Drivers creating shareholder value in South African manufacturing firms

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ABSTRACT

The objective of this study was to analyse the value drivers of manufacturing firms listed on the Johannesburg Stock Exchange. Unique performance measurement tools and processes exist in the manufacturing industry. The creation and measurement of shareholder value however, should be the goal of any manager in a firm. In order to optimise shareholder value creation, it is necessary to identify value drivers that management can control. A multiple regression analysis was used to identify the significant micro-value drivers of South African manufacturing firms. It was found that the value drivers that are significant in the explanation of shareholder value are the cost of goods to sales percentage, the degree of manufacturing leverage and the capital investment in plant and equipment. Value-based management, incorporating these value drivers, can guide manufacturing managers towards optimal shareholder value creation.

Keywords: Shareholder value, micro-value drivers, value-based management, manufacturing

INTRODUCTION

South Africa has undergone a remarkable political transformation during the last 16 years. Since 1994, when the political power was transferred from a white minority to the previously oppressed black majority, the ruling party – the African National Congress (ANC) – has created a relatively stable, peaceful and democratic political

regime. On the economic front, however, the country has not fared too well. Since 1994 per capita GDP has grown at an average rate of 1.2% per annum, which is comparable to that of sub-Saharan Africa, but much lower than that of our biggest competitors, South Asia (3.7%) and East Asia (6.2%). The most worrying aspect of this performance is the unemployment rate, which at 26% or 40% (depending on which definition of unemployment you use) is among the highest in the world (Rodrik, 2008). One of the reasons for this state of affairs could be the high wages demanded by trade unions, but a deeper cause for this situation probably lies in the weakness of export-oriented manufacturing growth of the South African economy.
The importance of the manufacturing industry is underlined by the fact that it is still one of the top four economic sectors that generate material wealth and create jobs in South Africa (Mammburu, 2011). The manufacturing sector, which is the third-largest employer (after financial services and the retail trade), is responsible for an estimated 17% of employment in SA (Allix, 2011). Local manufacturers find it difficult to compete in the domestic market due to increased competition from cheap imported products, the volatile exchange rate, eroding margins on exports and an overall reduction in competitiveness. During September 2011 a new R20 billion tax incentive to encourage investment in new manufacturing assets and employee training was launched by the South African government. Trade and Industry Minister Rob Davies stated that this would "create confidence in the manufacturing sector and support efforts by manufacturers to raise their competitiveness and improve their productivity" (Reuters, 2011).

On a micro- or firm level, however, Fedderke, Kularatne and Mariotti (2006) found that mark-ups in the South African manufacturing industry are significantly high and twice that of the manufacturing sector in the USA. It seems as if the South African manufacturing industry does not pass on cost improvements achieved through, for example, industry concentration and falling relative unit labour costs. Another study by Aghion, Braun and Fedderke (2008) found that the higher mark-ups and resultant higher profitability ratios computed from listed South African firms are associated with lower productivity growth rates. The profitability of a firm will have a direct effect on the value created (or destroyed) by that firm's management for the shareholders (Stewart, 1991).

The importance of the manufacturing sector to the South African economy on both a macro- and micro-level warrants continuous research in order to investigate ways of improving, optimising and enhancing the sector's operational efficiency. The South African economy, and more specifically the manufacturing industry, is burdened with the important task of creating more jobs, but at the same time faces the barriers and headwinds of international competition and greater efficiency attained by these competitors. In addition to these pressures on the manufacturing industry, they, like any other industry or firm, are faced with the goal of creating shareholder value for their shareholders.

This research investigated the process whereby manufacturing firms listed on the Johannesburg Stock Exchange (JSE) create value for their shareholders by identifying those manufacturing-related micro-value drivers that are significant in the creation of shareholder value. A study conducted by Waldron (2010) among the top 50 manufacturing companies in the USA found three micro-value drivers that are significant in the explanation of a firm's market capitalisation.

This article reports on a study aimed at identifying those manufacturing value drivers that will have an influence on shareholder value creation. As far as could be ascertained, such a study has not been undertaken in South Africa before. For this reason, it is believed that this study makes a contribution to the existing body of knowledge. The results of the study could provide important information for managers and shareholders in order to optimise manufacturing processes and activities and ultimately to facilitate shareholder value creation. Consequently, investors could possibly be persuaded to invest more of their time and money in (South African) manufacturing opportunities.

