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The impact of intellectual capital on firms' financial performance and market value: Empirical evidence from Italian listed firms

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The purpose of this paper is to extend the understanding of Intellectual Capital (IC) in the context of Italian listed firms. In this study, the Valued Added Intellectual Coefficient (VAIC) is employed as a measure of IC to investigate the relationship between IC, firms' financial performance and market value. The empirical investigation is developed by using data drawn from a sample of 135 Italian listed companies for the period from 2008 to 2017 and performing different Ordinary Least Squares (OLS) regression models. The findings suggest that, when taken in its aggregated form, IC exerts a positive impact on firms' financial performance measured as firms' profitability and growth in revenues as well as on market value. However, when considering its components, only Human Capital efficiency shows a positive effect on firms' financial performance while Structural Capital efficiency and Capital Employed efficiency exhibit a negative effect. Astonishingly, each of the individual IC components negatively influences firms' market value.

Key words: Intellectual capital, intangible assets, valued added intellectual coefficient (VAIC), Italian listed firms, market value, financial performance.

INTRODUCTION

In last decades, the development of new technologies and scientific innovations coupled with the rise of globalization and the changes in consumer purchasing processes has driven the transition from the old industrial economy to the new knowledge-based economy in which intangible assets have gradually replaced physical assets in firms' management and productive systems (Lev et al., 2005; Ahangar, 2011; Zou and Huan, 2011).

In this scenario, the importance of Intellectual Capital (IC) as a knowledge-based capital composed of a set of intangible resources mainly related to the employee

know-how and skills, competencies, information systems, databases, patents, brands and customer relationships, emerged (Ahangar, 2011; Ahmadi et al., 2012). Indeed, within this new economic context, IC resources are considered as fundamental drivers for firms' value creation process and key determinants of corporate sustainable competitive advantage, growth opportunities and market value (Ahmadi et al., 2012; Bhasin, 2012; Pentilde et al., 2012; Sardo and Serrasqueiro, 2018).

Scholars recognise that the term "intangible assets" and "intellectual capital" can be considered as

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synonymous (Bhasin, 2012; Pentilde et al., 2012; Goebel, 2015). However, Pentilde et al. (2012) clarify that, while the term intangible assets are generally employed in the field of accounting, the concept of IC is more frequently used in the human resources research field.

By considering its relevance, the correct identification, management, and measurement of IC have become essential to improve the strategy planning, formulation and assessment as well as the usefulness of information provided to investors (Bhasin, 2012; Pentilde et al., 2012; Dumay, 2016; Sardo and Serrasqueiro, 2018). Nevertheless, due to the overly-conservative approach of standard setters, traditional accounting reports fail in providing adequate representation of intangible assets on the balance sheet, thereby giving rise to an absence of the necessary data (Bhasin, 2012; Lev et al., 2005; Sardo and Serrasqueiro, 2018). As a response, in recent years, practitioners and scholars have started to develop several models to visualise, measure and manage IC (Meditinos et al., 2011; Sardo and Serrasqueiro, 2018).

Correspondingly, the Valued Added Intellectual Coefficient (VAIC) is one of the most popular employed models in the IC research field due to the objectivity and reliability of the data on which it is based and its ease of use (Chen et al., 2005; Dženopoljac et al., 2016; Smriti and Das, 2018). VAIC is not intended to provide a direct measure of IC, instead it has been developed to measure the efficiency of both tangible (capital employed) and intangible (human and structural capital) assets in the creation of firms' value added (Chen et al., 2005; Maditinos et al., 2011). Moreover, it has been widely used to investigate the relationship between IC, firms' performance and market value (Ahangar, 2011; Chen et al., 2005; Rehman et al., 2011; Smriti and Das, 2018).

Accordingly, the VAIC constitutes the basis of empirical analysis of the present work. This study embraces the lens of the resource-based view (RBV) theory of the firm which considers the IC resources such as skills, capabilities, know-how and experiences as firms' strategic assets capable to ensure a sustainable competitive advantage and superior financial performance through appropriate management and development processes (Gan and Saleh, 2008; Ahangar, 2011; Smriti and Das, 2018). Based on RBV theory, previous scholars have empirically investigated the relationship between IC measured as VAIC, firms' performance and market value in different geographical and political contexts (Chen et al., 2005; Ahangar, 2011; Rehman et al., 2011; Maditinos et al., 2011; Dženopoljac et al., 2016; Sardo and Serrasqueiro, 2018; Smriti and Das, 2018). However, the mixed results obtained in previous studies, constitute the primary motivation of the present research which aims at contributing to the current literature by extending the understanding of IC in the context of Italian listed firms.

More specifically, the present study applies the VAIC model to conduct a longitudinal study on the relationship between IC, firms' financial performance and market

value. The methodology for the measurement of IC is based on well-established previous research (Ahangar, 2011; Rehman et al., 2011; Dženopoljac et al., 2016; Cenciarelli et al., 2018; Sardo and Serrasqueiro, 2018; Smriti and Das, 2018). The empirical investigation is performed using data drawn from a sample of 135 Italian listed companies for the period between 2008 and 2017. The statistical analysis is based on different OLS regression models with control for year and industry sectors.

This paper contributes to the literature as follows: firstly, it extends the efforts made by previous scholars to develop an adequate IC measurement model by empirically testing the VAIC in the context of Italian listed firms.

Secondly, in the light of the RBV theory, it investigates the relationship between IC, its components, firm' financial performance and market value providing empirical evidence supporting the role of IC as a generator of higher performance concerning profitability, growth in revenues and market value.

The remainder of this paper is structured as follows: the literature review which is related to IC definition and previous research on VAIC. Then, the hypothesis development is presented. Subsequently describe both the sample selection and research method. The last two sections the main discussion of analysis along with the conclusion.

LITERATURE REVIEW

IC definition and its components

Brooking (1996: 12) defined IC as "the combined intangible assets of the market, intellectual property, human-centred and infrastructure which enable the company to function". According to Edvinsson and Malone (1997: 44), IC refers to "the possession of knowledge, applied experience, organizational technology, customer relationships and professional skills that provide the firm with a competitive edge in the market". Further, Maditinos et al. (2011: 134) argue that IC can be traced back to those "hidden assets" which although not recognised in financial statements leads organisations to obtain a competitive advantage.

According to the majority of IC scholars, it can be decomposed into three main categories: human capital, structural capital, and relational capital (Sardo and Serrasqueiro, 2018; Smriti and Das, 2018).

Human capital refers to the sum of skills, competencies, capabilities, creativity, know-how and experiences developed by employees and that they take with them when they leave the company. Structural capital delineates the basic structure of a company which supports employees in achieving performance and managers in maintaining profitable relationships with key

external stakeholders. It encompasses strategic resources such as culture, routines, databases, processes, patents, copyrights and trademarks, representing the knowledge which remains within the company at the end of the working day. Relational capital includes all the assets and resources involved in developing and managing of relationships among the organization and the external entities, including formal business collaborations and all other informal relationships with stakeholders such as customers, suppliers, banks, and non-profit organizations (Ahmadi et al., 2012; Sardo and Serrasqueiro, 2018; Smriti and Das, 2018).

Most of IC scholars converge on the concept of IC as an invisible source of competitive advantage and superior financial and market performance (Chen et al., 2005; Maditinos et al., 2011; Dženopoljac et al., 2016; Zhang, 2017).

The relevance of IC in the firms' value creation process can be discussed within the RBV theory framework (Gan and Saleh, 2008; Ahangar, 2011; Smriti and Das, 2018). According to this theory, IC resources such as skills, competencies, know-how and experiences can be considered as strategic resources which, being rare, firm-specific and hard-to-imitate, constitute the main drivers of firms' competitive advantage and superior financial performance (Ahangar, 2011; Zéghal and Maaloul, 2010). As such, the efficient development, management and measurement of IC components within firms has gained momentum (Chen et al., 2005; Ahangar, 2011; Zéghal and Maaloul, 2010; Sardo and Serrasqueiro, 2018).

However, in spite of the importance of IC, its management is made difficult by the lack of suitable tools for its identification and measurement (Sardo and Serrasqueiro, 2018). Indeed, current financial reporting systems fail in providing an adequate representation of intangible assets due to the overly-conservative standpoint of standard setters which does not allow for the recognition of most of the IC components or provide a description that only partially reflects their real economic value (Lev et al., 2005; Maditinos et al., 2011; Sardo and Serrasqueiro, 2018). As a response, in recent years, practitioners and scholars have started to develop several models to measure and adequately manage IC and its components (Meditinos et al., 2011; Pentilde et al., 2012). One of the most general methods employed to measure IC is the VAIC developed by Ante Pulic (Pulic, 1998; Chen et al., 2005; Sardo and Serrasqueiro, 2018). It provides a measure of the efficiency of three corporate inputs, that are, Capital Employed, Human Capital and Structural Capital in the value creation process (Chen et al., 2005; Maditinos et al., 2011). A high VAIC value signals good exploitation of the firm's value creation potential through the use of Intellectual, Financial and Physical Capital (Meditinos et al., 2011).

VAIC can be included within the realm of IC measurement methods, not only because of its denomination (Intellectual coefficient) and in spite of its

apparent contradiction to consider Physical Capital and IC on the same footing. Indeed, since its introduction, it has been clear that the term physical was not conceived as a counterpart of intangible or immaterial but, instead, as a counterpart of the intellectual potential which was measured, in monetary terms, by employee's salaries (Pulic, 1998). In Pulic's original vision, intellectual ability indicated, in a knowledge-based economy, "how successfully value added was created (...) with a given amount of physical and IC" (Pulic, 1998: 8). In other words, value added is the result of the appropriate combination of (highly specialized) labor and capital, made possible by the right mix of monetary investments, usually reported in two separate parts of financial statements (capital, as net assets, on the balance sheet and labor, as labor expenses, on the income statement) (Pulic, 1998).

Prior research on VAIC

Several scholars have employed VAIC to analyse the impact of IC on the different facets of firms' performance such as profitability, productivity, market value and sales growth (Chen et al., 2005; Maditinos et al., 2011; Smriti and Das, 2018).

Firer and Williams (2003) investigated a sample of 75 South African public traded companies by analysing the relationship between IC, firms' profitability, productivity and market valuation. They found only limited and mixed results suggest that, in the South African context, physical capital assets constitute the predominant driver of the firm's financial performance and market value. Chen et al. (2005) examined a sample of firms listed on the Taiwan Stock Exchange by assessing the relationship between VAIC, firms' market value and current and future financial firm performance. They found that VAIC and all of its components positively influence firms' market value. Moreover, they found that VAIC and two of its components (Capital Employed and Human Capital Efficiency) positively affect all the dimensions of financial performance (Return On Equity [ROE], Return On Asset [ROA], growth in revenues and employee productivity). Gan and Saleh (2008) conducted a study on a sample of technology-intensive companies listed on the Malaysia stock exchange by exploring the relationship between VAIC, market valuation, profitability, and productivity. Their results evidenced a positive and significant relationship between VAIC, two of its components (CEE and HCE) and both firms' profitability and productivity. However, no significant relationship between VAIC, its components and firms' market value occurred. Zéghal and Maaloul (2010) analysed a sample of 300 UK listed companies to examine the effect of IC, measured as VAIC, on firms' economic, financial and stock market performance. They observed that IC positively influences both economic and financial performance in all the

selected industry sectors, while positively affect market value only in the context of High-Tech industry. Ahangar (2011) investigated a sample of Iranian companies to assess the relationship between VAIC components and firms' profitability, employee productivity and growth in revenues. He found that HCE positively affects profitability, employee productivity and growth in revenues, while CEE exerts a negative influence on employee productivity and growth in revenues. Maditinos et al. (2011) examined the influence of VAIC on firms' market value and three dimensions of financial performance (ROA, ROE and growth in revenues) on a sample of 96 Greek listed companies. Their results failed in providing any significant relationship between the aggregate measure of VAIC, firms' market value and financial performance, showing that only human capital efficiency positively influences both market value and financial performance proxied as ROE. Rehman et al. (2011) investigated a sample of companies belonging to the Modaraba sector of Pakistan by assessing the association between VAIC, its components and firms' financial performance. They found that both VAIC and all of its components positively affect firms' financial performance. Dženopoljac et al. (2016) conducted a longitudinal study on a sample of 2.137 Serbian companies belonging to the ICT industry sector. They analysed the relationship between VAIC, its components and firms' financial performance measured as ROA, ROE, Return On Invested Capital [ROIC], profitability and Asset Turnover [ATO]). They found that CEE positively affects ROA, ROE and ATO while negatively influences firms' profitability.

As regards the other components, only HCE showed a positive and significant relationship with ROIC. Cenciarelli et al. (2018) adopted VAIC to examine the role of IC in predicting firms' bankruptcy by investigating a sample of US public companies for thirty years. Their results evidenced that firms with higher IC performance show a significantly lower probability of going bankrupt. Sardo and Serrasqueiro (2018) investigated the relationship between IC measured as VAIC, growth opportunities and financial performance on a sample of 2,044 non-financial listed firms coming from 14 European countries. Their results suggested that IC improves firms' financial performance measured as ROA in high-tech, medium-tech and low-tech firms and that growth opportunities positively influence firms' financial performance through the efficient use of IC. Finally, Smriti and Das (2018) explored a sample of 710 Indian publicly listed firms for the period 2001 to 2016 to evaluate the relationship between VAIC, its components and four dimensions of firms' performance: profitability, productivity, sales growth and market value. Results showed a deep impact of VAIC on all firms' performance dimensions, except HCE which positively influence only firms' productivity.

Therefore, considering previous studies, the relationship between IC, firms' performance and market value

deserve particular attention due to its relevance for managers, investors and practitioners (Ahangar, 2011).

The widespread acceptance of IC as a source of competitive advantage and driver of superior financial and market performance and the mixed results obtained in previous research, motivates this study which intends to empirically validate the VAIC as an IC measurement model in the context of Italian listed firms and, in the light of the RBV theory, provides evidence supporting the role of IC in driving firms' financial performance and market value.

Hence, the present study employs the VAIC method (Pulic, 2000; Ahangar, 2011; Rehman et al., 2011; Dzenopoljac et al., 2016; Cenciarelli et al., 2018; Sardo and Serrasqueiro, 2018; Smriti and Das, 2018) to extend the understanding of IC potentialities in the context of Italian listed firms. In doing so, a longitudinal study for the period 2008 to 2017 based on different OLS regression models are developed to investigate, firstly the relationship between IC, its components and firms' financial performance and secondly between IC, its components and firms' market value.

HYPOTHESIS DEVELOPMENT

According to Firer and Williams (2003), "corporate performance is a function of the effective and efficient use of the respective tangible and intangible assets of the firm". However, consistent with the RBV theory, while tangible assets are easily replicable and available on the market, intangible assets such as skills, experiences, competencies and knowledge assets are rare and difficult to imitate being internally generated (Ahangar, 2011; Ahmadi et al., 2012; Zhang, 2017; Smriti and Das, 2018). As a consequence, IC resources constitute vital and strategic elements whose proper management and development led to a sustainable competitive advantage and superior financial performance (Ahangar, 2011; Zéghal and Maaloul, 2010). As argued by Rahman and Ahmed (2012), the knowledge elements represent the most valuable assets of a company also considered responsible for increasing returns. Therefore, in addition to encouraging corporate performance, IC plays a pivotal role also in driving firms' market value (Chen et al., 2005; Gan and Saleh, 2008; Maditinos et al., 2011). Aware of IC potential, in the presence of an efficient market, investors will attribute a higher value for firms which own a greater amount of IC (Chen et al., 2005; Gan and Saleh, 2008). However, traditional financial reports based on historical figures, do not adequately reflect the value of IC components, causing a gap between market value and book value (Gan and Saleh, 2008; Maditinos et al., 2011). This gap could be reduced by developing a correct and adequate IC measurement which allow companies both to improve their internal strategic management and provide reliable information on IC to investors, fostering

Table 1. Industry sectors

Sector	Description	Frequency	%
1	Mines and manufacturers and building	85	62.96
2	Public services	11	8.15
3	Consumer goods, trade and services	19	14.07
4	Communication and IT	20	14.81
	Total of the full sample firms	135	100.00

positive effects on financial and market values (Zou and Huan, 2011; Ahmadi et al., 2012). Moreover, according to Sardo and Serrasqueiro (2018), IC also exerts a positive influence on firms' growth opportunities due to the tremendous innovative potential of some components such as Research and Development (R&D) activities whose investments positively affect earnings dynamics.

