4) will respectively increase in response to an improved measurement in the behaviour of organisational control systems (IDV).

Although all DVs showed a strong positive relationship between the IDVs, Table 6 indicates that the Strategic management and company culture variable (DV1) displayed a more intense relationship with organisational control systems than the other variables. The significance of this relationship underpins postulations by Dutta et al. (2017) that managerial leadership dictates how control systems are incorporated. It also echoes the postulations of Chialastri and Pozzi (2008) and Khoza (2016) that error-avoidance is achieved through multi-level and multi-disciplinary alignment of policy development and implementation to maintain robust, timeous and effective responses.

Conclusion

This study revealed a positive linear relationship between organisational control systems (IDV) such as quality assurance and corporate governance and organisational resilience (DV) in the South African aviation industry. This confirmation is not limited to the relationship between organisational resilience (DV) and organisational control systems (IDV), but this study confirmed a relationship between organisational control systems (IDV) and each of the respective categories associated with organisational resilience, namely Strategic management and company culture (DV1), Monitoring and awareness (DV2), Exposure management (DV3) and Responsive adaptation (DV4).

Apart from identifying a statistically strong relationship between these variables, this study provided insight into the nature of these relationships. A positive linear correlation was found for each of the relationships examined. Therefore, as the effectiveness and robustness of quality assurance and corporate governance in the local aviation industry increase, the same company's organisational resilience evolves autonomously.

The Strategic management and company culture (DV1) showed the strongest relationship with quality assurance and corporate governance. Whilst Exposure management (DV3) ranked second in the intensity of the relationships with organisational control systems, Responsive adaptation (DV4) presented itself in the third position. Although Monitoring and awareness (DV2) ranked fourth in terms of intensity of the relationship with the IDV, the intensity of this relationship is still deemed strong and statistically significant.

Whilst previous studies focussed on either a specific organisation or specific group of stakeholders, this study focussed on the South African aviation industry as a cohesive socio-technical entity and collected data from all strata of the homogenous stakeholder group as indicted in Table 1. Although the intended sample size was exceeded, the distribution of research participants was not equally shared between the study's stratified sample.

This study further indicates the integration of organisational control procedures related to situational monitoring, exposure management and controlled adaptation into organisational and strategic planning to avoid a polarised manifestation of organisational control systems. This study shows the benefits of consciously integrating quality assurance and corporate governance within organisations to stimulate collective assurance for all stakeholders.

Therefore, it is concluded that the benefits of organisational resilience emerge from a synergy between organisational control systems such as quality assurance and corporate governance in the South African aviation industry. The robust application of these organisational control processes increases an organisation's embedded capacity to yield favourable results, whilst autonomous adaptation to disruptions occurs. Similar to the socio-technical nature of the aviation system, a multi-disciplinary approach to pro-active excellence instead of reactive management of occurrences is necessary to ensure a robust implementation of organisational control systems.

The results of this study imply that organisations should continuously increase the robustness of quality assurance and corporate governance principles and practices. To increase organisational resilience in a complex socio-technical system, quality assurance and corporate governance should operate congruently as part of the organisation's internal control systems. Although the organisational resilience framework consisting of Strategic management and company culture, Monitoring and awareness, Exposure management and Responsive adaptation encompasses organisational control systems (quality assurance and corporate governance), the framework shown in Figure 1 cannot replace these systems. Quality assurance and corporate governance remain the disciplines and internal controls required by various certification organisations associated with the industry. The framework rather facilitates all-inclusive reliability and sustainability through a harmonious relationship between quality assurance and corporate governance.

Future research opportunities also exist to examine the relationship between organisational control systems and organisational resilience perpetually within a specific organisation. The statistically strong positive linear relationship between organisational control systems and organisational resilience provides insight and recommendations on adaptability in support of ongoing sustainability and growth of organisations within the South African aviation industry. The insight provided suggests integrating organisational control systems such as quality assurance and corporate governance to stimulate the embedded resilience of an organisation.

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Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

E.S. designed the project, developed the theory, the data collection instrument and performed data collection and analysis under the academic supervision of K.K.G. All authors discussed the results and contributed to the final manuscript.

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Data availability

This study generated its raw data. Derived data supporting the findings of this study are available from the corresponding author, K.K.G., upon reasonable request.

Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors.

References

Agresti, A. & Finlay, B., 2009, *Statistical methods for the Social Sciences*, 2nd edn., Pearson Prentice Hall, Upper Saddle River, NJ.

