

Effect of Back-Flush Accounting Techniques on the Financial Performance of Quoted Manufacturing Firms in Nigeria

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Abstract

This study examined the effect of Back-flush Accounting techniques on the financial performance of selected quoted manufacturing firms in Nigeria. In order to achieve the objectives of the study, a total of thirty-nine firms quoted on the Nigerian stock exchange market under the consumer goods, industrial goods and conglomerates sector with updated financial information for the period under study were selected and analyzed. Data for the study were extracted from annual reports and accounts of selected companies for the period 2012-2018. Data for back-flush accounting proxy by inventory turnover and firm's financial performance estimated by return on capital employed (ROCE) and return on assets (ROA) were extracted from the annual reports and accounts of selected companies. In testing the research hypothesis, the study adopted both descriptive statistics and simple regression techniques for quoted sampled firms analyzed with the aid of Statistical Package for Social Sciences (SPSS) version 20. The findings revealed that back-flush accounting have positive and significant effect on return on asset of manufacturing companies in Nigeria. Also, back-flush accounting has a positive relationship but insignificant impact on return on capital employed of manufacturing companies in Nigeria. Consequent upon this study, it was recommended that manufacturing firms should Endeavour to implement and adopt the philosophy of back-flush accounting which has enormous merits in inventory control and irrelevant cost reduction in an advanced manufacturing environment. Manufacturing firms should invest in knowledge capital (that is intellectual capital), information technology (ICT) and modern management accounting techniques to enable them achieve a better corporate objective and to maximize shareholders' wealth.

Keywords: *Back-flush Accounting, Return of Asset, Return on capital employed*

Introduction

The traditional focus of management accounting has been on cost control or cost reduction. Lower costs mean that lower prices can be charged to customers, or higher profits can be made. However, many companies now seek to increase customer satisfaction and meet customer needs. To meet customer needs, other factors in addition to cost can be important particularly product (or service) quality. Traditional management accounting ignores factors such as quality, reliability or speed of service (Saleh, 2015).

Many traditional management accounting techniques have a short-term focus. However, traditional management accounting systems do not provide senior managers with the information they need for making strategy decisions. Strategic decision-making needs information about competitors, customers, developments in technology and other environmental (external) factors. Management information systems should be capable of providing the information that managers need. For the management accounting system to be the main management information system within an organization it must be able to provide the necessary variety of information – financial and non-financial, long term as well as short-term – using suitable techniques of analysis (ICAN, 2014). The trend of this shift has resulted to a range of remarkable innovators in management accounting. This is evident through the adoption of innovative modern management accounting techniques like back-flush Accounting, activity based costing, strategic management accounting, just in time, lifecycle costing and contemporary performance measurement systems such as balance score card. As a result of this new developments some researchers argue that relevant lost may be regained in the near future. This resulting gain seems to be gradually adopted by Nigerian manufacturing companies.

Back-flush accounting is synonymously interchanged with back-flush costing. It is a cost accounting system which focuses on the output of an organization by working backward to allocate costs between cost of goods sold and inventory (Adeniyi, 2014). Back-flush Costing is a method of costing associated with a Just-In-Time production system, which applies cost to the output process. Back-flush costing is a simplified procedure for the allocation of costs between inventories and cost of sales. Cost do not mirror the flow of products through the production process, but are attached to the output produced (finished goods inventory and cost of sales), on the assumption that such back-flushed costs are realistic measure of the actual costs incurred (Chartered Institute of Management Accountant, 2014).

Back-flush Accounting aims to eliminate detailed accounting transactions that are carried out in a cost accounting environment. It focuses on the output of the organization and then work backward in the allocation of costs rather than tracking the movement of materials through the production process. It is appropriate for organizations that are trying to keep inventories to the barest minimum. It does not maintain separate accounting for work-in-process (WIP). One of the variants of back-flush accounting is that it maintains a single account for raw materials and WIP accounts, which can be called Raw and In-Process account (RIP) otherwise called raw material account (Adeniyi, 2014).

Statement of Problem

In the past, management accounting responsibility was limited. But the current business environment includes all levels of management (Stefanou & Athanasaki, 2012). Companies have found that in order to reduce product cost and irrelevant cost associated to production effectively, and gain a larger share of the market, traditional costing techniques should be replaced with the strategic management accounting techniques.