Hence, according to RB theory and previous studies, this research predicts a positive relationship between IC measured as VAIC, firms' financial performance measured as ROA and growth in revenues and market value expressed by Market to Book (MtB) Ratio by posing the following hypothesis:

H1a: IC positively affects firms' financial performance as ROA;

H1b: IC positively affects firms' financial performance as Growth in revenues;

H1c: IC positively affects firms' market value as MtB.

Moreover, this study also estimates the relationship between the different VAIC components (HCE; SCE and CEE), firms' financial performance and market value by setting out the following hypothesis:

H2a: IC components (HCE, SCE and CEE) positively affect firms' financial performance as ROA;

H2b: IC components (HCE, SCE and CEE) positively affect firms' financial performance as growth in revenues;

H2c: IC components (HCE, SCE and CEE) positively affect firms' market value as MtB.

MATERIALS AND METHODS

Sample and data selection

The sample includes 135 Italian companies listed on the Milan Stock Exchange. The selected data cover the period from 2008 to 2017.

The dataset was extracted from the Datastream database by Thomson Reuters which provides current, historical economic and financial data for all listed firms in the world's major stock exchanges.

The population of Italian listed firms included in the Datastream database in December 2018 consisted of 305 companies. The research sample has a balanced panel structure. Hence, companies incorporated after the 2008 (58 firms) have been excluded as well as firms that were delisted due to mergers,

acquisition, or bankruptcy (41 firms). Also, firms with missing financial data and Italian firms listed on different stock exchanges (71 firms) were excluded.

Finally, a sample of 135 Italian listed firms with complete and valid data for reliable statistical analysis has been obtained (from Datastream Database) for a total of 1,350 firm-year observations. Table 1 shows details regarding the industry sectors to which the companies belong to.

According to the previous literature (Chen et al., 2005), firms have been classified employing the Economic Sector Name provided by the Thomson Reuters Business Classification. However, to ensure that each cluster (or industry sector) contains a significant number of firms (at least 10 for each year), some industry sectors have been merged. For example, only three firms belong to the mines sector. These firms were included in the first cluster named Mines, manufacturers and buildings because of the specificity of these firms employing a high ratio of tangible assets, as manufacturers and buildings firms. In doing so, four different industry sector clusters have been obtained: Mines, manufacturers and building (Cluster 1); Public Services (Cluster 2); Consumer goods, trade and services trade (Cluster 3); and Communication and IT firms (Cluster 4).

At the end, 85 companies (62.96%) belong to the Mines and manufacturers and building sector; 11 companies (8.15%) pertain to the public services sector; 19 companies (14.07%) belong to the consumer goods, trade and services industry sectors; and 20 companies (14.81%) are included in the communication and IT industry sector.

Variable definition and measurement

The analysis investigates the relationship between IC, firms' financial performance and market value.

Financial performance and Market Value constitute the dependent variables, IC the independent variable. Firms' performance is measured by using two variables. The first is ROA, which is measured as the ratio of net income to book value of total assets (Ahangar, 2011; Chen et al., 2005; Gan and Saleh, 2008; Maditinos et al., 2011; Zhang, 2017; Smriti and Das, 2018). The second is growth in revenues, which measures the changes in firms' revenues from the previous year (Ahangar, 2011; Chen et al., 2005; Smriti and Das, 2018). The increases in the revenues signal firms' opportunities for growth (Chen et al., 2005; Smriti and das, 2018). Firms' market value is measured by employing the Market-to-Book ratio (MtB) calculated by dividing the market value (MV) with the book value (BV) of common stocks (Chen et al., 2005; Maditinos et al., 2011). It is computed regarding the mean of the opening and closing year values of the MtB to smooth some of the volatility in this ratio in a given year (Forte et al., 2017).

The IC is proxied by the VAIC (Chen et al., 2005; Ahangar, 2011; Maditinos et al., 2011; Dženopoljac et al., 2016; Smriti and Das, 2018).

The calculation of the VAIC requires different steps (Dženopoljac

et al., 2016; Cenciarelli et al., 2018; Smriti and Das, 2018). The starting point is the computation of Value Added (VA) which is the sum of operating profit (OP), employee costs (EC), depreciation expenses (DP) and amortisation expenses (AM):

$$VA = OP + EC + DP + AM$$

The second step involves the estimation of IC efficiency (ICE) determined as the sum of Human Capital Efficiency (HCE) and Structural Capital Efficiency (SCE).

$$ICE = HCE + SCE$$

HCE is represented by the ratio between VA and HC:

$$HCE = VA/HC$$

HC refers to annual employees' wages and salaries which in this model are considered as an investment and not as expenses (Zéghal and Maaloul, 2010). HC variable expresses the ability of a company to create value by investing in its human resources (Zéghal and Maaloul, 2010; Cenciarelli et al., 2018).

SCE is determined by the ratio between Structural Capital (calculated by subtracting HC from VA) and VA:

$$SCE = SC/VA$$

SCE measures the capacity of a firm to create value by developing its structure encompassing culture, routines, databases, processes, patents, copyrights and trademarks (Cenciarelli et al., 2018). It corresponds to the portion of value added that remains in the firm (retained earnings employed for new investments), after the subtraction of the portion that is distributed to lenders and shareholders (as respectively, interests and dividends).

The final indicator is the Capital employed efficiency (CEE), computed as the ratio between VA and net assets:

$$CEE = VA/CE$$

CEE gauges the efficiency of both physical and financial capital in the value creation process (Zéghal and Maaloul, 2010; Cenciarelli et al., 2018).

Finally, the overall measure of VAIC is obtained by summing the IC efficiency (ICE) and the physical and financial capital efficiency (CEE):

$$ROA_{i,t} = \alpha_{i,t} + \beta_1 VAIC_{i,t} + \beta_2 HCE_{i,t} + \beta_3 SCE_{i,t} + \beta_4 CEE_{i,t} + \beta_5 LEV_{i,t} + \beta_6 SIZE_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$GROWTH_{i,t} = \alpha_{i,t} + \beta_1 VAIC_{i,t} + \beta_2 HCE_{i,t} + \beta_3 SCE_{i,t} + \beta_4 CEE_{i,t} + \beta_5 LEV_{i,t} + \beta_6 SIZE_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$MtB_{i,t} = \alpha_{i,t} + \beta_1 VAIC_{i,t} + \beta_2 HCE_{i,t} + \beta_3 SCE_{i,t} + \beta_4 CEE_{i,t} + \beta_5 LEV_{i,t} + \beta_6 SIZE_{i,t} + \varepsilon_{i,t} \quad (3)$$

Table 2 shows the variables definition and their measurement along with the models developed and the hypotheses stated.

RESULTS AND DISCUSSION

Descriptive statistics

Table 3 shows the descriptive statistics for all the dependent and independent variables. Moreover, Tables

$$VAIC = ICE + CEE$$

or, that is the same,

$$VAIC = HCE + SCE + CEE$$

Despite scholars evidenced some drawbacks of VAIC mainly related to the Human Capital calculation involving the treatment of employees' costs as an investment and the Structural Capital computation which can be fundamentally associated to the accounting measure of operating margin (Dženopoljac et al., 2016; Smriti and Das, 2018), several advantages arise from VAIC employment.

Firstly, VAIC model is based on a simple calculation. Secondly, VAIC measure and its components are based on data which, coming from financial statements, are reliable and audited. Thirdly, being based on ratios, VAIC provides quantitative and standardized measures and allows for easy comparisons between firms (Firat and Williams, 2003; Ahangar, 2011; Maditinos et al., 2011; Dženopoljac et al., 2016; Sardo and Serrasqueiro, 2018).

Control variables

According to previous studies, financial leverage and firm size have been added as control variables which can influence firms' performance (Zéghal and Maaloul, 2010; Dženopoljac et al., 2016; Smriti and Das, 2018). Financial leverage is measured as the ratio of financial debts on total assets (Dženopoljac et al., 2016; Cenciarelli et al., 2018), while firm size is measured as the natural logarithm of total assets (Zéghal and Maaloul, 2010; Dženopoljac et al., 2016; Sardo and Serrasqueiro, 2018).

Regression models

To test our hypotheses, the following OLS regression models are estimated (Equations 1, 2, and 3). Each OLS regression model controls for the industry sectors and the years of the analysis. Equations 1 and 2 regress the IC measured as the VAIC with two indicators of financial performance ROA (profitability) and GROWTH (growth in revenues) while Equation 3 analyses the relationship between IC (VAIC) and firms' market value computed as MtB. In each model, two variables (leverage and size) are used as control variables.

4 and 5 show the average values of dependent and independent variables grouped by industry sectors (as classified in Table 1).

It is interesting to note that in our sample firms, 85 companies (62.96%) belong to the Mines, manufacturers and building sector. In these firms, the proportion of tangible assets is higher than intangible assets since they are mainly involved industrial activities (e.g. automotive, textiles, equipment, etc.); 11 companies (8.15%) belong

Table 2. Definition of variables, proxies, models and hypothesis.

Dependent variables	Variable description	Model	Hypothesis
$ROA_{i,t}$	Financial performance measured as firms' profitability proxied by Return on Assets - Operating income/total assets.	1	H1a-H2a
$GROWTH_{i,t}$	Financial performance measured as firms' growth in revenues proxied by the change in revenue from year t-1 to year t.	2	H1b-H2b
$MtB_{i,t}$	Firms' market value measured as the Market-to-Book ratio proxied by the market value divided by the book value of common stock (average value at the beginning and the ending of the year).	3	H1c-H2c

Test variables	Variable description	Model	Hypothesis	Expected sign
$VAIC_{i,t}$	Value Added Intellectual Capital proxied by the Pulic' model. estimated by summing the variables (HCE, SCE and CEE)	1	H1a	+
		2	H1b	+
		3	H1c	+
$HCE_{i,t}$	Human Capital Efficiency proxied by the Value Added (VA) scaled by the Employee costs.	1	H2a	+
		2	H2b	+
		3	H2c	+
$SCE_{i,t}$	Structural Capital Efficiency proxied by the difference between VA and HC scaled by the VA	1	H2a	+
		2	H2b	+
		3	H2c	+
$CEE_{i,t}$	Capital Employed Efficiency proxied by the ratio between VA and net assets of the year i	1	H2a	+
		2	H2b	+
		3	H2c	+

Control variables	Variable description	Model	Expected sign
$LEV_{i,t}$	Leverage ratio proxied by financial debts scaled total assets	1	+/-
		2	+/-
		3	+/-
$SIZE_{i,t}$	Firm size proxied by the natural logarithm of total assets	1	+/-
		2	+/-
		3	+/-

to the public services sector (electricity, energy, gas and petroleum). Most of these firms have institutional ownership; 19 companies (14.07%) belong to the consumer goods, trade and services

industry sectors (e.g. storage, wholesale and retail trade, food services, etc.). Finally, 20 companies (14.81%) are included in the communication and IT industry sectors. Some variables (ROA, VAIC

and MtB) are winsorized at 1% level to smooth the effect of some outlier values.

The ROA (winsorized at 1% level) for the full sample has a mean of 1.73%. Table 4 shows that,

Table 3. Descriptive statistics.

Variables	Mean	Median	Std. Err.	Minimum	Maximum	Std. Dev.	25%	75%
ROA	1.73	2.41	0.20	-30.30	21.15	7.33	0.00	4.98
MTB	1.64	1.12	0.05	-1.98	12.95	1.94	0.65	2.06
GROWTH	0.02	0.02	0.01	-0.61	0.96	0.21	-0.07	0.10
VAIC	2.72	2.36	0.06	-4.85	12.48	2.21	1.83	3.23
HCE	1.69	1.46	0.19	-252.00	15.06	7.10	1.17	2.07
SCE	0.39	0.33	0.08	-24.28	97.38	2.97	0.21	0.63
CEE	0.99	0.39	0.41	-41.53	545.56	15.20	0.21	0.63
LEV	29.64	28.79	0.50	0.00	190.76	18.41	16.88	40.43
SIZE	13.33	12.96	0.05	8.28	18.92	1.86	12.06	14.45

Note: This table reports the mean for the dependent and independent variables in equations 1, 2 and 3. Please see Table 2 for variable measurement details.

Table 4. Descriptive statistics for industry sectors (Independent variables).

Sector	Description	Frequency	ROA	GROWTH	MTB
1	Mines, manufacturers and building	850	2.42	0.017	1.62
2	Public services	110	2.49	0.052	1.09
3	Consumer goods, trade and services	190	0.64	0.044	2.25
4	Communication and IT	200	-0.59	0.004	1.45
Total		1,350	-	-	-

Note: This table reports the mean for the dependent variables in equations 1, 2 and 3, by industry sector. Please see Table 2 for variable measurement details.

on average, while public services firms (ROA = 2.49%) appear to be more profitable than other firms (ROA sector 1 = 2.42%; ROA sector 3 = 0.64%), the communication and IT firms show negative profitability (ROA = -0.59%). GROWTH (winsorized at the 1% level) has a mean of 0.02 for the full sample, meaning that, on average, the sales increase of 2% from year t-1 to year t. Table 4 also shows that, on average, public services firms (GROWTH ratio = 0.052%) register a higher growth in revenues than other firms (GROWTH ratio for sector 1 = 0.017%; GROWTH ratio for sector 3 = 0.044%) while communication and IT firms evidence the lower level (GROWTH ratio = 0.004%).

The dependent variable MTB (winsorized at the 1% level), has a mean value of 1.64 for the full sample, meanings that all sampled firms show a market value (the mean between the ending and the beginning MTB for each year) higher than the book value (the ratio, on average, is above 1). Moreover, on average, consumer goods, trade and services firms highlight the highest MTB ratio.

Overall, descriptive results highlight that public sectors firms (sector 2 in our analysis) show the higher performance (in term of ROA, GROWTH ratio and MtB) than other sample firms. This could be explained by the circumstance that public services firms operate in markets

with lower competition and invest less in tangible assets and more in intangible assets than firms working in the other industry sectors.

The variable VAIC for the full sample has a mean of 2.72. This finding indicates that all sampled firms produced an average value of 2.72 euros for each euro employed. Table 5 highlights that the public services sector shows the highest amount of VAIC. More specifically, these organizations are generally more effective in creating VA from their intellectual, physical and financial resources compared to the companies.

The variable HCE for the full sample has a mean of 1.69. The mean value above 1 indicates that the amount of VA is higher than the employee costs. Table 5 shows that, on average, the human resources in public services provide a substantial contribution to the VA creation process since the HCE mean value is higher than in other industry sectors. The variable SCE for the full sample has a mean of 0.39. Table 5 shows that firms belonging to the Mines, manufacturers and building and public services industry sectors have the same SCE mean value, while firms about the communication and IT sector present the highest SCE average value. The variable CEE for the full sample has a mean of 0.99. Since CEE is computed as the ratio between VA and net asset, an average value below 1, indicates a firm's value-added lower than the net

Table 5. Descriptive statistics for industry sectors (independent variables).

Variables	Mean for industry sector			
	1	2	3	4
VAIC	2.419	4.137	3.289	2.708
HCE	1.358	3.245	2.299	1.657
SCE	0.374	0.374	0.389	0.492
CEE	1.168	0.342	1.048	0.530
LEV	28.359	38.536	32.874	26.380
SIZE	13.289	14.910	13.166	12.816

Note: This table reports the mean for the independent variables in equations 1, 2 and 3 by industry sector. Please see Table 2 for variable measurement details

assets value. Table 5 shows that, on average, the efficiency of firms' physical and financial capital is higher for firms belonging to both the Mines, manufacturers and building and Consumer goods, trade and services industry sectors. This could be explained by the heavy weight of tangible and financial assets in these firms.

To sum up, descriptive results signal that sampled firms created more added value from HCE than from SCE and CEE.

The control variable LEV for the full sample has a mean of 29.64%, indicating, on average, that the financial debts are about 30% of the total assets. As shown in Table 5, on average, public services firms appear to be more indebted than other firms. Finally, the control variable SIZE for the full sample has a mean of 13.33. Table 5 indicates that, on average, public services organisations have the highest size value while communication and IT firms have the lowest.

Correlation analysis

Table 6 shows the results of the correlation analysis for all the variables. Both Pearson (coefficients below the diagonal) and Spearman (coefficients above the diagonal) correlation coefficients have been calculated. No correlation exceeds the threshold value of 0.8 so detecting any multicollinearity drawback (Smriti and Das, 2018).

As regards Pearson coefficients, ROA is positively correlated (at 1% level) with the dependent variables MTB and GROWTH as well as the independent variables VAIC, HCE and SIZE (at 1% level). GROWTH is positively correlated (at 1% level) with ROA and MTB as well as VAIC, HCE and SIZE (at 1% level). MTB shows only a positive correlation (at 1% level) with ROA.