Alexandra, E., Limnios, M. & Schilizzi, S.G.M., 2014, 'The resilience architecture framework: Four organizational archetypes', *European Management Journal* 32(1), 104–116. https://doi.org/10.1016/j.emj.2012.11.007

Alvi, M., 2016, 'A manual for selecting sampling techniques in research', *Munich Personal RePEc Archive,* pp. 1–57, viewed 10 August 2018, from https://mpra.ub.uni-uenchen.de/70218/.

Amankwah-Amoah, J., 2018, 'Why are so many African companies uncompetitive on the global stage? Insights from the airline industry', in *Africa's competitiveness in the global economy,* pp. 195–216, viewed 17 October 2018, from https://link.springer.com/chapter/10.1007/978-3-319-67014-0_8.

Amir, S. & Kant, V., 2018, 'Socio-technical resilience: A preliminary concept', *Risk Analysis* 38(1), 8–16. https://doi.org/10.1111/risa.12816

Beckett, C., Eriksson, E., Johansson, E. & Wikström, C., 2014, *Multivariate data analysis (MVDA),* 7th edn., Pearson Education Limited, Essex.

Bolarinwa, O.A., 2016, 'Principles and methods of validity and reliability testing of questionnaires used in social and health science researches', *Nigerian Postgraduate Medical Journal* 22(4), 195–201. https://doi.org/10.4103/1117-1936.173959

Bonett, D.G. & Wright, T.A., 2015, 'Cronbach's alpha reliability: Interval estimation, hypothesis testing, and sample size planning', *Journal of Organizational Behavior* 36(1), 3–15. https://doi.org/10.1002/job.1960

Boone, H.A. & Boone, D.A., 2012, 'Analyzing Likert data', *Journal of Extension* 50(2), 1–5, viewed 03 January 2019, from https://www.researchgate.net/profile/Mahdi_Safarpour/post/what_is_a_logistic_regression_analysis/attachment/59d622fb79197b8077981513/AS:304626539139073@1449640034657/download/Likert+Scale+vs+Likert+Item+%28Good+Source%29.pdf.

Braes, B. & Brooks, D., 2010, 'Organisational resilience: A propositional study to understand and identify the essential concepts', *Proceedings of the 3rd Australian Security and Intelligence Conference*, 30 November 2010, Perth, Edith Cowan University, pp. 14–22. https://doi.org/10.4225/75/579ec432099ca

Brough, P., 2019, *Advanced research methods for applied psychology – Design, analysis and reporting*, Routledge, Oxon. https://doi.org/10.4324/9781315517971

Burnard, K., Bhamra, R. & Tsinopoulos, C., 2018, 'Building organizational resilience: Four configurations', *IEEE Transactions on Engineering Management* 65(3), 351–362. https://doi.org/10.1063/1.2756072

Chialastri, A. & Pozzi, S., 2008, 'Resilience in the aviation system', in *International conference on computer safety, reliability*, September 22–28, 2008, pp. 86–98, Springer, Newcastle Upon Tyne. https://doi.org/10.1007/978-3-540-87698-4_10

Coenders, M. & Saez, M., 2000, 'Collinearity, heteroscedasticity and outlier diagnostics in regression: Do they always offer what they claim?', in A. Ferligoj & A. Mrvar (eds.), *New approaches in applied statistics,* pp. 79–84, FDV Publishing House, (FDV), Ljubljana.

Cohen, J., 1988, 'Set correlation and contingency tables', *Applied Psychological Measurement* 12(2), 425–434. https://doi.org/10.1177/014662168801200410

Creswell, J.W., 2014, *Research design – Quantitative, qualitative and mixed method approaches*, 4th edn., Sage, Los Angeles, CA.

Department of Transport, 2017, *White Paper on National Civil Aviation Policy*, Government Gazette No. 40847, The Government Printing Works, Pretoria, viewed 18 June 2018, from http://www.transport.gov.za/documents/11623/51141/GOVERNMENT_GAZETTE_NCAP_December2017.pdf.

Dutta, S., Lanvin, B. & Wunsch-Vincent, S., 2017, *The Global Innovation Index 2017 – Innovation feeding the world*, World Intellectual Property Organization (WIPO), Geneva, viewed 26 March 2018, from https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2017.pdf.

Edgeman, R., 2015, 'Strategic resistance for sustaining enterprise relevance', *International Journal of Productivity and Performance Management* 64(3), 318–333. https://doi.org/10.1108/09564230910978511

eNCA, 2019, *Commercial aviation grows*, viewed 19 December 2019, from https://www.youtube.com/watch?v=OLBwOnnazZs&feature=youtu.be.