Adoption of successful Strategic management Accounting Techniques (SMAT) is a major challenge for many organizations and depends on many factors. Back-flush accounting technique has been found as one of the strategic management accounting techniques that is associated with Just in Time (JIT) which is a better tool for inventory cost reduction. Changes in business processes of organization related to the successful implementation of back-flush accounting technique have significant implications for all parts of the accounting and management accounting especially (Tanyani & Gilaninia, 2015).

However, Johnson and Kaplan 1987, cited in Shah, Malik, and Malik, (2011) observed that traditional management accounting systems are inadequate in fulfilling this role. They stated that the focus of traditional management accounting is “too late, too aggregated and too distorted to be relevant for managers’ planning and control decisions”. Ramljak and Rogošić (2012) observed that the focus of traditional management accounting on financial information, thereby neglecting the operational environment of the business where decisions are made and implemented, is a major weakness of the system in modern day business contextualization. Ramljak and Rogošić (2012) further noted that ‘much of the domain of conventional management accounting appears to be more associated with ‘tactical’ than ‘strategic’ management.

The criticism of “relevance loss” of accounting information due to the usage of traditional techniques has given birth to new cost accounting techniques such as Activity Based Costing, Target Costing, Life Cycle Costing, Just in Time System, Back flush Accounting and Throughput Accounting among others. Since the arrival of the new cost and management accounting techniques, it is worthwhile to know the extent at which the new techniques are being used and also to ascertain if the conventional techniques are still in vogue despite the criticisms.

Back-flush accounting which is connected with the aim of responding to the requirements of JIT production system has been made in response to the advances and innovations of production. In reality Companies are still finding it difficult to cope with the modern costing systems due to cumbersome calculations, delay in tracking the costs, lack of technological advancement knowledge, inefficient labour cost system and lack of understanding of the relevance of the use of the modern trend in the costing system especially the back-flush accounting system. The modern management accounting techniques have been seen to have the following advantages namely speed, accuracy, improved quality, reduction in cost per unit, reduced labour cost et cetera (Amahalu, Nweze & Obi, 2017).

Some manufacturing companies in Nigeria are not even aware of the importance of strategic management accounting techniques which leads them to engage in activities which do not add value to their business and in which they do not have competitive ability thus leaving their core competent area to suffer and incur unnecessary costs (Onalapo & Oladejo, 2013). Moreover, it is observed that there has been tremendous work on topics related to strategic management accounting techniques, but few among them that attempted to focus on back-flush accounting while establishing the relationship with corporate performance. It is on view of this that the present study decided to examine the effect of back-flush accounting techniques on the financial performance of manufacturing firms in Nigeria. The specific objective of the study is to determine if there is any significant relationship between Back-flush Accounting and Return on capital employed and return of Asset of quoted firms in Nigeria.

Review of related literature

Back-flush Accounting

Back-flush accounting is a method of cost accounting that is consistent with JIT systems. Traditional cost accounting systems for manufacturing costs are 'sequential tracking' systems. They track the costs of items as they progress through the manufacturing process, from raw materials, through work in progress to finished goods. At each stage of the manufacturing process, more costs are added and recorded within the cost accounting system.

Backflush accounting is an alternative costing system that can be applied in a Just in Time environment. It is ideally suited to a manufacturing environment where production cycles times are fairly short and inventory levels are low. Backflush accounting term published by CIMA terminology was introduced in February 1991. CIMA defined backflush accounting as an accounting system which is focused on the output of an organization and then works are returned to inventory and cost of sales based on the characteristics of the cost. Traditional accounting system uses the successive tracking, i.e. accounting methods are paced with the physical sequence of purchasing and manufacturing. Delayed term is related to its creation because backflush accounting delays costing of inventories to sales time and finally cost returns through accounting system. Backflush accounting removes the need to separate the WIP account (Omah & Okolie, 2013).