In the study a multiple regression analysis was performed using data from manufacturing companies listed on the JSE. A population of 49 companies over a five-year period provided a sample size of 245 observations, which was more than sufficient to produce a ratio of observations beyond the desired level of between 15 and 20 in order to generalise the results (Hair, Black, Babin and Anderson, 2010). In a study by Waldron (2010) on the 50 best manufacturing companies in the USA, market capitalisation (V_0) was treated as a function of seven predictor variables or micro-value drivers. This study used the same seven manufacturing value drivers as in the Waldron study, namely:

- CGS% = Cost of goods sold ÷ Net sales
- DML = %Δ Gross profit ÷ %Δ Net sales
- IT = Cost of goods sold ÷ Inventory
- EI = %Δ Inventory ÷ %Δ Net sales
- CIPE = Plant & equipment net of depreciation ÷ Net sales
- FAT = Net sales ÷ Plant & equipment net of depreciation
- IMCO = (Δ CGS + Δ I + Δ $P\&E_{NET}$) ÷ Δ Net sales

The Waldron (2010) study was extended by adding and testing five more dependent variables. These variables are regarded as actual measures of value creation. Market capitalisation on its own cannot be seen as a measure of value creation, but represents a growth in the size or value of equity, irrespective of the capital needed to create the additional or increased equity (Stewart, 1991). The additional dependent variables that were used in the study were market value added (MVA), market to book value (M-B), return on equity to cost of equity net of equity growth ($ROE \div K_e$), economic value added (EVA) and the Q-ratio (Q).

The first objective of this study was to identify the manufacturing value drivers that were able to explain changes in the market capitalisation of a company resulting from variances in the seven manufacturing micro-drivers. These results were then compared to those of the Waldron (2010) study. By introducing five measures that actually measure value creation as dependent variables, this study was aimed at achieving its main objective, namely to see how the seven manufacturing micro-drivers influence the actual value created (as represented by the five additional variables) by management of the firm. Lastly, an objective of the study was to present management of a manufacturing firm with a value driver map which will indicate the impact of each micro-value driver on value creation as well as the influence that management might have on those drivers.

The article is organised as follows: the literature on performance measurement in the manufacturing industry is reviewed and the link between performance measurement and value creation is established. Next, the micro-value drivers and value creation measures of a firm are identified. Thereafter the research method is presented, followed by a discussion of the results of the statistical analysis. Lastly, conclusions are drawn and recommendations made from the results.

REVIEW OF THE LITERATURE

The literature on manufacturing covers many topics and genres, some of which overlap. Manufacturing as a research topic is characterised by continuous suggestions, proposals and system improvements from economists, financial scholars and engineers. In this study, the emphasis was on manufacturing financial performance measurement and its link to value creation, rather than on the engineering systems or technical efficiency of manufacturing firms. In this review of the literature, performance management in a manufacturing firm is discussed, where after the measurement of value creation is dealt with. Next, a micro-value driver matrix is created after deriving the value drivers from the literature. This matrix sets out the value impact of the micro-value drivers against the level of control that management have over them. Finally, it is proposed that value-based management must be practised with the value drivers as an integral part of the process.

Performance management in manufacturing firms

Manufacturing companies are experiencing increasing competitive pressure due to the globalisation of manufacturing activities. Therefore, they need to improve their operations, processes, procedures and systems to remain competitive. Technology changes must be incorporated into the manufacturing environment speedily and continuously in order for them to retain or to achieve a competitive advantage. Gomes, Yasin and Lisboa (2004), who carried out a literature review of the evolution of performance measurement systems, quote studies by Schmenner and Vollmann (1994), Birchard (1995) and Clinton and Chen (1998) which indicate frustration experienced by managers of manufacturing companies due to the lack of practical performance management systems.

Ghalayini, Noble and Crowe (1997) contend that the literature concerning performance management can be grouped into two phases: the first phase, which spans the century from 1880 to 1980, emphasises financial performance measures based on profit, investment and productivity. The second phase started in the 1980s. Due to global competition that changed customer requirements, it became necessary to implement new technologies (mainly from Japan) such as total quality management (TQM), just-in-time (JIT), computer-integrated manufacturing (CIM) and optimised production realisation (OPR). Ghalayini et al. (1997) state that the traditional (financial) performance measures, such as return on investment (ROI), return on assets (ROA), purchase price variances, sales, profit or output per employee, and production output, have significant limitations, mainly because they are based on management account systems that focus on reducing labour costs. In addition, these financial performance measures are generic and fail to take into account the unique features of a production process, business unit or firm.

In his discussion of performance measures, Plossl (1991) states that performance measures in modern manufacturing operations must attain three objectives, namely customer satisfaction, cutting costs and using capital more efficiently. When wrong measures are used, poor decisions ensue.

In view of the shortcomings in these performance measurement systems, Ghalavivi et al. (1997) discuss three integrated performance measurement systems that have been developed to provide an overall measure of company performance. Firstly, the strategic measurement analysis and reporting technique (SMART) consists of a four-level pyramid of objectives and measures, namely corporate vision/strategy, financial objectives, operational objectives and departmental level operational criteria and measures. Secondly, the performance measurement questionnaire (PMQ) helps to identify existing, new and improved performance measurements. Lastly, the well-known balanced scorecard approach developed by Kaplan and Norton (1992) integrates strategic, operational and performance measures. Ghalayini et al. (1997) developed what they called the ‘integrated dynamic performance measurement system (IDPMS)’ which aims to integrate three primary functional areas, namely management, process improvement teams and the factory shop floor. This system integrates general areas of success with associated performance measures and relevant financial measures with operational performance measures.