Spearman coefficients evidence a positive correlation (significant at 1% level) between ROA, MTB and GROWTH. Moreover, a positive relationship (significant at 1% level) between ROA, VAIC, HCE, SCE, CEE and SIZE has been detected. In the end, a positive correlation (significant at 1% level) between GROWTH and VAIC,

HCE, SCE, CEE and SIZE has been evidenced. Unlike Pearson correlation, Spearman coefficients highlight several associations for the variable MtB (VAIC, HCE, SCE and CEE at 1% level).

Multiple regression analysis

Table 7 shows the results of the three linear regression models performed to test the relationship between IC (VAIC), firms' financial performance (ROA and GROWTH) and market value (MtB). The models control for years and industry sectors.

The F-tests ($\text{Prob} > F$) is significant at the 1% level for all the models. The adjusted R-square is 0.2781 for Model 1 (ROA as the dependent variable), 0.090 for Model 2 (GROWTH as the dependent variable) and 0.0742 for Model 3 (MtB ratio as the dependent variable). These values indicate that Model 1, Model 2 and Model 3 can explain about the 27.81%, the 9% and about the 7.42%, respectively, of the variance in the dependent variable for the whole sample. Consistent with Dzenopoljac et al. (2016), the first model, using the ROA as a dependent variable, has a higher explanatory power than the other models.

Further, to test for potential multicollinearity issues, Variance Inflation Factors (VIF), though not reported here, has been computed for all the variables, indicating that all the statistics are well below the threshold of 2 for each set of model variables.

Overall, results suggest that IC (proxied by the VAIC) taken in its aggregated form, positively affects firms' financial performance and market value. Indeed, the coefficient of VAIC is positive and significant (at 1% level) in all the performed models.

According to the RB theory, these findings support the pivotal role of IC in creating a competitive advantage and ensuring superior financial performance (Chen et al., 2005; Ahangar, 2011; Cenciarelli et al., 2018). Moreover, these results also indicate that IC contribute in enhancing firms' market value because investors attribute a higher value to those companies which invest in IC (Chen et al.,

Table 6. Correlation matrix

<i>Variables</i>	<i>ROA</i>	<i>MTB</i>	<i>GROWTH</i>	<i>VAIC</i>	<i>HCE</i>	<i>SCE</i>	<i>CEE</i>	<i>LEV</i>	<i>SIZE</i>
<i>ROA</i>	1	0.422**	0.354**	0.491**	0.539**	0.466**	0.164**	-0.235	0.199**
		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<i>MTB</i>	0.149**	1	0.191**	0.295**	0.193**	0.209**	0.315**	-0.045	0.043
	0.000		0.000	0.000	0.000	0.000	0.000	0.101	0.111
<i>GROWTH</i>	0.250**	0.048	1	0.236**	0.264**	0.200**	0.091**	-0.088	0.107**
	0.000	0.076	-	0.000	0.000	0.000	0.001	0.001	0.000
<i>VAIC</i>	0.333**	0.120**	0.113**	1	0.785**	0.667**	0.148**	0.062*	0.333**
	0.000	0.000	0.000	-	0.000	0.000	0.000	0.023	0.000
<i>HCE</i>	0.132**	-0.063	0.114**	0.259**	1	0.851**	-0.198	0.022	0.466**
	0.000	0.020	0.000	0.000	-	0.000	0.000	0.414	0.000
<i>SCE</i>	0.033	0.004	-0.046	0.320**	0.002	1	-0.326	0.030	0.369**
	0.231	0.879	0.091	0.000	0.929	-	0.000	0.271	0.000
<i>CEE</i>	0.036	-0.007	-0.015	0.178**	0.002	-0.005	1	-0.119	-0.204
	0.186	0.809	0.578	0.000	0.948	0.842		0.000	0.000
<i>LEV</i>	-0.305	-0.023	-0.093	0.116**	0.073**	0.090**	0.088**	1	0.160**
	0.000	0.388	0.001	0.000	0.008	0.001	0.001	-	0.000
<i>SIZE</i>	0.173**	-0.064	0.079**	0.303**	0.168**	0.012	-0.056	0.117**	1.000
	0.000	0.018	0.004	0.000	0.000	0.654	0.040	0.000	-

Notes: This table reports Pearson (Spearman) coefficients correlation for the model variables below (above) the diagonal. ** Correlation is significant at the 1% level (2-tailed) and * at the 5% level (2-tailed). Probabilities are shown in brackets. For detailed variable definitions please see Table 2.

2005; Gan and Saleh, 2008; Sardo and Serrasqueiro, 2018).

However, when the individual components of VAIC are examined, different findings are observed. More specifically, in Model 1, employing ROA as the dependent, consistent with expectations, the coefficient of VAIC is observed positive and significant at the 1% level. This finding provides the evidence that the IC value has a positive impact on firms' profitability thus suggesting that IC resources play a significant role in creating value for the stakeholders and shareholders (Zéghal and Maaloul, 2010). Thus, according to the RBV theory, efficiency in managing and utilizing IC resources lead to a better performance regarding profitability (Chen et al., 2005; Gan and Saleh, 2008). This result is also consistent with prior literature (Firer and Williams, 2003; Chen et al., 2005; Gan and Saleh, 2008; Zéghal and Maaloul, 2010; Rehman et al., 2011; Dženopoljac et al., 2016; Sardo and Serrasqueiro, 2018; Smriti and Das, 2018). Accordingly, hypothesis H1a is confirmed.

Model 1 also indicates an association between firms' profitability and some IC components. Consistent with expectations and previous studies (Chen et al., 2005; Gan and Saleh, 2008; Ahangar, 2011; Rehman et al., 2011), the coefficient of HCE is positive and significant at 5% level. This result highlights the efforts made by firms in stressing their human resources to improve their

profitability (Gan and Saleh, 2008). It also indicates that the skills, competencies, capability, creativity know-how and experiences developed by employees are one of the main drivers of firms' profitability (Smriti and Das, 2008). This is particularly true in the public services sector where the weight and the relevance of human resources are notably high.

On the other hand, contrary to expectations, the coefficient of SCE is negative and significant at 5% level. This finding is not consistent with prior literature (Chen et al., 2005; Ahangar, 2011; Rehman et al., 2011), while it is consistent with Smriti and Das (2018) who find a negative relationship between SCE and ROA for Service sector. This finding may be explained by the circumstance that the 63% of the sample firm belong to the mines, manufacturers and building sector. Probably, in these firms, the investment in structural capital (e.g. processes, patents, copyright), takes time to impact on firm's financial performance.

Finally, model 1 shows that CEE does not drive firms' profitability. According to the RBV theory, firms' performance is more stimulated by the efficiency of using and developing intangible assets such as skills, competencies and experiences (HCE) considered strategic and hard to imitate than by the efficiency of tangible assets (CEE) (Zéghal and Maaloul, 2010; Smriti and Das, 2018).

Table 7. Linear panel regression model

	Model 1: ROA		Model 2: GROWTH		Model 3: MtB	
	Firms= 135		Firms= 135		Firms= 135	
	Obs: 1.350		Obs: 1.350		Obs: 1.350	
	<i>Coeff.</i>	<i>Sig.</i>	<i>Coeff.</i>	<i>Sig.</i>	<i>Coeff.</i>	<i>Sig.</i>
Constant	0.211		0.044		2.325	***
VAIC	1.228	***	0.001	***	0.184	***
HCE	0.059	**	0.030	***	-0.025	***
SCE	-0.124	**	-0.004	**	-0.040	**
CEE	-0.000		-0.000		-0.006	*
LEV	-0.139	***	-0.001	***	-0.001	
SIZE	0.316	***	0.004		-0.117	***
IND:						
1	---		---		---	
2	-1.276	**	0.018		-0.628	***
3	-2.267	***	0.021		0.485	***
4	-3.526	***	-0.018		-0.258	*
	<i>Model 1 specification:</i>		<i>Model 2 specification:</i>		<i>Model 3 specification:</i>	
	R-square: 28.78%		R-square:10.28%		R-square: 8.66%	
	F (18, 1331) = 29.88		F (18, 1331) = 8.47		F (18, 1331) = 7.01	
	Prob> F= 0.000		Prob> F= 0.000		Prob> F= 0.000	
	Adj. R-squared: 27.81%		Adj. R-squared: 9.06%		Adj. R-squared: 7.42%	
	VIF < 2% for all variables		VIF < 2% for all variables		VIF < 2% for all variables	
	Year control: yes		Year control: yes		Year control: yes	

Notes: This table reports the linear panel regression for equations 1, 2 and 3. *** = significant at the 1% level (2-tailed); ** = significant at 5% level (2-tailed). and * = significant at the 10% level (2-tailed). For detailed variable definitions please see Table 2

Hence, hypothesis H2a is supported only by HCE results. Moreover, the control variable LEV has a negative and significant, at 1% level, sign (Dženopoljac et al., 2016; Smriti and Das, 2018). This finding suggests that the increase in leverage negatively affects firms' profitability because of the interests paid to the lenders. Finally, in line with previous studies (Dženopoljac et al., 2016; Sardo and Serrasqueiro, 2018; Smriti and Das, 2018), the control variable SIZE presents a positive sign (significant at 1% level), indicating that size positively impacts on firms' profitability.

Model 2, employing GROWTH as the dependent variable, consistent with expectations, shows that the coefficient of VAIC is positive and significant at the 1% level. As well as for model 1, results of model 2 confirm that IC represents a substantial driver of firms' financial performance. According to previous scholars (Chen et al., 2005; Smriti and Das, 2018), IC value positively influences firms' growth in revenues leading to an overall improvement of firms' financial performance. Thus, by investing in IC components, firms obtain benefits in the year. These benefits consist of growth in firms' sales arising from the confidence of the markets in firms' ability to create value for stakeholders starting from the

intangible (invisible or not recognized) assets other than the tangible and physical assets (Bhasin, 2012).

According to Bhasin (2012), IC investments translate knowledge in revenues. Hence, hypothesis H1b is supported.

Model 2 also indicates an association between firms' GROWTH and some IC components. In line with expectations, the coefficient of HCE is positive and significant at 1% level, testifying a positive impact of human capital resources on firms' sales growth (Chen et al., 2005; Ahangar, 2011). On the other hand, contrary to expectations, the coefficient of SCE is negative and significant at 5% level, indicating a negative impact of structural capital on firms' sales growth. Finally, the coefficient of CEE is negative and not significant. Accordingly, hypothesis H2b is supported only by HCE results.

Further, regarding model 2, the control variable LEV has a negative and significant, at 1% level, sign. Previous literature did not investigate the relationship between leverage and GROWTH. The present finding suggests that leverage negatively impacts firms' growth in revenues. Further, the control variable SIZE has a positive sign, though it is not significant.

Model 3, with MtB as the dependent variable, by expectations, evidences a positive and significant (at the 1% level) relationship between VAIC and firms' market value. This result suggests that investors place a higher value on firms with greater IC taken in its aggregated form so exerting a positive effect on firms' market performance (Chen et al., 2005; Gan and Saleh, 2008; Sardo and Serrasqueiro, 2018). Accordingly, hypothesis H1c is supported.

Nevertheless, in contrast with the hypothesis, model 3 highlights that each IC component exerts a negative influence on firms' market value. More specifically, the coefficient of HCE is negative and significant at 1% level, the coefficient of SCE is negative and significant at 5% level and, the coefficient of CEE is negative and significant at 10% level. These findings imply that while investors are attributing a pivotal relevance to the IC value taken in its aggregate form (VAIC), negatively appreciate the importance of the separate IC components. Thus, markets negatively react to investments made only in individual IC components, considering pivotal the combined effect exerted by the three IC components (HCE, SCE, CEE) in their firms' evaluation.

These results are in contrast with those obtained by Chen et al. (2005) who, in the context of Taiwanese listed companies, found that VAIC and all of its components positively influence firms' market value and partially with those observed by Dženopoljac et al. (2016) who, in the context of Serbian ICT companies, showed that human capital efficiency positively influences market value. Accordingly, hypothesis H2c is not supported.

Finally, model 3 shows that the control variable LEV has a negative sign, though it is not significant, while the control variable SIZE has a negative and significant at 1% level coefficient.

Conclusion

The paper contributes to the literature by exploring a sample of Italian listed firms for the period of 2008 to 2017 to extend knowledge about the role of IC in enhancing firms' performance and market value. In particular, adopting a well-established IC measurement tool (VAIC), the present research attempted to investigate the relationship between IC, two dimensions of firms' financial performance (profitability and growth in revenues) and market value.

The study empirically demonstrated that, in the Italian context, firms with greater IC efficiency yield higher profitability, growth in revenues and stock market performance. It also revealed that among individual IC components, only Human Capital efficiency positively affects firms' financial profitability and growth in revenues while Structural Capital efficiency and Capital Employed efficiency negatively influence firms' financial

performance. Nevertheless, each IC component negatively affects firms' market value, evidencing that while investors are attributing a pivotal relevance to the IC investments in their aggregate form (VAIC), negatively react to investments made in individual IC components.

These results are in accordance with Pulic, who stated: "we have evidence that value creation depends much more on intellectual potential than on physical capital" (Pulic, 1998: 14) and demand further investigations, giving evidence that firm's success is determined not only by its attitude to create value-added but also to distribute it among its stakeholders: as a matter of fact, leverage has, through the burden of interests, a negative, and sometimes, significant impact.

The research has implications for managers and researchers. Managers must recognize the relevance of IC in driving the firms' financial performance and market value by developing appropriate management and developing a programme of this kind of resources. In particular, human resources deserve attention due to their positive impact on firms' profitability and growth in revenues. The researcher can utilise these results and replicate the study in other countries also employing other variables to obtain useful insights.

The study also has some limitations that provide avenues for future research. Firstly, it employs only one of the possible existing methods for measuring IC: the VAIC. This method, as aforementioned, presents some drawbacks. Secondly, the sample is limited to the Italian listed companies. Thirdly, it controls for the effect of only two variables such as size and leverage.

Thus, future research could focus on a larger sample including companies from different European countries also testing the effects of other variables. Moreover, future research might consider the use of other versions of the VAIC.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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Full Length Research Paper

Critical success factors for green supply chain management practices: An empirical study on data collected from food processing companies in Saudi Arabia

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The aim of this research paper is to explore critical success factors required to implement green supply chain management. A descriptive analytical method was used by which a questionnaire was developed based on literature review and suggestions of academics as well as experts. It was distributed to a sample of 360 managers selected from food processing companies in Saudi Arabia. Out of 360 questionnaires, 278 were returned valid with a response rate of 77%. Using the principal component analysis to reduce the available data along with the confirmatory factor analysis to confirm the structure of extracted factors as observed variables and latent variables, the results revealed 16 critical success factors loaded on the major dimensions, which were management-led drivers (awareness of GSCM effects, management commitment, organizational involvement, investment recovery practices, green purchasing, environment-oriented TQM, and green information systems), external drivers (government drivers, cost drivers, customer drivers, supplier drivers and energy consumption reduction) in addition to product processing and recycling factors (society drivers, product end-of-life processing, eco-designed product and ISO 14001 certification). Considering these results, it was concluded that green supply chain management implementation is an integrated process consisted of activities directed to produce ecofriendly products oriented by internal and external drivers. This paper contributes to the literature through conceptualizing green supply chain management as a construct which embodies three major elements, management, environment and product. Managers in food processing companies who seek to achieve a successful implementation of green supply management initiative should take these three dimensions into their account.

Key words: Green supply chain management implementation, critical success factors, food processing companies, Saudi Arabia.

INTRODUCTION

The Green Supply Chain Management (GSCM) provides the resource optimization and seen as a solution to solve

environmental problems and consumption patterns within the whole supply chain. The GSCM implementation and

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performance assessment is relatively important for survival in an ever-increasingly competitive environment.

In Saudi Arabia more and more of the CEOs of the food processing companies are paying great deal of attention to the measurements and precautions of the environmental damage. This paper focuses on Critical Success Factors (CSF) for GSCM in food processing companies in Saudi Arabia.

The introduction of green supply chain management practices was a result of thinking of the negative effects of supply chain management (SCM) practices on the environment (Kaur et al., 2018). Researchers cited numerous reasons that call companies to adopt and implement GSCM practices. Examples of these reasons encompass social pressure to protect the environment (Mumtaz et al., 2018) and to improve the reputation of the company (Longoni and Cagliano, 2018) as well as government, market, supplier customer demands (Mathiyazhagan et al., 2018). In the literature, forces that spur companies on addressing green practices in their SCM were named drivers of GSCM (Dhull and Narwal, 2018). In the current study, these and other drivers were analyzed and prioritized under CSFs of GSCM implementation in line with prior research (Luthra et al., 2016; Raut et al., 2017; Mathiyazhagan et al., 2018; Prasad et al., 2018).