Back flush Costing which is also called Delayed or Post Deduct Costing is one of the simplest methods of cost accumulation that is used by companies that have adopted the JIT system. However, the JIT is not just a technique or techniques for accumulating costs and has a broader philosophy that focuses on continuous simplification and reduction of loss and waste in all levels of the institution's activities and one of the goals of this system is zero ending inventories. The new costing system which is connected with the aim of responding to the requirements of the JIT production system is called back flush costing (Bhimani & Gosselin, 2004). Back-flushing is a theoretically elegant solution to the complexities of assigning costs to products and relieving inventory, but it is difficult to implement.

Back-flush Accounting Techniques and Financial Performance

As the term 'back-flush' might suggest, costs are calculated after production has been completed. They are allocated between the cost of goods sold and inventories in retrospect. They are not built up as work progresses through the production process. It is important to recognize that the great advantage of back-flush accounting is that costs can be worked 'backwards', after the goods have been produced and sold. There is no need for a complex cost accounting system that records costs of production sequentially (ICAN, 2014). Cost of goods sold and inventories are both components of inventory turnover, hence it measure how often costs are back flushed within a period of time. Recent Research shows a positive significant relationship between back-flush accounting techniques and financial performance of quoted firms in Nigeria. This result has lots of mix controversy as some researchers noticed a native insignificant relationship between back-flush accounting and financial performance of firms in Nigeria.

Amahalu, Nweze and Obi (2017), conducted a study on Backflush Accounting and Financial performance of quoted food and beverages companies in Nigeria using data from the annual reports and accounts of eleven (11) quoted food and beverages companies for the year 2010 to 2015. The study revealed that backflush accounting has a positive and statistically significant effect on ROA, ROE, and EPS of food and beverage firms quoted on the floor of Nigerian Stock Exchange at 5% level of significance.

Amir and Mohammed (2014) on Back-flush costing and back-flush accounting in Iran using an empirical studies in exploring the significant of back-flush accounting in manufacturing companies in Iran, it was ascertained that back-flush costing estimates the values of inventories less than true during the year. Actual reverse costing methods can be varied according to the procedures specific to each company and its aim is to reduce the number of measured and recorded events in accounting system. Secondly it was ascertained that Back-flush costing has most association with private companies which use just-in-time manufacturing system for inventories or activity-based costing system. Back-flush costing does not comply with GAAP and cannot be used for external reporting requirements.

In a study conducted by Rehana and Mahmuda (2011) which examined an appraisal of Cost Management tools in manufacturing organizations of Bangladesh (Using back-flush accounting). A survey was conducted using a total 70 manufacturing organizations have been surveyed. Findings from multiple regression analysis reveals that only five cost management tools are influential in profit planning decisions and only there are three satisfied cost management tools which are significant in overall satisfaction of cost management tools. And a positive insignificant relationship exists between back-flush accounting and financial performance. Based on the previous research and controversy on the relevance of back-flush Accounting, this study seeks to establish if there is any significant statistical relationship between back-flush accounting and financial performance of quoted manufacturing firms in Nigeria.

Theoretical framework

Theory of Constraints (TOC)

The theory of constraints (TOC) is an overall management philosophy introduced by Eliyahu M. Goldratt in his 1984 book titled *The Goal*, that is geared to help organizations continually achieve their goals (Cox, Jeff & Goldratt, 1986). Goldratt adapted the concept to project management with his book *Critical Chain*, published in 1997. Theory of Constraints (TOC) is a management paradigm that views any manageable system as being limited in achieving more of its goals by a very small number of constraints. There is always at least one constraint, and TOC uses a focusing process to identify the constraint and restructure the rest of the organization around it. TOC adopts the common idiom "a chain is no stronger than its weakest link". This means that processes, organizations, etc., are vulnerable because the weakest person or part can always damage or break them or at least adversely affect the outcome.

Theory of Constraints advocates strongly exclusions of any capacity costs from products. The underlying premise of the theory of constraints is that organizations can be measured and controlled by variations on three measures: throughput, operational expense, and inventory. Inventory is all the money that the system has invested in purchasing things which it intends to sell. Operational expense is all the money the system spends in order to turn inventory into throughput. Throughput is the rate at which the system generates money through sales. In the TOC, capacity cost should be used to create customer value. If all the company resources are not matched with the throughput the company creates, inefficient use of the capacity in various business processes can mean low or nonexistent profits. In that meaning, TOC may target its profit as added value. TOC is a methodology for identifying the most important limiting factor (that is, constraints) that stands in the way of achieving a goal and then systematically improving that constraint until it is no longer the limiting factor. In manufacturing, the constraint is often referred to as a bottleneck.