Govuzela, S. & Mafini, C., 2019, 'Organisational agility, business best practices and the performance of small to medium enterprises in South Africa', *South African Journal of Business Management* 50(1), 1–13. https://doi.org/10.4102/sajbm.v50i1.1417

Greener, S., 2008, *Business research methods*, Ventus Publishing Aps, Frederiksberg.

Grundgeiger, T., Sanderson, P.M. & Dismukes, R.K., 2014, 'Prospective memory in complex socio-technical systems', *Journal of Psychology* 222(2), 100–109. https://doi.org/10.1027/2151-2604/a000171

Hahn, J., 2015, 'Structure of a dissertation for participatory phenomenology design', in K. Strang (ed.), *The Palgrave handbook for research design in business and management,* pp. 513–526, Palgrave McMillan, New York, NY.

Hamel, G. & Välikangas, L., 2003, 'The quest for resilience', *Harvard Business Review* 81(9), 52–63, viewed 02 January 2019, from http://www.worldcat.org/oclc/112271876.

Harpe, S.E., 2015, 'How to analyse Likert and other rating scales', *Currents in Pharmacy Teaching and Learning* 7(6), 836–850. https://doi.org/10.1016/j.cptl.2015.08.001

Harris, D. & Stanton, N., 2010, 'Aviation as a system of systems: Preface to the special issue of human factors in aviation', *Ergonomics* 53(2), 1–5. https://doi.org/10.1080/00140130903521587

Harris, R., 2017, 'Corporate governance law reform in South Africa', Masters dissertation, University of Pretoria, Pretoria, viewed 07 April 2018, from https://repository.up.ac.za/bitstream/handle/2263/60052/Harris_Corporate_2017.pdf?sequence=1.

Hickford, A.J., Blainey, S.P., Hortelano, A.O. & Pant, R., 2018, 'Resilience engineering: Theory and practice in interdependent infrastructure systems', *Environment Systems and Decisions* 38(3), 278–291. https://doi.org/10.1007/s10669-018-9707-4

Institute of Directors Southern Africa, 2016, *King IV,* Institute of Directors Southern Africa, Johannesburg, viewed 28 April 2017, from https://cdn.ymaws.com/www.iodsa.co.za/resource/collection/684B68A7-B768-465C-8214-E3A007F15A5A/IoDSA_King_IV_Report_-_WebVersion.pdf.

International Organization for Standardization, 2015, *ISO 9001:2015 – Quality management system requirements,* International Organization for Standardisation, Geneva.

Jafari, M.J., Nodoushan, R.J., Shirali, G.A., Khodakarim, S. & Zare, H.K., 2018, 'Indicators of organizational resilience in critical socio-technical systems: A qualitative study for the refinery complex', *Health Scope* 7(3), 1–5. https://doi.org/10.5812/jhealthscope.14134

Jogulu, U.D. & Pansiri, J., 2011, 'Mixed methods: A research design for management doctoral dissertations', *Management Research Review* 34(6), 687–701. https://doi.org/10.1108/01409171111136211

Joshi, A., Kale, S., Chandel, S. & Pal, D.K., 2015, 'Likert scale: Explored and explained', *British Journal of Applied Science & Technology* 7(4), 396–403. https://doi.org/10.9734/BJAST/2015/14975

Junyong, I., 2017, 'Introduction of a pilot study', *Korean Journal of Anaesthesiology* 70(6), 601–605. https://doi.org/10.4097/kjae.2017.70.6.601

Kothari, C.R., 2004, *Research methodology – Methods and techniques,* 2nd edn., New Age Publisher, New Delhi.

Khoza, P., 2016, *The true state of the South African aviation industry,* viewed 10 February 2018, from http://www.caa.co.za/Media%20Statements/2016/The%20true%20state%20of%20aviation%20in%20South%20Africa.pdf.

Lane, M.D., 2017, *Introduction to statistics*, Rice University, Houston, TX. httsp://doi.org/10.1016/b978-0-12-370483-2.00006-0

Lazur, B., Jagadeesh, L., Karthikeyan, B. & Shanmugaraja, M., 2014, 'An approach to improve aviation quality management using total quality management principles', in R.P. Bajpai, U. Chandrasekhar & A.R. Arankalle (eds.), *Innovative design, analysis and development practices in aerospace and automotive engineering*, pp. 69–78, Springer, New Delhi.