CSFs to GSCM implementation has been investigated in different industries in various countries such as manufacturing companies in India (Mumtaz et al., 2018), food retailing in Croatia (Petljak et al., 2018), automobile industry in China (Dou et al., 2018), cashew industry in West Africa (Agyemang et al., 2018), construction industry in India (Mathiyazhagan et al., 2018), and electrical and electronic companies in Taiwan (Hu and Hsu, 2010). Some studies in the same context were conducted to examine GSCM implementation using samples of companies in numerous countries (Wang et al., 2018).

Investigating CSFs of GSCM implementation, researchers identified several factors that play a significant part in the implementation of these practices. In general, CSFs that found out by researchers can be systematized as internal factors and external factors. Examples of critical internal success factors for GSCM implementation include management commitment (Agyemang et al., 2018), awareness of GSCM implementation implications (Irum et al., 2018). On the other hand, government, market, supplier, customer, and environment drivers and institutional external pressures (Zhu et al., 2013) were hold as external factors of GSCM implementation (Mathiyazhagan et al., 2018).

Although many studies have confirmed the importance of GSCM implementation to address environmental problems and challenges, some companies remain unconvinced about the feasibility of GSCM implementation; other companies have many barriers that prevent them to engage in such implementation.

Therefore, the present study aims to identify and prioritize CSFs for implementing GSCM practices in order to help them and to encourage the adoption of GSCM practices that benefit companies in Saudi Arabia, communities and the entire world.

LITERATURE REVIEW

GSCM definition

GSCM has been taken by a number of authors as a process that integrates environment-directed thinking into SCM (Mumtaz et al., 2018). Some features of green practices can be found by reviewing the definitions quoted by the researchers. The definitions cited by Zhu and Sarkis (2004), for example, show that GSCM is a concept that makes allowance for SCM innovation in the milieu of the environment as well as a set of processes directed to reuse and recycling of materials, and a practice of environmental performance of the SCM.

Srivastava (2007) defined GSCM as an integration of environmental issues into SCM that echoed in products design, material purchasing, products manufacturing, products delivery to customers and management of products end of life. For Jayant and Tiwari (2018), GSCM is an organizational philosophy introduced to meet the standards of improving processes and products in conformity with environmental regulations that need companies to take part in diminishing environmental threats. Based on these definitions, GSCM was conceptualized as a construct covers three key aspects related to organizations' environmental responsibility, environmental performance as well as ecofriendly products.

Critical success factors of GSCM implementation in the literature

CSFs have been defined as variables that ensure the success of the company's efforts in the case of effective and sustainable management of these variables (Prasad et al., 2018). In order to identify these factors, a review of the literature was conducted. Research that approaches GSCM initiative particularized a set of factors that play an efficacious role in the success of GSCM implementation.

These factors can be categorized into two major sets: organizational internal factors and institutional external factors (Testa and Iraldo, 2010). Internal GSCM was defined as organization-founded practices in the context of achieving the environmental objectives, while external GSCM was defined as collaboration-based efforts with organization's stakeholders that are directed to enhance the environmental performance (Zhang et al., 2018).

Mumtaz et al. (2018) carried out a research in Pakistan to discern the impact of GSCM practices on organizational

performance. They consider four practices of GSCM. The first one includes practices that implemented by the company itself such as organizational support and known as internal practices. The second one is related to practices of external parties such as suppliers, customers and government. The third practice was investment recovery that concern excess and scarab materials and finally, eco-design, which is a practice of designing and production of environment friendly products.

Agyemang et al. (2018) studied barriers of GSCM implementation in cashew industry in West Africa and highlighted three major obstacles concerned lack of top-management commitment, integrated management information as well as traceability systems. On the basis of a sample encompassed subjects from Chinese companies, Zhu and Sarkis (2004) examined the effect of GSCM on organizational performance. They measured GSCM practices by internal factors of environment management, external factors of GSCM, eco-design, and investment recovery. The authors measured the internal environment management using indicators such as management commitment, cooperation for environmental improvements, and environment-oriented total quality management (TQM).

Three critical factors of GSCM were identified by Hu and Hsu (2010), which were product recycling, organizational involvement and life cycle management. An examples of GSCM external factors embraced by Hu and Hsu (2010) was supplier management. According to Hervani et al. (2005), cooperation at the organizational level as a whole is required for successful implementation of GSCM. In a multinational research covered 246 companies by Wang et al. (2018), cost and customer drivers were found to significantly affect GSCM implementation.

Irum et al. (2018) reviewed GSCM literature in Asian countries and concluded that GSCM practices are strongly associated with organizational performance as measured by economic, operational and environmental performance. It was understood from these results that companies' awareness of the effects of GSCM implementation encourages or prevents the intention to adopt GSCM initiative. Mathiyazhagan et al. (2018) explored the motivational factors that encourage Indian companies in construction sector to implement GSCM. Their results suggested that the most vital factors were government, market, supplier, customer, internal and environment motivations.

Diabat and Govindan (2010) analyzed the drivers of GSCM implementation in an industrial company in Southern India and identified 11 drivers of GSCM implementation; green design, government regulations, environment-directed collaboration between the company and its suppliers, energy consumption reduction, material recycling, environment-directed collaboration between the company and its customers, reverse logistics, ISO 14001 certification, suppliers' environmental management system, co-design and integration of quality environment management into

planning and operational processes.

Investigating factors of sustainable SCM in manufacturing industry in China, Wu et al. (2018) specified the following factors: customer pressure, industry pressure, management awareness, and government participation. According to Pourjavad and Shahin (2018), green design and green manufacturing were the most important factors that have significant effects on company performance. Petljak et al. (2018) conceptualized GSCM in terms of three dimensions: green purchasing, green logistics and cooperation with suppliers. In a review of 365 papers on GSCM from 1996-2016 by Jayant and Tiwari (2018), the following GSCM related dimensions were discussed: green procurement, green design, green operations, green purchasing, green manufacturing, and green marketing. Table 1 summarizes CSFs of GSCM found in the literature. These twenty factors were tabulated as internal GSCM (1-10) and external GSCM (11-20).

METHODOLOGY

Research strategy

This study can be sorted out as an empirical paper conducted with the aim of exploring CSFs of GSCM implementation. According to Prasad et al. (2018), using empirical strategy in research refers to a procedure of conducting a research on the basis of a target sample, a questionnaire development, data gathering as well as data analysis via descriptive and factor analysis. In the current research paper, all these exigencies of empirical strategy were considered.

Questionnaire development

A questionnaire was developed based on CSFs that were identified in the literature review, which were 20 dimensions in addition to suggestions of a panel of experts consisted of ten academics and professional experts. Considering the suggestions, the initial version of the questionnaire was refined, and then the final version of the questionnaire was developed. Each dimension was assessed using two items. In total, the questionnaire contained 60 items. The questionnaire was anchored using five-point Likert scale, where 5 = very important, 4 = important, 3 = fairly important, 2 = slightly important, 1 = not important (Brown, 2011).

Research sample and data collection

The target sample of this research was selected from managers working at food processing companies in Saudi Arabia. It was consisted of 360 participants randomly selected from managers in top, middle and first-line management levels. Referring to sample-to-variable ratio (N:P), where N = 360 and P = 20, the sample of the current research was regarded suitable and representative since N:P was 18:1. According to Williams et al. (2010), a sample-to-variable ratio is accepted when N:P ranged between 15:1 and 20:1. Myers et al. (2011) indicated that an adequate sample-to-variable ratio that required for the application of factor analysis is N:P \geq 10. In terms of data collection, a total of 360 questionnaires were distributed to research participants and 278 were returned valid with a response rate of 77%.

Table 1. Critical success factors of GSCM found in the literature.

Factors	Code	References
Internal factors: Factors that implemented by the organization itself.	Organizational involvement	GSCM1
	Management commitment	GSCM2
	Eco-designed products.	GSCM3
	Investment recovery practices	GSCM4
	Traceability systems.	GSCM5
	Integrated management information.	GSCM6
	Awareness of GSCM effects	GSCM7
	Environment-oriented TQM	GSCM8
	Green information systems	GSCM9
	Green purchasing	GSCM10
External factors: Factors related to external parties such as suppliers, customers, government and non-government institutions	Cost drivers	GSCM11
	Customer drivers	GSCM12
	Government drivers	GSCM13
	Market drivers	GSCM14
	Supplier drivers	GSCM15
	ISO 14001 certification requirements	GSCM16
	Society drivers	GSCM17
	Energy consumption reduction	GSCM18
	Product end-of-life processing	GSCM19
	Reverse logistics	GSCM20

Principal component analysis (PCA)

Factor analysis was used to extract factors on the basis of the principal component analysis (PCA). According to Fabrigar et al. (1999), since the goal of the researcher is data reduction, PCA is the most appropriate approach. In order to investigate factorability of these 20 factors for factor analysis, two tests were used: Kaiser-Meyer-Olkin (KMO) and Bartlett Test of Sphericity. An acceptable value of KMO should be no less than 0.5, in addition Bartlett Test of Sphericity should be significant (Williams et al., 2010). The results of KMO and Bartlett Test of Sphericity emphasized that all factors used in the initial version of the questionnaire were adequate for conducting factor analysis since the value of KMO equals 0.871, Bartlett's test of Sphericity was significant at 0.01 (P-value = 0.000) (Prasad et al., 2018).

Based on Eigenvalues greater than 1 with varimax rotation and suppressing small coefficients with absolute value below 0.4, it was clarified that factor loadings of 16 factors out of 20 were high since they were greater than 0.70 (Shevlin and Miles, 1998); therefore, 4 factors were deleted due to their low values of factor loadings, which were tractability systems (GSCM5), integrated management information (GSCM6), market drivers (GSCM14) and reverse logistics (GSCM20). In a similar study conducted by Hu and Hsu (2010) to explore CSFs for GSCM implementation in Taiwan, five factors out of 25 factors were removed due to their factor loadings that appeared less than 0.6. In Prasad et al. (2018)'s study carried out to analyze CSFs for sustainable SCM in India, 20 success factors were identified based on the literature and none of them were eliminated after conduction factor analysis. In their study on GSCM in manufacturing companies in China, Zhu et al. (2008) identified 21 factors of GSCM related to green purchasing, eco-design practices, internal environmental management, cooperation with customers, investment recovery and environmental requirements.

Adopting Hu and Hsu (2010)'s procedure, the remaining 16 factors

of GSCM implementation were reanalyzed and loaded on three dimensions; 7 indicators were related to the first dimension (Management-led drivers), 5 indicators were associated with the second dimension (External forces) and 4 indicators were linked to the third dimension (product specifications and recycling). The results of factor analysis are illustrated in Table 2. These results expounded that the extracted 16 indicators were loaded on three factors. All factor loadings were higher than 0.7 (Shevlin and Miles, 1998) and significant at $P < 0.001$ (Carter and Jennings, 2002).

Reliability and validity

Reliability was measured based on composite reliability (CR) and Cronbach's alpha (α). Values of composite reliability were calculated based on lambda, lambda square, epsilon and AVE. Prasad et al., 2018 indicated that reliability should be assessed to ensure the results shown in Table 2 indicated adequate values of CRs since all values were greater than 0.7 (Fornell and Larcker, 1981) and values of and Cronbach's alpha greater than 0.7 (Hu and Hsu, 2010). Convergent validity as well was confirmed based on AVE values that were more than 0.50 (Walter et al., 2001).

Confirmatory factor analysis (CFA)

Based on the results of the principal factor analysis in which sixteen success factors for GSCM implementation were extracted, CFA was conducted using AMOS program in order to examine the goodness-of-fit indices of the proposed model. Five indices were used (Table 3): the chi-square / degree of freedom ration (χ^2/df), the goodness-of-fit index (GFI), the adjusted goodness-of-fit index (AGFI), the root mean square residual (RMR) and the comparative fir index (CFI). According to Hooper et al. (2008), one purpose of using the goodness-of-fit

Table 2. Results of factor analysis.

S/N	CSFs	1	2	3	AVE	CR (α)
1	Awareness of GSCM effects (GSCM7)	0.911				
2	Management commitment (GSCM2)	0.935				
3	Organizational involvement (GSCM1)	0.931				
4	Investment recovery practices (GSCM4)	0.951			0.511	0.960 (0.94)
5	Green purchasing (GSCM10)	0.949				
6	Environment-oriented TQM (GSCM8)	0.944				
7	Green information systems (GSCM9)	0.898				
8	Government drivers (GSCM13)		0.901			
9	Cost drivers (GSCM11)		0.888			
10	Customer drivers GSCM12		0.811		0.583	0.910 (0.89)
11	Supplier drivers (GSCM15)		0.797			
12	Energy consumption (GSCM18)		0.799			
13	Society drivers (GSCM17)			0.801		
14	Product end-of-life processing (GSCM19)			0.787		
15	Eco-designed products (GSCM3)			0.743	0.594	0.850 (0.84)
16	ISO 14001 certification (GSCM16)			0.731		

KMO = 0.871, Bartlett's test of Sphericity was significant at 0.01

Table 3. Results of goodness of fit indices.

Indices	χ^2/df	GFI	AGFI	CFI	RMR
Values	1.94	0.922	0.913	0.919	0.04
Criteria	< 2.00	> 0.90	> 0.90	> 0.90	< 0.05

indices is to assess the measurement model. According to Huang and Cheng-Po Lai (2012), another aim of CFA is to identify the structure latent variables.

The results of these indices as can be seen in Table 3 indicated an adequate fit of the proposed model; χ^2/df was 1.94 which is less than 2 (Carr and Pearson, 2002), GFI was 0.921 which is greater than 0.90, AGFI was 0.913 which is more than 0.90, CFI was 0.919 which is higher than 0.90), and RMR was 0.04 which is less than 0.05 (Carter and Jennings, 2002; Chien and Shih, 2007).

RESULTS AND DISCUSSION

Figure 1 illustrates that CSFs for GSCM implementation were loaded on three latent factors: management-led drivers, external factors and product specifications and recycling factors. Management-led drivers have seven factors (GSCM1, GSCM2, GSCM4, GSCM7, GSCM8, GSCM9 and GSCM10), external factors were five factors (GSCM11, GSCM12, GSCM13, GSCM15 and GSCM18) and product specifications and recycling factors were four (GSCM3, GSCM16, GSCM17 and GSCM19).

In order to rate CSFs for GSCM; means, standard deviations and ranks of these factors were identified in Table 4. All factors were ranked moderate (fairly important) to very important (4.561). It was noted that management

awareness of GSCM effects was the most important factor of GSCM implementation (M = 4.561, SD = 0.842) followed by government drivers (M = 4.522, SD = 0.841), energy consumption (M = 4.191, SD = 0.798), cost drivers (M = 4.114, SD = 0.812), supplier drivers (M = 4.017, SD = 0.745), green purchasing (M = 3.975, SD = 0.821), organizational involvement (M = 3.988, SD = 0.654), product end-of-life processing (M = 3.942, SD = 0.743), management commitment (M = 3.887, SD = 0.654), customer drivers (M = 3.878, SD = 0.657), green information systems (M = 3.858, SD = 0.696), eco-designed products (M = 3.821, SD = 0.696), investment recovery practices (M = 3.801, SD = 0.457), society drivers (M = 3.799, SD = 0.851), ISO 14001 certification (M = 3.795, SD = 0.884), and environment-oriented TQM (M = 3.787, SD = 0.585).