The Theory of Constraints takes a scientific approach to improvement. It hypothesizes that every complex system, including manufacturing processes, consists of multiple linked activities, one of which acts as a constraint upon the entire system (i.e. the constraint activity is the "weakest link in the chain"). One of the appealing characteristics of the Theory of Constraints is that it inherently prioritizes improvement activities. The top priority is always the current constraint. In environments where there is an urgent need to improve, TOC offers a highly focused methodology for creating rapid improvement.

Methodology

This study is based on Ex-post factor research design. Ex-post facto design is a non-experimental research technique in which pre-existing groups are compared on some dependent variables. The researcher adopted the Ex-post factor research design because it helps to explain the relationship between independent and dependent variables as would help in actualizing the objectives of this

study. Back-flush Accounting variable which are compared with financial Performance variables in the study are based on events that occurred in the past. The population of the study is consists of all the companies quoted in the Nigerian stock exchange as at 2019. The consumer goods, industrial and conglomerates sector is the focal of this study from the period of the adoption of the international financial reporting standard in Nigeria, which is from 2012 to 2018.

In determining the sample size of the study, the researcher employed the purposive or judgmental sampling technique in determining the sample size. Our decision was based on the availability of financial information for the companies. A total of thirty nine firms quoted on the floor of the Nigerian Stock Exchange were selected. Secondary source of data collection was used to retrieve information used in this study. Secondary source of data involves the collection of already existing data. The secondary data used in this study was obtained from the financial statements of the various companies from the Nigerian stock exchange and their individual websites for the period 2012-2018. The technique used in analyzing the formulated hypotheses for this study is the simple regression technique, done with the aid of SPSS (Statistical Package for Social Sciences) The decision rule is based on the computed P-value, if the P-value is less than the Alpha (α) value of 0.05 Reject the Null Hypothesis. If the P-value is greater than the Alpha (α) value of 0.05 Accept the Null Hypothesis.

The independent variable in this study is Back-flush Accounting which is proxy by Inventory Turnover (INVT) (Amahalu, Nweze and Obi, 2017).

This is the number of times inventory is turned over in a year. The formula is:

$$\text{INVT} = \frac{\text{Cost of goods sold}}{\text{Average Inventory}}$$

The dependent variable is financial performance which is measure by the following driver variables:

1. **Return on capital employed:** A financial ratio that measures a company's profitability and the efficiency with which its capital is employed (Paulinus & Jones, 2017). Return on capital employed (ROCE) is calculated as:

$$\text{ROCE} = \frac{\text{Earnings Before interest and Tax (EBIT)}}{\text{Capital Employed}}$$

“Capital employed” as shown in the denominator is the sum of shareholder's equity and debt liabilities; it can be simplified as (total asset- current liabilities).

2. **Return on asset:** this is the ratio of annual net income to average total assets of a business during a financial year. It measures efficiency of business in using its assets to generate net income (Paulinus & Jones, 2017). It is a profitability ratio that is calculated as:

$$\text{ROA} = \frac{\text{Annual Net Income}}{\text{Average Total Assets}}$$

Net income is the after tax income. It can be found on the income statement. Average total assets are calculated by dividing the sum of total assets at the beginning and at the financial

year by 2. Total assets at the beginning and at the year can be obtained from year ending statement of financial position of two consecutive financial years.