Lee, A.V., Vargo, J. & Seville, E., 2013, 'Developing a tool to measure and compare organizations' resilience', *Natural Hazards Review* 14(1), 29–41. https://doi.org/10.1061/(ASCE)NH.1527-6996.0000075

Mabotja, M.J., Mampana, N.J., Tavengwa, B., Walters, J., Mears, M.A. & Swanepoel, E., 2019, 'An analysis of the demand for business aircraft among the corporate sector in South Africa', *Journal of Transport and Supply Chain Management* 13, 8–16. https://doi.org/10.4102/jtscm.v13i0.441

Marx, B. & Mohammadali-Haji, A., 2014, 'Emerging trends in reporting: An analysis of integrated reporting practices by South African top 40 listed companies', *Journal of Economic and Financial Sciences* 7(1), 231–250. https://doi.org/10.4102/jef.v7i1.138

Maurice, L.Q. & Burleson, C.E., 2012, 'Aviation Policy and Governance', in O. Inderwildi & D. King (eds.), *Energy, Transport, & the Environment: Addressing the Sustainable Mobility Paradigm*, pp. 348–400, Springer, London. https://doi.org/10.1007/978-1-4471-2717-8

Martínez-Mesa, J., González-Chica, D., Bastos, J.L., Bonamigo, R.R. & Duquia, R.P., 2014, 'Sample size: how many participants do I need in my research?', *Anais brasileiros de dermatologia* 89(4), 609–615. https://doi.org/10.1590/abd1806-4841.20143705

Mhlanga, O., 2018, 'Impacts of the macro environment on airline performances in southern Africa: Management perspectives', *Tourism and Hospitality Research* 18(2), 1–13. https://doi.org/10.1177/1467358418771442

Mhlanga, O. & Steyn, J., 2016, 'The aviation industry in South Africa: A historical overview', *African Journal of Hospitality, Tourism and Leisure* 5(4), 1–13, viewed 06 June 2018, from http://www.ajhtl.com/uploads/7/1/6/3/7163688/article_24_vol_5__4_.pdf.

Njoya, E.T., 2013, 'Air transport and destination performance – A case study of three African countries (Ethiopia, Kenya and South Africa)', *Aviation Research Workshop* 14(1), 1–15, viewed 15 April 2018, from http://mpra.ub.uni-muenchen.de/48017/.

Njoya, E.T., 2016, 'Africa's single aviation market: The progress so far', *Journal of Transport Geography* 50(1), 4–11. https://doi.org/10.1016/j.jtrangeo.2015.05.009

Patriarca, R., Di Gravio, G. & Constantino, F., 2016, 'Resilience engineering to assess risks for the air traffic management system: A new systemic method', *International Journal of Reliability and Safety* 10(4), 323–345. https://doi.org/10.1504/IJRS.2016.10005344

Rahi, S., 2017, 'Research design and methods: A systematic review of research paradigms, sampling issues and instruments development', *International Journal of Economics & Management Sciences* 6(2), 1–5. https://doi.org/10.4172/2162-6359.1000403

Saunders, M.N., Lewis, P. & Thornhill, A., 2009, *Research methods for business students*, 5th edn., Pearson, New York, NY.

Serfontein, E. & Govender, K., 2020, 'Embedded resilience properties identified in quality assurance and corporate governance in the South African Aviation Industry', *African Journal of Hospitality, Tourism and Leisure* 9(2), 86–100. https://doi.org/10.46222/ajhtl.19770720-6

Taherdoost, H., 2016, 'Validity and reliability of the research instrument: How to test the validation of a questionnaire/survey in research', *International Journal of Academic Research in Management* 5(3), 29–36. https://doi.org/10.2139/ssrn.3205040

Teixeira, E.D.O. & Werther, W.B., 2013, 'Resilience: Continuous renewal of competitive advantages', *Business Horizons* 56(3), 333–342. https://doi.org/10.1016/j.bushor.2013.01.009

Tjørhom, B.B., 2010, 'Risk governance within aviation', *Risk Management* 12(4), 256–284. https://doi.org/10.1057/rm.2010.5

Wensveen, J.G., 2018, *Air transportation – A management perspective*, 7th edn., Routledge, New York, NY.

Willits, F. & Theodori, G., 2016, 'Another look at Likert scales', *Journal of Rural Social Sciences* 31, 126–139, viewed 26 March 2019, from https://egrove.olemiss.edu/jrss/vol31/iss3/6/.

Wynbrandt, J., 2017, 'Charter market report 2017 – The industry is climbing', *Aviation News International,* viewed 01 August 2018, from https://www.ainonline.com/sites/default/files/pdf/ain_chartermarket_oct_2017_0.pdf.

Yin, R.K., 2018, *Case study research and applications – Design and methods*, 6th edn., Sage, Los Angeles, CA.

Zaid, M.A., 2015, *Correlation and regression analysis,* The Statistical, Economic and Social Research and Training Centre for Islamic Countries (SESRIC), Ankara. https://doi.org/10.4324/9780203856123-19