The above-mentioned results emerged in many previous studies as CSFs for GSCM implementation; awareness of GSCM effects (Huang et al., 2015; Malviya and Kant, 2015; Ahmed et al., 2018), management commitment (Luthra et al., 2014), organizational involvement (Muduliet al., 2013), investment recovery practices (Zhu et al., 2005), green purchasing (Zhu and Sarkis, 2004), environment-oriented TQM (Zhu and Sarkis, 2004) and green information systems (Agyemang et al., 2018). In

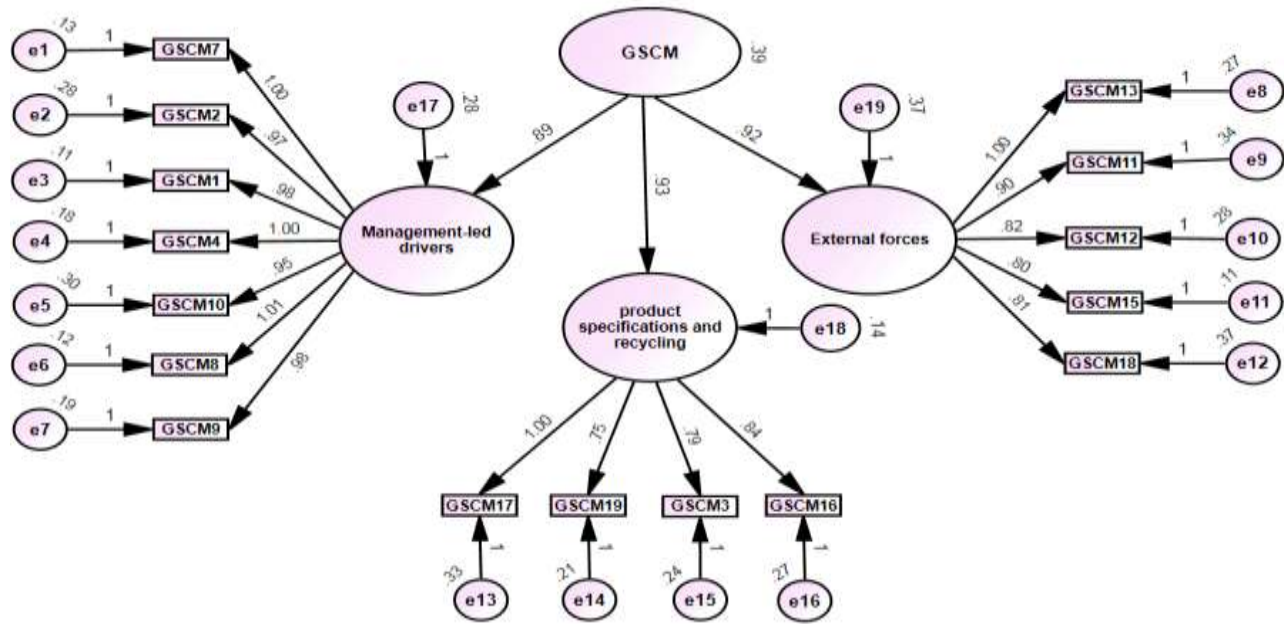


Figure 1. CFA results.

Table 4. Means, SD and ranks of CSFs for GSCM.

S/N	CSFs for GSCM	Means	SD	Ranks
Management-led drivers				
1.	Awareness of GSCM effects (GSCM7)	4.561	0.842	1
2.	Management commitment (GSCM2)	3.887	0.654	9
3.	Organizational involvement (GSCM1)	3.988	0.753	7
4.	Investment recovery practices (GSCM4)	3.801	0.457	13
5.	Green purchasing (GSCM10)	3.975	0.821	6
6.	Environment-oriented TQM (GSCM8)	3.787	0.585	16
7.	Green information systems (GSCM9)	3.858	0.696	11
External factors				
1.	Government drivers (GSCM13)	4.522	0.841	2
2.	Cost drivers (GSCM11)	4.114	0.812	4
3.	Customer drivers (GSCM12)	3.878	0.657	10
4.	Supplier drivers (GSCM15)	4.017	0.745	5
5.	Energy consumption (GSCM18)	4.191	0.798	3
Product specifications and recycling factors				
1.	Society drivers (GSCM17)	3.799	0.851	14
2.	Product end-of-life processing (GSCM19)	3.942	0.743	8
3.	Eco-designed products (GSCM3)	3.821	0.773	12
4.	ISO 14001 certification (GSCM16)	3.795	0.884	15

agreement with prior research, external factors include government drivers (Zhu et al., 2013), cost drivers (Wang et al., 2018), customer drivers (Mumtaz et al., 2018), supplier drivers (Hu and Hsu, 2010; Grimm et al., 2014)

and energy consumption (Diabat and Govindan, 2010). Finally, product specifications and recycling factors contain society drivers (Zhang et al., 2018), product end-of-life processing (Srivastava, 2007), eco-designed products

(Zhu et al., 2008), and ISO 14001 certification (Diabat and Govindan, 2010).

CONCLUSION, POLICY IMPLICATIONS AND FUTURE WORK DIRECTIONS

Green supply chain management has been regarded as a pivotal cornerstone for organizations strive to make their performance better. As a result, this study was devoted to explore critical success factors required to flourish the management of their green supply chains. A mixed sample including academics, experts and managers in food processing companies in Saudi Arabia was used to investigate those factors.

The results pointed out that critical success factors of green supply chain management can be categorized into three dimensions, which are management-led drivers, external factors and product specifications and recycling. Management-led drivers include managers' awareness of GSCM effects on their organizations, which can be supported by management commitment and involvement, investment recovery, green purchasing as well as green information systems. Moreover, external success factors are related to stakeholders (e.g., government, customers and suppliers) as well as cost drivers and energy consumption. In terms of product specifications and recycling, four factors emerged; society drivers, product end-of-life processing, eco-designed products in addition to ISO 14001 certification. As a matter of fact, these results enrich the literature on critical success factors of green supply chain management. Practically, business managers are invited to pay more attention to these factors. They should enhance the awareness of GSCM effects through workshops, benchmarks and lessons learned from local and global enterprises. Their commitment is essential for GSCM to be successful. Additionally, managers should take organizational involvement into consideration. They are requested to adopt the concept of employee participation and empowerment either in decision making or problem solving.

Likewise, our results require managers to look upon the best practices of investment recovery that suit their business. Examples of these practices include suppliers' engagement in by-product recycling and waste reduction. Environmental management has become a key concept for organizations that seek sustainability through adopting greening. Therefore, it should be integrated into organizational operations and initiatives such as total quality management. These suggestions can be implanted by the aid of environmental information systems. By the same token, the results notified managers to observe the importance of external factors that exert influence on green supply chain management such as stakeholders, example, government, customers and suppliers via the introduction of related approaches like supplier efficiency and effectiveness, compliance with governmental regulations,

customer satisfaction, cost reduction and energy utilization. Finally, managers are called upon to take an interest in other critical success factors related to products in terms of specifications and recycling. Yet, this study is limited to the industry in which the study was applied; food processing companies. Future studies might repeat the current study using data from other industries such as commercial malls. Our data were collected via across-sectional design; hence, future studies can use longitudinal design to catch a larger well as accurate picture of managers' perspectives on critical success factors of GSCM.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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Full Length Research Paper

Satisfaction of university community on in house sourcing (Samara University) versus outsourcing (some selected government universities in Ethiopia)

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Outsourcing noncore activities are the best solution for many organizations. This study was conducted to study the comparative analysis of university community satisfaction on outsourcing in some selected universities in Ethiopia using both primary and secondary data. Samples were taken from students, teachers and support staff of four universities. The research identified that by outsourcing the different non-core services universities were able to enjoy advantages such as improved resource management, administrative burden decreased, decreased staff complains, timely and quality service improved, operational and recruitment cost decreased. The research has also found that students, support staff and teachers of outsourced universities have a higher level of satisfaction than the non-outsourced counterparts. Based on the findings, the researchers recommend that Samara University can better satisfy its community through outsourcing non-core activities.

Key words: Outsourcing, satisfaction, non-core service, analysis of variance (ANOVA).

INTRODUCTION

Recently, increasingly rapid changes in all aspects of the environments, and in technology and international deregulation have challenged large corporations to compete on a global scale (Hendry, 1995). To meet this competition the giants had to learn to dance, to be flexible themselves, and to "do more with less". Critically reviewing the sources of their value-added, many were beginning to contract out non-core functions and move towards to fast-moving, fashion-based industries (Hendry, 1995).

According to Sparrow (2004) outsourced projects pose a serious security threats especially in case of customers data protection and firms other confidential matters. According to Swartz (2004) security and privacy risk is greater when off shoring takes place and companies send most sensitive customer information to the vendor. The supplier's inability to maintain confidentiality is a question mark for outsourcing particularly to an offshore destination.

Outsourcing is growing at an exponential rate, as the

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increasingly global marketplace sees an array of competitive factors such as cost, speed, quality, volume, flexibility, and innovation becoming increasingly important, leading firms to move from transactional outsourcing to using more strategic outsourcing as a means of achieving competitive success. Firms which achieve success in their international business are those that perceive the changes in the international environment and who are able to develop strategies that enable them to respond accordingly (Gilley and Rasheed, 2000).

Outsourcing has been in business literature for many years and it has been observed that firms are outsourcing to leverage production to achieve economy of scale and lower the cost, for instance 30 to 40% of Nokia mobile production has been outsourced (Shy and Stenbacka, 2005). "Outsourcing refers to the practice of transferring activities traditionally done within a firm to third party providers within the country or "off-shore" (Sen and Shiel, 2006).

According to Offshore outsourcing is an old phenomenon and many of the multinational companies' strategies' to bring the operating cost down. Outsourcing is handing over one or many of the business processes to an outside vendor or the utilization of outside available services provided by third party to carry out business activities is the outsourcing strategy.

Outsourcing does not come without risks; one main risk is that companies leave the supply of the products or services in the hands of someone whom they cannot control, contrary to controlling their own supply (Meresea, 2007).

Globally, outsourcing becomes more sophisticated and complex. The functions that are being outsourced ranges: from non-core functions like janitorial service to the core or main function such as production and marketing (Meresea, 2007). The problem is that organizations have difficulties in selecting, contracting and managing an outsourcing's service provider in ensuring the expected benefit.

This study attempts to make an important contribution to the management of the university by exploring the satisfaction of university on the issue of outsourcing non-core services. Particularly, addresses the following questions: What common challenges will affect the ability of the university to successfully outsource services? What opportunities will be available for the university because of outsourcing non-core functions of the university? What are the reasons for outsourcing non-core functions? These questions will be answered through a survey carried out in different sampled government universities.

Research questions

(1) What is the students and employee's attitude towards the level of outsourced services in universities?

(2) What are the challenges and opportunities of outsourcing non-core services in the universities?

Objectives of the study

General objective

- (1) To examine the satisfaction and attitude of university community towards outsourced services in universities.
- (2) To identify the subjective challenges and opportunities for outsourcing in universities.

Hypothesis of the study

- H0: There is no difference in the level of satisfaction between outsourcing and non-outsourcing universities.
 H1: Outsourcing results difference in the level of satisfaction between outsourcing and non-outsourcing universities.

LITERATURE REVIEW

Outsourcing definition

The business environment has undergone major changes, particularly in the last six decades. And companies are under significant pressure to maintain and increase their profitability as well as customer service and market share in a global economy. Outsourcing is one more approach that can lead to greater competitiveness (Weston, 1996; as quoted by Embleton and Wright, 1998). Greaver (1999) supports this view and indicates the need for organizations to think about how they should deal with market pressures.

Motivations for outsourcing

There are three major categories of motivations for outsourcing: cost, strategy, and politics. The first two commonly drive outsourcing by private industry. Political agendas often drive outsourcing by public organizations (Kakabadse and Kakabadse, 2000). While there may be three categories, outsourcing activities are likely to be initiated for more than one reason and in fact, may be driven by elements from all three categories. For example, the outsourcing of taxing and health services for the British government was driven by elements from both the cost and political categories (Willcocks and Currie, 1997). The political climate favored privatization because of the belief that private firms are more efficient and provide better service than public counterparts. Cutting the cost of providing services also drove the British government's outsourcing efforts.

Outsourcing advantages

Outsourcing helps to avoid the costs associated with bureaucracy typically associated with production inside the firm (D'Aveni and Ravenscraft, 1994; Jensen and Meckling, 1976). Finally, outsourcing opens up the possibility of obtaining rents from relations with suppliers (Dyer and Singh, 1998; Linder, 2004). While firms may now have the opportunity to outsource, outsourcing initiatives do not necessarily fulfill all their expectations. Writing a poor contract and losing control over the outsourced activity has the largest impact on the (negative) outcome of outsourcing efforts (Barthelemy, 2003).

Impact of outsourcing on business performance

An outsourcing project can have both positive and negative impacts on business performance. The outcome ultimately depends on the way the company goes about the outsourcing project and what support the project receives from top-level management. Furthermore, the phase the company is at in the outsourcing project can have a direct impact on business performance. For example, just before or just after signing the contract the benefits reported by companies are not actual but projected benefits, which could lead the company into many problems if they do not consider this (Barthelemy, 2003). The impact of outsourcing can be divided into reasons and challenges of outsourcing.

The expected benefits of outsourcing

The rapid growth of outsourcing suggests that both public and private organizations expect benefits from outsourcing. Naturally, different organizations in different circumstances will expect different benefits. For example, all organizations may expect costs savings even though in government outsourcing, the typical cost savings are only about half of what the private sector achieves (Kakabadse and Kakabadse, 2000). The expected benefits of outsourcing may include realizing the same or better service at a lower overall cost, increased flexibility and/or quality, access to the latest technology and best talent, and the ability to re-focus scarce resources onto core functions. For the political organization, additional expected benefits may include better accountability and management, and a better political posture. There also appears to be an expected benefit of mimicking competitors or "getting rid" of troublesome functions (Willcocks and Currie, 1997).

Potential risks of outsourcing

As with any process, there is a negative side to

outsourcing. However, many of the disadvantages of outsourcing are the flipside of the advantages or gains and may arise mainly due to poor outsourcing decisions and management. Embleton and Wright (1998) and Lankford and Parsa (1999) add that determining core competencies, which is key to the outsourcing decision, can be difficult, and a mistaken decision, very costly. They go on to point out that despite the sound financial appeal, outsourcing is also a subject that is still fraught with emotional overtones. The fear of losing control, for example, is a major emotional stumbling block to outsourcing. Companies are also averse to the idea of provider dependency. According to Greaver (1999), outsourcing problems can generally be divided into people, process, technology and other problem areas. People problems can have many causes, from the loss of key people to poor performance to people not getting along well together. Process problems generally result from how the operations are set up; how decision rights, responsibilities, and authorities are distributed; and how the activities are defined. Technology problems generally relate to the acquisition, implementation, and maintenance of equipment or systems. These problems can have their root causes in either party and addressing the problems is a shared responsibility.

MATERIALS AND METHODS

Data source, data type and sampling design

Source and type of data

This study was conducted on selected universities in Ethiopia, namely, Adigrat University (ADU), Axum University (AXU), Debre Birhan University (DBU) and Samara University (SU). Among these universities, the first three outsourced some of their non-core services whereas SU is yet to decide on outsourcing of its non-core services. The first three universities were chosen considering some factors such as their experience, similarity of the year of operation with SU, their distance from the center.

In the study, primary data, as well as secondary data were used. The sources of data were students, staffs, directors and vice presidents of the universities. Primary data was collected from students, academic and support staffs, directors and vice presidents of each university. Questionnaires were developed for all respondents, whereas interviews were used in addition to questionnaires. Questionnaires consisting of both closed and open-ended questions for (the vice presidents, procurement directors and staffs, finance directors and staffs, human resource management directors and staffs, estate and facility management directors and staffs, and student service directors) were used. Data was collected about the personal characteristic of the respondent, the level of satisfaction obtained from the various services given by the universities which are considered in this study.

Secondary data was collected from the published and unpublished documents, contract agreements, and procedural manuals.

Sampling technique and sampling design

Two-stage cluster sampling was used to select sample students. In

Table 1. Sample size of students in each university.

Parameter		ADU	AXU	DBU	SU
Students	Total population (N)	2507	2088	3065	728
	Sample size (n)	96	95	97	88
Support staff	Total population (N)	1375	908	938	947
	Sample Size(n)	93	90	91	90
Teachers	Total population (N)	625	505	1007	607
	Sample size(n)	86	83	91	86

Source: Human resource office, student dean, and registrar offices of each university.

the first stage, graduating students were identified from total students because graduating students spend more years in the university than the rest and know well the services that have been provided. In the second stage, cafeteria users were selected from non-users and which simple random sampling was drawn. The need to select cafeteria users was because only these groups knew the cafeteria service.

On the other hand, a simple random sampling technique was used to draw samples from staffs (support and Academic) of the universities.

Samples drawn from each university were different in size because the universities have a different number of students, teachers, and support staffs enrolled in the year the study was undertaken.

In this study, the researchers selected samples from all four universities. The sample size for the study is calculated using Yamane formula for sample size determination (Yamane, 1973)

$$n = \frac{N}{1 + Ne^2} \quad (1)$$

where n is sample size; N is total population and e is a probability of error. The level of error was 10%.

Accordingly, Table 1 shows the sample sizes drawn from each group of respondents and from each university.