Control Variables:

The following control variables were used in this study:

1. Total Asset (TA): This is measured with the natural log of total assets
2. Share Equity (SE): This is measured with the natural log of total share equity

Model Specification

The hypothesized relationship was analyzed using regression analysis. For this study, a model was developed in order to evaluate the effect of back-flush accounting on financial performance. The model used in this research is as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \mu_{it} \quad (1)$$

Where:

- Y = Performance (dependent variable)
 X = Back-flush Accounting (independent variable)
 β_0 = Constant term (intercept)
 β = Coefficient of back-flush accounting
 μ = Error term (stochastic term)

Explicitly, the equation can be defined as:

$$\text{Financial Performance} = f(\text{back-flush accounting}) + \mu_{it}$$

Representing other equations with variables of the construct, hence the following are formulated:

$$ROCE_{it} = \beta_0 + \beta_1 INVT_{it} + \beta_2 TA_{it} + \beta_3 SE_{it} + \mu_{it} \quad (2)$$

$$ROA_{it} = \beta_0 + \beta_1 INVT_{it} + \beta_2 TA_{it} + \beta_3 SE_{it} + \mu_{it} \quad (3)$$

Where;

$ROCE$ = Return on Capital Employed

ROA = Return on Asset

$INVT$ = Inventory Turnover

TA = Total Asset \log_{10}

SE = Share Equity \log_{10}

Test of Hypotheses and discussion of findings

Hypothesis One

H₀: Inventory Turnover does not have significant effect on Return on Capital Employed (ROCE) of Selected Manufacturing firms in Nigeria.

Model Specification

$$ROCE_{it} = \beta_0 + \beta_1 INVT_{it} + \beta_2 TA_{it} + \beta_3 SE_{it} + \mu_{it} \quad - \quad - \quad (2)$$

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.372 ^a	.138	.106	.37775

a. Predictors: (Constant), se, INVT, ta

Source: Researcher's Computation using SPSS version 20 software, 2019

ANOVA^a

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1.874	3	.625	4.377	.007 ^b
	Residual	11.701	82	.143		
	Total	13.575	85			

a. Dependent Variable: ROCE

b. Predictors: (Constant), se, INVT, ta

Source: Researcher's Computation using SPSS version 20 software, 2019

4Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.650	.552		-1.179	.242
	INVT	.021	.020	.116	1.097	.276
	Ta	.009	.081	.013	.113	.910
	Se	.103	.034	.373	3.076	.003

a. Dependent Variable: ROCE

Source: Researcher's Computation using SPSS version 20 software, 2019

The result obtained from table above shows the model summary results which sought to establish the explanatory power of the independent variables (inventory turnover) for explaining and predicting the dependent variable (return on capital employed). R, the correlation coefficients, (i.e. the linear correlation between the observed and model predicted values of the dependent variable) shows a value of 0.372. R square, the coefficient of determination (i.e. the squared value of the correlation coefficients) showed a value of 0.138 or 13.8% of the variation in the dependent variable (return on capital employed) is explained by the model. This means that the total variation in return on capital employed is explained by 13.8% INVT.

The result of the ordinary least square regression analysis showed in table seeks to evaluate the level of significance of the influence of inventory turnover on return on capital employed revealed that return on capital employed is explained by -0.650 constant factor and 0.021 of the inventory turnover as demonstrated in the regression model used to test the level of effect that inventory turnover has on return on capital employed as shown below;

$$ROCE = -0.650 + (0.021) INVT + (0.009) TA + (0.103) SE$$

This means that every unit change in inventory turnover will lead to 0.021 changes on return on return on capital employed. This shows a positive relationship and signifies that inventory turnover has a positive impact on return on capital employed. The P-value from the coefficient table was used to determine the significance of the influence that inventory turnover has on return on capital employed. The contribution of inventory turnover to the model is insignificant because p-value (0.276) is greater than the alpha value of 0.05. Hence, we accept the null hypothesis which states that inventory turnover does not have significant effect the return on capital employed of selected manufacturing firms in Nigeria.

Hypothesis Two

H₀: Inventory Turnover does not significantly affect the Return on Asset (ROA) of Selected Manufacturing firms in Nigeria.