Method of data analysis

Two methods of data analysis were used in the study. The first part used an econometric analysis which was used to analyze the model. A model was specified to measure the satisfaction of the university community from the services they have been getting from their universities. In order to estimate parameters with high precision, high efficiency and unbiasedness, standard tests of CLRM including homoscedasticity, multicollinearity, and normality tests were undertaken.

The second method of data analysis used was a descriptive analysis which was used to analyze the reasons, challenges, and opportunities for outsourcing.

Model specification: The ANOVA model

The attempt in the study was to see if there was a statistically significant difference in the average level of satisfaction obtained

from the services (janitorial service, cafeteria service, and security service) between the outsourced universities (ADU, AXU, and DBU) and the non-outsourced university (SU in this case).

To enable comparison of satisfaction between SU and the rest, the names of the universities were incorporated as a dummy variable. This enables to estimate the mean level of satisfaction and to test whether a statistically significant difference in the level of satisfaction was present.

When all the regressors are dummies, an ANOVA model can be specified to make meaningful comparison across those dummy regressors (Gujarati, 2003). Accordingly, the model was specified, to make a comparison of satisfaction across the four universities, as:

$$Y_i = \beta_0 + \beta_1 ADU + \beta_2 AXU + \beta_3 DBU + ui \quad (2)$$

where Y_i = the satisfaction of a person, β_0 = is the benchmark with respect to which comparison is made. β_i = is a (Kx1) vector of the unknown parameter to be estimated; $ADU = 1$, if it is Adigrat University, 0 otherwise; $AXU = 1$ if it is Aksum University, 0 otherwise; $DBU = 1$ if it is Debre Birhan University.

The dependent variable being estimated was, the level of satisfaction of the person (student, Academic, or support staff) from the service being given to. It was measured using a Likert scale rated as "strongly agree"=5, "agree"=4, "neutral"=3, "disagree"=2, and "strongly disagree"=1.

When the dependent variable ordered such as this, OLS estimates give an average level of the variable/the category whereas (ordered) logit estimates give the probability that a particular category will occur along with the cut-points. Even though OLS is affected by the values attached to each category, it was chosen in this study because it was intended in the study to show the mean difference across categories.

SU is omitted from Equation 1. When a category is omitted, it is called a benchmark or omitted category. As a result, the interpretation of the estimates of the coefficients is done with respect to SU (the omitted category). An omitted category assumes the value of the constant term. Since SU is the omitted category, it provides two purposes. One, the estimate makes comparisons of satisfaction between SU and the rest of universities easily. Two, omitting a category overcomes the problem of multicollinearity.

In the study, the services students, academic and support staff obtained were not identical. For example, academic and support staffs get janitorial service and security services. Students, on the other hand, get all the student cafeteria service, janitorial service, and security service. As a result, it was found plausible to estimate

Table 2. OLS result for the satisfaction of students about janitorial service across universities (STATA estimation result).

Janitor	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Adigrat_Univ	0.71778	0.172166	4.17	0.000***	0.3792458	1.056321
Aksum_Univ	0.45657	0.1730259	2.64	0.009***	0.1163504	0.796807
DebreBirhan_Univ	1.171392	0.172166	6.80	0.000***	0.8328541	1.509929
_cons	2.375	0.1246658	19.05	0.000***	2.129864	2.620136

***Significance at 1%.
Source: Study Result (2016).

Table 3. OLS result for satisfaction of teachers about janitorial service across universities (STATA estimation result).

Janitor_tchr	Coef.	Robust Std. Err	t	P> t	[95% Conf. Interval]	
Adigrat_Univ	1.11627	0.199569	5.59	0.000***	0.7237406	1.508818
Aksum_Univ	1.05491	0.199686	5.28	0.000***	0.6621495	1.447685
DebreBirhan_Univ	1.51725	0.187626	8.09	0.000***	1.148203	1.886298
_cons	2.18604	0.126590	13.74	0.000***	1.873131	2.498962

***Significance at 1%.
Source: Study Result (2016).

mean satisfaction of students, academic and support staff separately.

RESULTS AND DISCUSSION

Perception of students, teachers and support staff towards janitorial service

Tables 2, 3 and 4 show separate estimates of perception/satisfaction of students, teachers and support staff towards janitorial service.

Table 2 shows the estimation result for the satisfaction of students about janitorial service for Adigrat University, Aksum University, Debre Birhan, and Samara University. Samara University represented by the constant term (_cons) is the omitted category, hence serves as a benchmark or reference category for comparison among universities.

The coefficients of all universities are statistically significant at 1% level. Hence, statistics are on our side to reject the null hypothesis stating that there is no average difference of satisfaction of students across the four universities. Accordingly, the following interpretations of coefficients universities are made.

The mean or average estimate of janitorial service, as rated by students of Samara University, is 2.375 and it is found statistically significant. Since SU is the benchmark or omitted category, the rest coefficients indicate the difference in the level of satisfaction from Samara University. For example, a statistically significant coefficient of Adigrat University shows that the average satisfaction of students at Adigrat University is greater

than average satisfaction of students at Samara University by the estimated value of 0.71778.

Similarly, the average satisfaction of students of Aksum University is greater than average satisfaction of students of Samara University by the estimate equal value of 0.45657.

Again, the average satisfaction of students of Debre Birhan is greater than average satisfaction of students of Samara University by the estimate equal value of 1.171392.

Since ADU, AXU and DBU have outsourced and since SU does not, the higher satisfaction of students from janitorial service than SU may be because of the improvement of the service brought by outsourcing. To make things clear, when universities outsource services, they set service level agreements and make frequent controls, follow-ups and take corrective measures if services are not being delivered according to service level agreements.

Table 3 also shows the OLS estimate of satisfaction of teachers from janitorial service in ADU, AXU, DBU, and SU.

All the coefficients are significant at 1% level. The estimate for the coefficient of Samara, the benchmark, is 2.18604. The rest coefficients indicate the mean difference in satisfaction from Samara University. The coefficient of Adigrat University shows that the average satisfaction of teachers at Adigrat University is greater than average satisfaction of teachers at Samara University by the estimated value of 1.11627.

Furthermore, the average satisfaction of teachers of Aksum University is greater than average satisfaction of teachers of Samara University by the estimate equal

Table 4. OLS result for the satisfaction of support staffs about janitorial service across universities (STATA estimation result).

Janitor_stff	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Adigrat_Univ	0.30860	0.1701347	1.81	0.071*	-0.0259805	0.6431848
Aksum_Univ	0.32222	0.1715235	1.88	0.061*	-0.0150918	0.6595362
DebreBirhan_Univ	0.73882	0.1710517	4.32	0.000***	0.4024418	1.075214
_cons	2.76666	0.1212855	22.81	0.000***	2.52815	3.005184

*** and **Significance at 1 and 10%, respectively.
Source: Study Result (2016).

Table 5. OLS result for the satisfaction of students about security service across two universities (STATA estimation result).

Security_stud	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Debre_Berhan_Univ	1.393392	0.164913	2.39	0.018**	0.0680175	1. 7187
_cons	3.204545	0.1194132	6.84	0.000***	2.96894	3.44015

*** and **Significance at 1 and 5%, respectively.
Source: Study Result (2016).

Table 6. OLS result for satisfaction of teachers about security service across two universities (STATA estimation result).

Security_Tchr	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Debre_Berhan_Univ	0.62381	0.1723811	3.62	0.000***	0.28360	0.96403
_cons	3.04651	0.1236015	24.65	0.000***	2.80257	3.29045

***Significance at 1%.
Source: Study Result (2016).

value of 1.05491. In Addition, the average satisfaction of teachers of Debre Birhan University is greater than average satisfaction of teachers of Samara University by the estimate equal value of 1.51725.

Lastly, the OLS estimate for the satisfaction of support staff is shown in Table 4.

Here also, all coefficients are significant but at the different level. Particularly, the coefficients of ADU and AXU are significant with less precision (10%). The average estimate of janitorial service for support staffs of Samara University is 2.76666.

A statistically significant coefficient of Adigrat University shows that average satisfaction of support staff at Adigrat University is greater than average satisfaction of support staffs at Samara University by the estimated value of 0.30860. Similarly, the average satisfaction of support staff of Aksum University is greater than average satisfaction of teachers of Samara University by the estimate equal value of 0.32222. Again, the average satisfaction of support staffs of Debre Birhan is greater than average satisfaction of teachers of Samara University by the estimate equal value of 0.73882.

In general, we infer from the three estimates shown in Tables 2, 3 and 4 that SU had less satisfaction as rated

by teachers, students and support staff. The reason for this difference can be attributed to outsourcing, because unlike the remaining three, SU does not outsource. Besides, the difference in the average satisfaction of students, support staff and janitorial service was higher for Debre Birhan University. This may be because DBU has longer experience in outsourcing than the rest. This enables it to make strong controlling mechanisms, improve contract agreements, etc.

Perception of students, teachers and support staff towards security service

Apart from janitor service, estimates were made for the satisfaction of students, support staff and teachers from security service. Since DBU was the only university which outsourced the service by the time this study was done, we tried to compare satisfaction between DBU and SU.

Tables 5, 6, and 7 show average satisfaction for students, teachers and support staff respectively.

The coefficient of Samara University is 3.204545 and it is found statistically significant at 1% level. On the other hand, the coefficient of Debre Birhan University is

Table 7. OLS result for the satisfaction of support staffs about security service across two universities (STATA estimation result).

Security_support	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
Debre_Berhan_Univ	0.90256	0.583784	5.70	0.000***	0.5900351	1.21509
_cons	2.86666	0.1266056	22.64	0.000***	2.616835	3.116498

***Significance at 1%.

Source: Study Result (2016).

Table 8. OLS result for satisfaction of students about cafeteria service across two universities (STATA estimation result).

Cafeteria_stud	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Aksum_Univ	-0.137320	0.1832907	-0.75	0.454	-0.4981402	0.223499
Debre_Berhan_Univ	0.3425492	0.1823798	1.88	0.061**	-0.0164772	0.701575
_cons	2.863636	0.1320616	21.68	0.000***	2.603664	3.123608

*** and **Significance at 1 and 10%, respectively.

Source: Study Result (2016).

significant at 5% level. Since both coefficients are statistically significant, we may infer that the average satisfaction of students of DBU from security service was greater than the average satisfaction of janitor service by the average value of 1.393392. This result is strengthened by the directors' positive response that theft, crime, and misconduct were reduced after security had been outsourced.

As stated earlier, Table 5 shows the satisfaction of teachers from the security service. Statistically significant coefficients for both DBU and SU indicate that average satisfaction of teachers is greater than average satisfaction of teachers at Samara University by the estimated value of 0.62381.

The last estimate for the satisfaction from security service was done for support staff of both DBU and SU, as presented in Table 7.

Since both coefficients are significant with high precision (1% level), the conclusion is similar to that of estimates for students and teachers. Accordingly, the estimate of average satisfaction estimate of support staff of Samara University is 2.86666. Whereas, the average satisfaction of support staff of DBU is greater than average satisfaction of support staff at Samara University by the estimated value of 0.90256.

Perception of students towards cafeteria service

Table 8 shows students perception towards the cafeteria service. The estimate shows that the coefficient of DBU and SU are statistically significant. But, the coefficient of AXU is not statistically significant.

The implication is that the average satisfaction of students about cafeteria service at Debre Birhan University is greater than average satisfaction of

students at Samara University by a small amount of 0.3425492.

On the other hand, the coefficient of AXU is statistically insignificant. That means, statistically there is no significant difference in average satisfaction between students of AXU and students of SU from cafeteria service. This could be plausible because SU has outsourced student cafeteria partially.

The coefficient of Aksum University is statistically insignificant therefore we do not reject the null that its coefficient is zero.

Conclusions

(1) Outsourcing results difference in the level of satisfaction in the university communities, that is, Students, Academic and support staff of outsourced universities have a higher level of satisfaction than the non-outsourced counterparts.

(2) There is positive attitude towards outsourcing and by outsourcing the different noncore services universities were able to enjoy advantages such as improved resource management, administrative burden decreased, decreased staff complain, timely and quality service improved, operational and recruitment cost decreased.

RECOMMENDATION

Based on the findings, the researchers recommend that Samara University can better satisfy its community through outsourcing non-core services.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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Full Length Research Paper

The status quo of East African stock markets: Integration and volatility

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This paper presents the current stock markets' situation of East African markets compared to Johannesburg Stock Exchange (JSE). The study uses weekly price indices of Kenya, Tanzania, Rwanda, and Uganda, South Africa as a performance benchmark for the African market. The period used is from 17th January 2008 to 31st March 2017. The stock indices' returns results show in general that there is relatively moderate-to-low volatility. The Dar-es-Salaam stock index and the Johannesburg stock index show a higher volatility relative to the other stock market indices with the JSE showing the highest return of 0.117089 when compared to the East African market indices. The Vector Autoregressive (VAR) and Granger causality results capture the linear interdependencies among the given markets and illustrate that JSE has a low contributory impact on the returns on the East African markets. Besides, evidence shows that East African markets are independent, thus offering regional diversification benefits. However, integration is still underway.

Key words: East African stock markets, stock market integration, vector autoregressive, Johannesburg stock exchange, correlation coefficient, volatility.

INTRODUCTION

Less attention has been put on the African Stock Exchange Market, as this market is considered fragmented and full of risk (Alagidede, 2008). This attribution poses risk on the African market, as many investors get reluctant in venturing these markets. Therefore, in order to attract investors in the African market, a higher degree of financial African market integration should be achieved in the future. Integrated markets have a positive impact on the cross-border capital inflows and a decrease in the cost of capital that enhance the investment opportunities in the given

markets (Boamah, 2016). Due to the rapidly changing structure in the financial markets, during the post financial-crisis period, some studies like that of Caporale and You (2017) have proven the convergence in these markets that show the high degree of integration in these markets; consequently, low diversification opportunities. Therefore, investors try to find opportunities to invest abroad and realize the benefits of diversifying in other markets, like in the East African markets, due to the positive market trends in these markets in relation to the Gross Domestic Product (GDP) changes and growth

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opportunities in these markets over the years. Hence, there is a need to investigate volatility and co integration of East African stock markets regionally (in East Africa and using South Africa as a performance benchmark for the African region), and then examine which markets are least integrated and less volatile, and come with the most diversification chances.

According to Ncube and Mingiri (2015), integrated stock markets appear to be more efficient and effective as compared to fragmented stock markets due to the ease of flow of information and low transaction costs. Furthermore, it is worth mentioning that discrepancies between stock market indices offer good possibilities for international investors to diversify in African markets. Alagidede (2008), who investigated the linkage between African stock markets and the other stock markets in the world, has also proved the fact that integrated stock markets are more efficient than segmented markets.

Financial integration can be advantageous for East African economies by improving information sharing among the financial institutions across East Africa. It can also enhance liquidity by providing companies and consumers more financing options, which results in increased competitiveness on the international stock market. Nevertheless, there are risks that arise from stock market linkages, for instance contagion (Roman et al., 2016). Wongswan (2003) defines contagion as surfeit conditional correlations among countries' asset returns that cannot be explained by economic fundamentals or systematic risks.

However, there is a risk of market disruptions when one market is affected by a crisis. Researchers like Xiong and Han (2015) illustrate volatility spill over effects between foreign exchange and stock markets in their work. Therefore, volatility spillover effect reflects the variable's second moment relationship, in which market volatility is influenced not only by its own early stage, but also by volatility coming from other markets (Xiong and Han, 2015). International investors interested in diversifying in East African stock markets will carefully observe the trend of stock returns before making any investments. Hence, volatility plays a key role in measuring the stocks' riskiness using standard deviation.

According to Alagidede (2008), volatility is a metric that indicates stock returns' deviations from the mean or average return. Thus, the higher the volatility, the riskier the investment on the security. The trend of volatility in East African securities is mostly outlined by illiquidity of the markets, operational inefficiency and the size of the markets (Alagidede, 2008). This study ascertains the interdependencies between the East African Area (EAA) stock markets, which include the Nairobi Securities Exchange (NSE), Uganda Securities Exchange (USE), Dar-es-salaam Stock Exchange (DSE), and Rwanda Stock Exchange (RSE) as well as to uncover diversification opportunities within the region. There is a gap in the literature concerning a comparison between

the best performing African Stock Exchange with regional stock markets like the East African Area stock markets. Johannesburg Stock Exchange (JSE), South Africa, is the most pronounced stock exchange in Africa, thereby, expressing the performance benchmark in African stock markets. This study therefore, contributes to the global financial integration literature. The stock return behaviour illustrated in this paper, would be useful for academic research, for regulators and for investors interested in venturing East African markets.

Furthermore, this paper also explores volatility in stock returns and the causal relationship between East African markets and Johannesburg Stock Exchange. The study implements weekly data from 7th January 2008 until 8th April 2017. Therefore, the following research questions are introduced:

- 1). Is the East African stock markets affected by the shocks and changes from the Johannesburg stock market?
- 2). Is there a relationship between East African stock markets and Johannesburg stock market?
- 3). Is the stock market movements related to each other in reference to volatility of stock returns?

Defining capital market integration

Capital market integration is a situation where prices in different markets move together. Price co-movements are exhibited by the correlation between the returns in each market (Lumenga-Neso Mbuku, 2001). According to Lumenga-Neso (2001), assets with the same risk in completely integrated markets have comparable returns regardless of the market. Therefore, the correlation coefficient between concurrent returns in these markets can illustrate the degree of market integration. The higher the correlation coefficient, the stronger the market integration.

In addition, other researchers define capital market integration as the free movement of capital across the boundaries in a region with minimal transaction costs or friction. Therefore, there is a perfect capital mobility in integrated financial markets (Mensah, 2006). Nevertheless, there are certain pre-conditions that need to be fulfilled for a market to be defined as fully integrated. Firstly, there should be the same set of rules for all participants in the market, and secondly, the participants should have a uniform access to the set of financial instruments or services (Mobarek and Mollah, 2016). These pre-conditions are important to ensure that no market participant is discriminated in any way.

Lumenga-Neso (2001), states that, in perfect integrated markets, the expected real interest rates are similar in the markets of interest. Additionally, direct financial integration, implies the law of one price, which means that an investor can expect similar returns on investments on distinct markets after the required adjustment for risk

Table 1. List of East African Stock Exchanges and Johannesburg Stock Exchange (JSE).

Economy	Exchange	Location	Founded	Listings	Mkt cap (US \$ billions)
Kenya	Nairobi Securities Exchange	Nairobi	1954	64*	18.8*
Uganda	Uganda Securities Exchange	Kampala	1997	15*	7*
Tanzania	Dar-es-Salaam Stock Exchange	Dar-es-Salaam	1997	15*	11*
Rwanda	Rwanda Stock Exchange	Kigali	2010	8*	2*
Burundi	NA	NA	NA	NA	NA
Eritrea	NA	NA	NA	NA	NA
Ethiopia	NA	NA	NA	NA	NA
Somalia	Somali Stock Exchange	Mogadishu	2011	20***	NA
South Sudan	NA	NA	NA	NA	NA
Sudan	Khartoum Stock Exchange	Khartoum	1992	NA	NA
South Africa	Johannesburg Stock Exchange	Johannesburg	1887	303	951.3**

Note. (Nairobi Stock Exchange, 2017).

*, **, ***, Reference year 2017, 2016, 2015 respectively.

and transaction costs. On the other hand, indirect financial integration attributes that the return on an investment in one country is indirectly associated to the return on investments in other countries (Lumenga-Neso, 2001). The literature exhibits three financial indicators that exemplify the level of financial market integration. First, price-based indicators, which examine the co-movement between asset prices (Fauziah, 2018), integration based on law of one price – see for example Adam et al. (2002). Secondly, quantity-based indicators which are statistical data that quantify determinants of demand and supply of investment opportunities and capture the importance and size of financial connections between countries. Thirdly, regulatory and institutional measures, which include laws and regulations, trigger the barriers across different financial markets (Perera and Wickramanayake, 2012). Some scholars use changes in returns dispersion to test the law of one price, for instance Solnik and Roulet (2000), Baele et al. (2004), Byström (2006), and Eiling and Gerard (2007). These studies show highly correlated returns move together on the up or the downside, while lower correlations depict divergence in returns.

This study adapts the price-based measures that capture disparities in assets prices across different national markets and the regulatory measures' indicators that analyse the price co-movements of different stock indices from the mentioned countries besides uncovering the rules and restrictions that hinder the allocation of financial resources across these countries. In addition, volatilities in stock market returns across the markets are compared to measure their impact in the chosen markets.

OVERVIEW OF THE EAST AFRICAN STOCK MARKETS

East African stock markets are facing some challenges that are slowing down the integration of these markets.

Political turmoil and underdevelopment in information exchange systems are some of those challenges to be overcome. The depth of the different markets in East Africa is measured by their market capitalisation and listings (Ncube and Mingiri, 2015). The upcoming part gives an insight in the development of the East African stock markets.

East African stock markets capitalisation

East African stock markets are not as striking as some stock markets in Northern and Southern Africa. Kenya has, by far, an expansive and the most advanced bond market in the region, comprising about 67% of the total outstanding government bonds in issue (African Financial Markets Initiative, 2016). Furthermore, according to Allen et al. (2011), East African markets are deemed the most illiquid markets in Africa as they hold less than 1% value in stock traded on their stock markets in relation to their GDP (Allen et al., 2011: 5). However, more support to integrate the East African Area (EAA) capital markets in order to improve their investment features is coming from the East African Securities Regulatory Authorities (EASRA). This body comprised of capital market regulators, working on legislation that will enable companies in Kenya, Uganda, Tanzania and Rwanda to float bonds within the region (African Financial Markets Initiative, 2016). Some efforts are being done to facilitate regional integration among the East African countries, which comprise of eliminating restrictions on cross-border trade and free movement of capital and services across borders (World Bank, 2014). This is, of course, a chance for EAA to integrate its stock market activities in the global market. Kenya has the oldest and most pronounced stock exchange market in East Africa compared to the other capital markets in Uganda, Tanzania and Rwanda as shown in Table 1. This Table clearly shows that Kenya has the oldest stock exchange

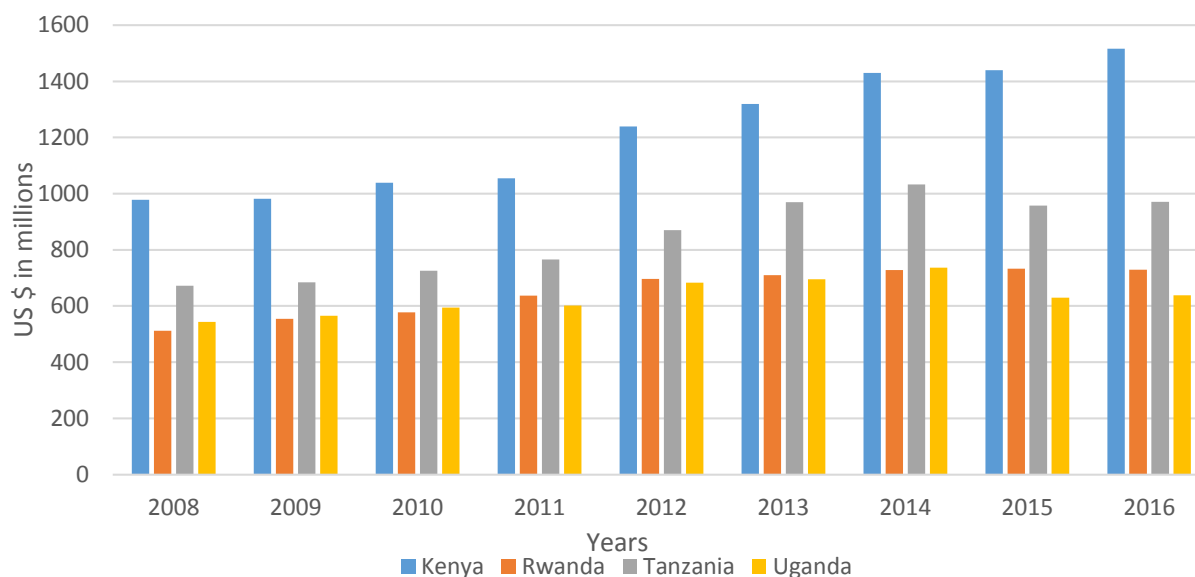


Figure 1. GDP per capita in US\$, 2017.
Source: Author's own representation with IMF data, 2017.

in East Africa founded in 1954, followed by Dar-es-Salaam founded in 1996. In addition, the biggest market capitalisation¹ of around US\$18.8 billion is the Nairobi Securities Exchange (NSE) of Kenya, followed by Tanzania at US\$11 billion, Rwanda at just under US\$2 billion and Uganda a value of US\$7 billion (Nairobi Stock Exchange, 2017).

Table 1 also illustrates that South African JSE can be used as a performance benchmark for the African stock markets as it is the oldest stock market in Africa with an outstanding market capitalisation of US\$ 951.3 billion (World Bank, 2016).

Features of the East African region and stock markets

East African countries are stated in Table 1. However, the countries of interest in this paper are Kenya, Rwanda, Tanzania, and Uganda due to data availability. These aforementioned countries have a total population of approximately 147 million people (International Monetary Fund, 2017). Tanzania has the highest population of around 49 million followed by Kenya with a population of around 45 million people. Tanzania ranks third with a population of around 41 million and the least population rate is in Rwanda with 12 million people. The population

in East African countries matters because of GDP per capita (Vossos, 2019). The GDP level of these countries is illustrated in Figure 1. This Figure shows a positive trend in population over the years from the year 2008 until 2016. The highest trend in GDP can be seen in Kenya, between the year 2012 and 2016 where a gradual increase from US \$1239 mio to US \$516 mio in GDP is noticed.

Restricted securities operations in the East African Area

Table 2 illustrates the restrictions in operations in the East African region. This table demonstrates how the markets in East Africa are yet to align their securities operations in the region to make it easier for investors to enter these markets (African Securities Exchanges Association, 2014). Local purchase by non-residents of collective investment schemes (mutual funds) is allowed in all the markets but the other security operations still need alignment. The next chapter illustrates the theoretical background of the existing literature in this area. Various scholars have researched on stock market integration concluding different results on how integrated the stock markets are.

THEORETICAL BACKGROUND OF EXISTING LITERATURE

According to Kapinguria et al. (2014), financial or stock market integration prevails in three dimensions: nationally

¹ "Market capitalisation or market cap is the market value of a company's issued share capital or the number of shares issued times the current price of those shares on the stock market."

Table 2. Securities Operations that are Restricted in East African Community.

Securities operations	Kenya	Rwanda	Tanzania	Uganda
Foreign shares purchase by residents	Open	Open	No	Open
Local purchase by non-residents of shares	Open	Open	No	No
Participation of residents in IPO's in foreign capital markets	Open	Open	No	Open
Local sale by non-residents of foreign shares	Open	Open	No	Open
Foreign sale of shares by residents	Open	Open	No	Open
Local purchase of bonds and other debt instruments by non-residents	Open	Open	No	No
Local purchase by non-residents of collective investment schemes (mutual funds)	Open	Open	Open	Open
Foreign purchase / sale of money market instruments (debt securities)	Open	No	Open	Open

Source: African Securities Exchange Association (ASEA) Year Book Annual Report (2014).

(in a given country), regionally (in a particular region e.g. in the African region) and globally (combining different regions and countries together). Vertical integration exists between domestic markets and international financial markets (e.g. African and European markets), while horizontal integration occurs among domestic stock market segments (e.g. integration among different African markets) (Kapinguria et al., 2014). This study focuses on horizontal integration among the East African region stock markets. This is because they share the same geographical region. However, JSE is used as a performance benchmark for the African region as it is one of the pronounced stock market in Africa.

Using samples of five African stock markets with monthly data ranging from February 2000 to September 2008, Ncube and Mingiri (2015) found out that South Africa was the best performing stock market compared to Botswana, Namibia, Mauritius and Nigeria. Despite contagion risk that may arise due to stock market integration, researchers like Bracker (1999), Stulz (1999), Irving (2005), and Alagidede (2009), have proven the edge of integrated markets. These researchers imply that integrated capital markets strengthens competition, lowers the cost of information sharing among the members and enhances innovation across different institutions, thereby providing a wider range of investment products for potential international investors in the market (Yabara, 2012).

On the other hand, other researchers' findings show that highly segmented markets have an inflated level of risk, which inevitably affects the local cost of capital; affecting business financing and, hence, economic growth. The results also crystalize how the world stock markets are progressively becoming integrated (Bekaert, 1995; Bekaert and Harvey, 1995; Kim and Singal, 2000).

Some studies show that developing stock markets are less correlated with developed stock markets which may propose remarkable diversification advantages for international investors (Bekaert and Harvey, 1995; Yeoh et al., 2010; Neaime, 2012). Despite the fact that African financial markets are fast growing and becoming more

significant for investors, there is still less in relation to the degree of integration and volatility of African markets with the global financial markets. Researchers like Umutlu et al. (2010) and Ali et al. (2011) have focused on the level of stock market development in emerging markets, while others like Yu et al. (2010), have studied the level of integration between different markets in Asia on a regional basis.

Various empirical research apply the co integration analysis approach to check for integration among different markets. Serletis and King (1997) and Bley (2009) explore capital market integration in European markets. Manning (2002), Yu et al. (2010) Wang and Huyghebaert (2003) exert this approach to investigate the integration in Asian capital markets. They only vary from each other in the countries used and the time period implemented in their analysis. Nonetheless, less has been said about integration and volatility in stock returns in African stock markets, especially in the East African Area.

DATA AND METHODOLOGY

The data for analysis used in this study comprises of weekly (Friday's) closing price indices of four East African countries: Kenya, Tanzania, Rwanda, and Uganda and South Africa as a benchmark for the African market. If Friday is a holiday, then Thursday's closing price is used. The period used is from 17th January 2008 to 31st March 2017 with 479 observations as generated by Eviews software. The data used is displayed in Table 3. Data on stock market indices was taken from www.tradingeconomics.com all the data sets are in local currencies and illustrated in Table 3. The missing values were catered for by interpolation.

To determine the weekly returns and volatility of stock returns, the Box Jenkins Model is implemented. The weekly stock log returns for these selected East African stock indices are calculated as follows:

$$\ln(P_t / P_{t-1}) = \text{Index Return} \quad (1)$$

The natural log difference approach is used to calculate the stock returns, where P_t and P_{t-1} are the current and previous day closing prices respectively.

Table 3. Summary of stock market data.

Country	Index	Source	Beginning date
Kenya	NSE 20	www.tradingeconomics.com	29 th July 2010
Tanzania	DSE All Share	www.tradingeconomics.com	7 th January 2008
Rwanda	RSE All Share	www.tradingeconomics.com	11 th January 2013
Uganda	USE All Share	www.tradingeconomics.com	7 th January 2008
South Africa	JSE	www.tradingeconomics.com	7 th January 2008

Source: Author's own presentation.

Unit root test

The primary step in estimating the property of a time series is by conducting a unit root test. The most popular way is by using an Augmented Dickey Fuller (ADF) test. According to Arltová and Fedorová (2016), there are different models to keep in mind before running an ADF test. The three regression models are:

First, there is no constant and no trend:

$$\Delta y_t = \gamma y_{t-1} + v_t \quad (2)$$

Second, there is a constant, but no trend:

$$\Delta y_t = \alpha + \gamma y_{t-1} + v_t \quad (3)$$

Lastly, there is a constant and a trend:

$$\Delta y_t = \alpha + \gamma y_{t-1} + \lambda_t + v_t \quad (4)$$

The dissimilarity among the three regressions is the existence of the deterministic elements, α and λ_t . Equation 2 is a pure random walk model, Equation 3 adds an intercept or a drift term and Equation 4 includes both a drift and a linear time trend. Before performing a co integration test, one has to make sure that the series are non-stationary and thus integrated of order 1. This study implements the Augmented Dickey Fuller test on the series as this seems to be the standard measure used by most scholars to perform unit root tests. The data is differenced to confirm the series order. Phillips-Peron concept is used for lag selection. The ADF test is as follows:

$$\Delta y_t = \alpha + \delta y_{t-1} + \gamma t + \sum_{i=1}^n \beta_i \Delta y_{t-1} + \varepsilon_t \quad (5)$$

Where alpha (α) is a constant and gamma (γt) is a time trend, which assumes that y_t will be quadratic, t is linear, and n is the final amount of lag order of the autoregressive process. The lags i.e. Δy_{t-1} are the estimators of the β_i that have $t -$ distributions. The unit root test is performed under the hypothesis $\delta = 0$ against the alternative hypothesis of $\delta < 0$. If we reject the null hypothesis, this means that the series is stationary and if the null is not rejected, this indicates that the series is non-stationary. In the ADF test, the negative number under t -statistic is taken into consideration and the more negative it is, the stronger the rejection of the null hypothesis.