Model Specification

$$ROA_{it} = \beta_0 + \beta_1 INVT_{it} + \beta_2 TA_{it} + \beta_3 SE_{it} + \mu_{it} \quad (3)$$

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.633 ^a	.401	.379	.07476

a. Predictors: (Constant), se, INVT, ta
Source: Researcher's Computation using SPSS version 20 software, 2019

ANOVA^a

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.307	3	.102	18.282	.000 ^b
	Residual	.458	82	.006		
	Total	.765	85			

a. Dependent Variable: ROA
b. Predictors: (Constant), se, INVT, ta
Source: Researcher's Computation using SPSS version 20 software, 2019

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	-.217	.109		-1.987	.050
INVT	.010	.004	.221	2.514	.014
Ta	-.012	.016	-.072	-.730	.467
Se	.045	.007	.679	6.715	.000

a. Dependent Variable: ROA

Source: Researcher's Computation using SPSS version 20 software, 2019

The result obtained from table above shows the model summary results which sought to establish the explanatory power of the independent variables (inventory turnover) for explaining and predicting the dependent variable (return on asset). R, the correlation coefficients, (i.e. the linear correlation between the observed and model predicted values of the dependent variable) showed a value of 0.633. R square, the coefficient of determination (i.e. the squared value of the correlation coefficients) showed a value of 0.401 of the variation in the dependent variable (return on asset) is explained by the model. This means that the total variation in return on asset is explained by 40.1% INVT.

The result of the ordinary least square regression analysis showed in table, seeks to evaluate the level of significance of the influence of inventory turnover on return on asset revealed that return on asset is explained by -0.217 constant factor and 0.010 of the inventory turnover as demonstrated in the regression model used to test the level of effect that inventory turnover has on return on asset as shown below;

$$ROA = -0.217 + (0.010) INVT + (-0.012) TA + (0.045) SE$$

This means that every unit change in inventory turnover will lead to 0.010 changes on return on asset. This shows a positive relationship and signifies that inventory turnover has a positive impact on return on asset. The P-value from the coefficient table was used to determine the significance of the influence that the inventory turnover has on return on asset. The contribution of inventory turnover to the model is significant because p-value (0.014) is less than the alpha value of 0.05. Hence, we reject the null hypothesis and accept the alternate hypothesis which states that inventory turnover significantly affect the return on asset of selected manufacturing companies in Nigeria.

Conclusion and Recommendations

This study has examined the effect of back-flush accounting on the performance of selected manufacturing companies in Nigeria. The study made use of ex-post factor research design. Annual reports prepared following the adoption of International Financial Reporting Standards in Nigeria for seventeen companies quoted on the floor of the Nigerian stock exchange were used for

the study. These manufacturing companies were grouped under the consumer goods sector, the criterion for selection of sample was purposively based on the basis of availability of data. The financial ratios used for the study were return on assets and return on capital employed. Back-flush accounting was proxy by inventory turnover.

Simple linear regression analyses were run with the aid of SPSS version 20 software. Sequel to the analysis and findings of this study, the researcher therefore concludes that back-flush accounting has positive effect on the performance of manufacturing companies in Nigeria. These results were significant on earnings per share and return on asset. Hence, the adoption of back-flush accounting techniques would enable the organization to improve the innovative capacity of the organization, eliminate irrelevant cost in operation, reduce inventory cost and flexibility so that it can continually change and improve financial performance. Based on this study, the following recommends were made:

Specific Recommendations

1. Since back-flush accounting has a positive and insignificant effect on ROCE, then companies should use the costing techniques that are most suitable for their manufacturing environment to increase their level of profitability.
2. Since back-flush accounting has a positive and significant effect on ROA then the manufacturing sector should endeavour to implement and adopt the philosophy of back-flush accounting which has enormous merits in inventory control and irrelevant cost reduction in an advanced manufacturing environment.

General Recommendations

1. A consensus should be reached among business executives, academics and accounting practitioners on the components of Strategic Management Accounting to enhance its implementation in the Nigerian manufacturing firms.
2. Manufacturing firms in Nigeria should welcome a change from the Traditional based Costing to a Back-flush costing for the effectiveness of Strategic Management Accounting. Resistance to such change could be managed through – proper education of organizational members on the need and benefits of the change; involvement of organizational members or their representatives in decisions initiating such a change; and provision of incentives to organizational members to encourage their acceptance of the change.
3. As needs of organization vary across industries and over time it is suggested that corporations should carry out an in-depth analysis of their activities to determine the

information needs of managers which should guide the adoption and implementation of any technique in the strategic management accounting toolbox. Constant monitoring of the adopted tools should also be enforced to ensure that the tools meet the needs of managers over time.

4. A more robust use of longitudinal data and comprehensive industry coverage or spread is therefore recommended for further research.

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