Granger causality test

Granger causality is a circumstance in which a one time series

variable consistently and predictably changes before another variable (Studenmund, 2006: 431). Granger causality is essential as it enables examination of which variable precedes the other, as this is important for forecasting purposes. Granger proposed that, to check whether A Granger-caused Y, one should run:

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \beta_p Y_{t-p} + \alpha_1 A_{t-1} + \alpha_p A_{t-p} + \varepsilon_t \quad (6)$$

and test the null hypothesis that the coefficients of the lagged As (the α s) are equal to zero. If we reject this null hypothesis using the F-Test, then we prove that A Granger causes Y. The application of this test means running two Granger tests, one in each direction, testing for Granger causality in both directions by testing the null hypothesis that the coefficients of the lagged Ys (α s) are equal to zero (Studenmund, 2006).

$$Y_t = \beta_0 + \beta_1 A_{t-1} + \beta_p A_{t-p} + \alpha_1 Y_{t-1} + \alpha_p Y_{t-p} + \varepsilon_t \quad (7)$$

If the F-test is significant for Equation 6 and not for Equation 7, then we can conclude that A Granger causes Y. Chapter 5 introduces the results of the descriptive analysis with the unit root test results and the correlation test results.

The vector autoregressive (VAR) time series model

The Vector Auto regressive (VAR) Model is one of the most successful, flexible, and easy to use models for the analysis of multivariate time series. It is a natural extension of the univariate autoregressive model to dynamic multivariate time series. The VAR Model has proven to be especially useful for describing the dynamic behaviour of economic and financial time series and for forecasting. It often provides superior forecasts to those from univariate time series models and elaborate theory-based simultaneous equations models. Forecasts from VAR models are quite flexible because they can be made conditional on the potential future paths of specified variables in the model (Canova, 1995).

To illustrate the mechanism, this study used two lags ($k=2$) of each variable. Schwartz (SIC) and Akaike (AIC) Information Criterion using 2 lags in the general VAR model determined the lag length. JSE is the independent variable and the East African stock market indices are the dependent variables. The estimates of the parameters of the equation is given below in Table 4 with data series spanning from 2008 to 2017.

The output of the JSE VAR effect on the East African Market is to be interpreted in the old fashion. Of course, with several lags of the same variable, each estimated coefficient will not be statistically significant, possibly because of multicollinearity. However, collectively, they may be significant based on the standard F test. In addition, Figure 2 shows the impulse response in the given markets.

This confirms the low impact of changes or shocks from the

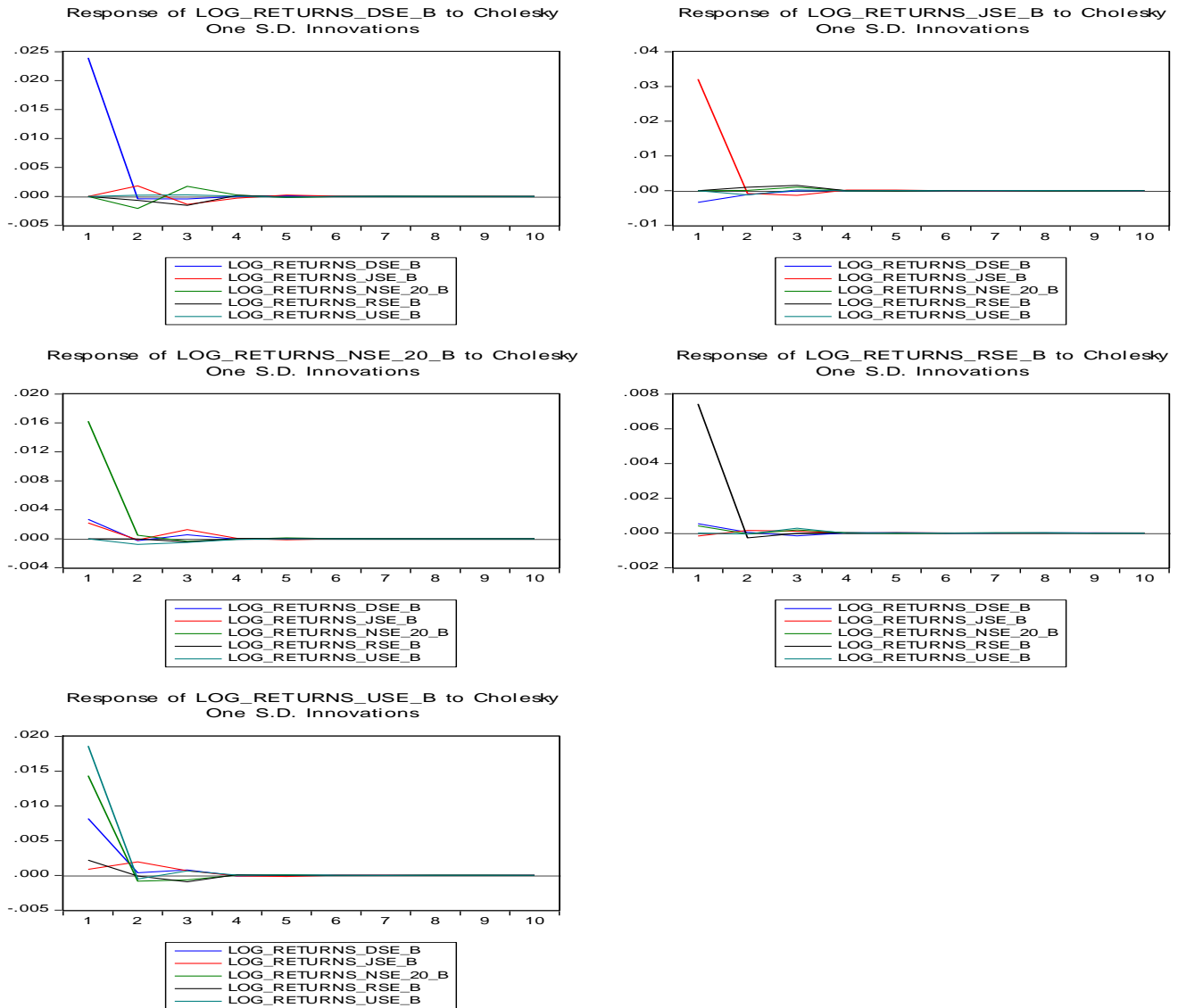


Figure 2.The impulse response pattern of the log returns in each market. Source: Author’s own representation.

given markets to each other.

Interpretation of VAR model results

From Table 4, the coefficient of LOG_RETURNS_DSE_B at period one is 0.038 on the average. This implies that a 1% increase in the log returns of the JSE will have 0.038% negative marginal contributory on the Dar-es-Salaam stock index return. This further confirms the degree of independence in the respective stock markets with respect to return (Demirhan and Atyb, 2013). The relation is also found to be not significant as $p < 0.05$. At lag two, the contributory impact is also negative and insignificant.

Due to the idea of infinite memory of a variable and the persistence of random shocks, current values are chiefly affected by their past values over time. JSE negatively influences its period one and two past values by 0.02 and 0.03% respectively, and not significant ($p < 0.05$). The NSE 20 Index for Kenya estimate shows a

positive contributory impact of 0.058 and 0.039% and Rwanda stock index (USE) estimates shows a higher positive contributory impact of 0.150 and 0.20% compared to other East African Markets. The Uganda stock Index (USE) shows a negative and positive contributory impact of 0.067 and 0.01%.

The Coefficient of Multiple Determination (R^2) of the JSE regression equation is 0.009351 indicates the percentage of the total variations in the endogenous variable(s) that are explained by the variations in the entire lagged endogenous variable as shown in Table 4. In essence, as expected, the JSE model suggests a very low predictive power. This means the shocks or changes on the JSE stock exchange have less impact on the given East African stock markets. Figure 2 displays the response of the Johannesburg (JSE) stock index return, Uganda stock Index (UGS), Rwanda stock index (RSE), Dar-es-Salaam stock index (DSE) and NSE 20 Index for Kenya (KES) to a one-standard deviation structural innovation. Short-dashed lines show the two-standard-error confidence intervals. The discussion of the impulse response functions (IRFs)

Table 4. VAR Model parameters.

LOG_RETURNS_JSE_B	
LOG_RETURNS_DSE_B(-1)	-0.038802 (0.06601) [-0.58780]
LOG_RETURNS_DSE_B(-2)	-0.020579 (0.06588) [-0.31236]
LOG_RETURNS_JSE_B(-1)	-0.027825 (0.04700) [-0.59206]
LOG_RETURNS_JSE_B(-2)	-0.039523 (0.04716) [-0.83804]
LOG_RETURNS_NSE_20_B(-1)	0.058752 (0.11506) [0.51063]
LOG_RETURNS_NSE_20_B(-2)	0.039480 (0.11492) [0.34355]
LOG_RETURNS_RSE_B(-1)	0.150233 (0.20247) [0.74201]
LOG_RETURNS_RSE_B(-2)	0.202995 (0.20267)
LOG_RETURNS_USE_B(-1)	-0.067134 (0.08002)
LOG_RETURNS_USE_B(-2)	0.010273 (0.07982) [0.12870]
C	0.003713 (0.00153) [2.42186]
R-squared	0.009351
Adj. R-squared	-0.011908
Sum sq. resids	0.484734
S.E. equation	0.032252
F-statistic	0.439868
Log likelihood	966.8301
Akaike AIC	-4.007673
Schwarz SC	-3.911567
Mean dependent	0.003337
S.D. dependent	0.032062

Source: Author's calculations.

mainly centres on the responses of each stock index return to their own and other shocks. Given that supply shocks and global

demand shocks, as captured by global real economic activity shocks, are treated as contemporaneously exogenous to the other

Table 5. Basic statistics of weekly return for January 2008 to March 2017.

	DSE log returns	JSE log returns	NSE 20 log returns	RSE log returns	USE log returns
Mean	0.002135	0.003453	-0.001519	0.000361	-9.72E-05
Q2	0.003406	0.004812	-0.000459	0.000000	-0.00037
Max.	0.057401	0.117089	0.041358	0.060004	0.073727
Min.	-0.12455	-0.091926	-0.073559	-0.021715	-0.089015
SD	0.023977	0.032147	0.016584	0.007384	0.024872
JB	0.000000	0.000002	0.000000	0.000000	0.000226
SKN	-1.289997	0.368533	-0.563177	2.893796	-0.300454
KT	8.388958	3.892956	5.393900	23.80233	3.693041

Note. Q2= Median. SD=Standard Deviation. JB=Jarque Bera (prob.). SKN= Skewness. KT=Kurtosis.
Source: Author's calculations.

Table 6. Statistical correlation comparison between JSE and the East African Market Indices.

	DSE log returns	JSE log returns	NSE 20 log returns	RSE log returns	USE log returns
DSE log returns	1.000000	-0.102692	0.148881	0.075247	0.327303
JSE log returns	-0.102692	1.000000	0.117823	-0.029169	0.000856
NSE 20 log returns	0.148881	0.117823	1.000000	0.062329	0.615265
RSE log returns	0.075247	-0.029169	0.062329	1.000000	0.143265
USE log returns	0.327303	0.000856	0.615265	0.143265	1.000000

Source: Author's calculations.

variables in the system, it is interesting to analyse how the each index return react to their own shock (Canova, 1995).

DESCRIPTIVE ANALYSIS RESULTS

Summary statistics for the returns series are shown in Table 5. The five indices show in general that there is relatively moderate-to-low volatility. DSE index and JSE index show a higher volatility relative to the other stock market indices with the JSE showing the highest return of 0.117089 and DSE has the lowest return of 0.12455.

Consistent with theoretical market expectation, all the indices have a relatively low mean return with particular exception to NSE 20 Index for Kenya and Uganda stock index (USE), both of which produced a negative mean value implying the long-term depreciation in dividend gains in the markets. The Jarque-Bera statistic confirms that not all of the series are normally distributed which further implies that they have non-symmetric distributions. Negative Skewness for the Dar-es-Salaam stock index (DSE), NSE 20 Index for Kenya (NSE) and Uganda stock index (USE) returns points to a thicker lower tail. The asymmetric tail indicates more negative values on the left. The kurtosis statistics indicate that all the returns series are more peaked than a normal distribution. The correlation test is to essentially test the degree of relation one variable has to the other with a goal of establishing covariance to quantify how strong the returns are related

(Capital Markets Authority, 2010). This implication is displayed in Table 6.

The lowest correlation is experienced between the JSE log return and DSE. This implies that as the return on the JSE rises, DSE return falls by 10% and RSE falls by 2.9%. It would be advisable for Tanzanian and Rwandese investors to invest in JSE as the stock markets are anti-correlated for diversification purposes. The highest positive correlation coefficient is between JSE and NSE 20 Index for Kenya (NSE) hence, when JSE returns rise, NSE returns responds with an 11% increase in log returns.

Unit root test results

Two or more nonstationary time series are co-integrated if a linear combination of the variables is stationary. Therefore, the first step in the analysis is to examine each series for the presence of unit roots, to determine if the stock index return series are non-stationary. Non-stationarity is a precondition for co integration; additionally, all the series must be integrated of the same order. For this, the Augmented Dickey-Fuller (ADF) and Phillips and Perron (PP) tests are applied to the levels and first differences of each series; the null hypothesis is that a series is non-stationary, so rejection of the unit root hypothesis supports stationarity (Canova, 1995). Table 7 displays the unit root results. Unit root tests are

Table 7. Unit root test results.

Order of Integration	Variable	ADF	PP
I(0)	DSE log returns	-22.31734***	-22.31315***
I(0)	JSE log returns	-22.35162***	-22.35784***
I(0)	NSE 20 log returns	-21.35959***	-21.35832***
I(0)	RSE log returns	-22.67347***	-22.68017***
I(0)	USE log returns	-22.41115***	-22.41655***

Note: ADF=Augmented Dickey-Fuller Unit Root Test. PP=Phillip-Perron Unit Root Test

I(0)=integrated at order 0 or variable at level (Author's calculations)

***significant at 1% level, **significant at 5% level & *significant at 10% level

Table 8. VAR Granger causality/block exogeneity wald tests.

Dependent variable: LOG_RETURNS_JSE_B				
Excluded	Chi-sq	df	Prob.	
LOG_RETURNS_DSE_B	0.435919	2	0.8042	
LOG_RETURNS_NSE_20_B	0.404684	2	0.8168	
LOG_RETURNS_RSE_B	1.503983	2	0.4714	
LOG_RETURNS_USE_B	0.718852	2	0.6981	
All	3.356830	8	0.9100	

Note. Chi-sq=Chi square. df=degrees of freedom. Prob.=probability.

Source: Author's calculations.

conducted using the Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) tests. All the variables are integrated at order 1(0), in other words stationary at level and hence no need for differencing and co integration.

Granger causality test results

We can test if the endogenous variable can be treated as exogenous. In other words, they are 'truly' endogenous. The chi-square X^2 (Wald) statistics is for the joint significance of each of the other lagged endogenous variables. Prob. is the p-value of that statistics as illustrated in Table 8. According to Table 8 above, all variables in this model are truly endogenous. Given that $p > 0.05$, we accept the null hypothesis of exogeneity (no causality) for all the causality between the log returns of East African markets and JSE. Therefore, it was concluded that the respective returns from East African stock market indices do not Granger-cause JSE market returns.

Conclusions

This paper explores the status quo of the selected East African stock markets in relation to JSE stock index. Hence, the paper investigates the relationship and volatility between these markets and Johannesburg stock

market as a performance benchmark for African stock markets. The objective of the paper is to determine if the relationship between the stock markets has an influence on volatility of stock returns in the other markets. In addition, the aim was also to find out if the shocks and changes on JSE stock market have an impact on the given East African stock Exchanges. The study implements Vector Autoregressive Model (VAR), to capture the linear interdependencies among JSE and the East African stock markets. In essence, as expected, the JSE model suggests a very low predictive power. The results in this model show that shocks or changes on the JSE stock exchange have less impact on the given East African stock markets. The less market response behaviour is justified by the impulse response function results. This is because JSE is the performance benchmark in Africa, one would expect the changes from this market to influence the other African markets, but this is not the case here. This could be because of the geographical concentration of the East African stock markets.

The Granger Causality Test results helps us to answer the question whether changes on East African stock markets have an impact on JSE. The results show that the East African markets are not truly endogenous and as such the returns from these stock markets do not Granger-cause JSE market's returns. The low market response among the given markets, show that these markets are independent. Moreover, the low correlations

among the East African stock markets offer diversification opportunities for investors in the given stock markets. It will be interesting to examine, in the future, how East African stock markets are integrated with the rest of world markets to illustrate diversification opportunities for international investors.

There is no potential conflict in this research as this research is fully supported by my employer and this is a good chance for employees to get further studies in this case, a PhD degree.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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