Neely, Gregory and Platts (2005) state that the balanced scorecard approach of Kaplan and Norton (1992) is based on the principle that a performance measurement system should provide managers with the following information:

- How do we reward our shareholders (financial perspective)?
- What are our operational strengths (internal business perspective)?
- What are our customers' perceptions of us (customer perspective)?
- How can we adhere to the goal of the firm and thus create value (innovation and learning perspective)?

These four perspectives are interrelated. However, Neely et al. (2005) claim that the balanced scorecard has a serious flaw, namely that if a manager were to introduce a set of measures based solely on this method, it would not answer one of the most fundamental questions: How do we compare with our competitors? (This is the competitor perspective.) Plossl (1991) supports this view when he states that conventional accounting and financial reporting systems have failed to aid manufacturing management in making decisions affecting competitive position.
Based on the literature, it was clear that a need exists for improvement in measuring a manufacturing firm's performance. The study that informed this article was consequently aimed at addressing this need.

Value creation measures in manufacturing firms

The goal of the study was to use value creation performance measures, such as market value added (MVA), economic value added (EVA) and the Q-ratio to identify the value drivers of a manufacturing firm in order to improve shareholder value creation. While a vast array of different manufacturing performance measures have been developed over the years, the fundamental importance of whether a firm creates value or not will depend on a number of factors, most of them financial. In the end, all perceptions, actions, manufacturing processes and systems, financial structuring of a company, profit margins, competition, beliefs and even customer loyalty combine to create or destroy shareholder value. If a manufacturing company's value creation can be measured and analysed over time, it will render important information to its managers and shareholders, as value creation for shareholders represents the goal of any firm.

The measurement and creation of shareholder value in the manufacturing industry have a number of unique factors that distinguish them from any other sector. Manufacturing firms are unique in the sense that the value drivers are different to those in retail, service or mining firms.

In the past, a number of manufacturing-based processes or operational systems have been linked to value-creating performance measures. It is a strategic objective of any company to make economic profit over the long term in order to create shareholder value.

Ittner, Larcker and Randall (2003) divide strategic performance management into two categories. Firstly, the simplest approach calls for the use of a diverse set of financial and non-financial measures. This measurement diversity approach ensures that all measures are taken into account and not a single one measure is favoured at the expense of another. A second approach is based on the contingency theory which argues that strategic performance measures must be aligned with the firm's strategy (improved economic performance and ultimately value creation) and the value drivers. Closely related to the contingency perspective is the use of measurement techniques such as the balanced scorecard and economic value measurement (e.g. EVA). Such a performance measurement system will align performance measures with strategic objectives, select strategies that achieve these objectives and identify the value drivers that actually create value for the firm (Copeland, Koller and Murrin, 2000).

Roztocki and Needy (1999) present a system that integrates activity-based costing (ABC) with the EVA financial performance measure. They argue that reducing costs by using tools such as JIT and TQM do not automatically create shareholder value. The implementation procedure that Roztocki and Needy (1999) propose includes the selection of 'cost drivers'. They contend that operating cost drivers and capital cost drivers must be used to trace costs to products. Their analysis requires information that can only be obtained from the detailed manufacturing information of a company. However, it serves the very important principle that it can isolate to management those products that create value and those that do not, based on the economic profit created by that specific product. Value-maximising decisions can thus be made based on the products, as indicated by the cost drivers. It was the goal of this study to identify those value drivers that create overall shareholder value.

Christopher and Ryals (1999) discuss the influence of the supply chain of a company on shareholder value, EVA and ultimately the incorporation thereof in value-based management (VBM). They identified the drivers of shareholder value as being revenue growth, operating cost reduction, fixed capital efficiency and working capital efficiency. All four of these can be influenced by the supply chain strategy of a firm. An appropriate focus to positively use the supply chain of a firm to increase the free cash flow of a firm that creates shareholder value is firstly, to reduce the total end-to-end pipeline time internally in order to use less working capital; secondly, to embrace and improve relationships with suppliers; and thirdly, to establish a close connection with customers in the marketplace in order to better plan and schedule production capacity. Although Christopher and Ryals (1999) did not identify any grassroots value drivers, they demonstrated the important link between manufacturing supply chain management and shareholder value creation.

The balanced scorecard (BSC) as performance measurement tool has been discussed above. Fletcher and Smith (2004) who used an analytical hierarchy process (AHP) to develop a comprehensive performance measurement system, link the BSC and EVA. Young and O'Bryne (2001) found both these concepts to be highly complementary. The AHP includes the identification of value drivers such as on-time delivery, which can improve customer satisfaction, leads to higher sales and speedier collection of debtors (and therefore lower working capital), which in turn can lead to a higher EVA. The balanced scorecard focuses management attention on these causal relationships that can lead to improved shareholder value creation. Fletcher and Smith (2004) illustrate how the AHP identifies 17 value drivers across the four BSC perspectives and assign a weight factor to each. The financial perspective has return on net assets (RONA), sales growth, the weighted average cost of capital (WACC), inventory turnover and the debtors' collection period as value drivers. Non-financial drivers are among the rest of the 17 drivers.

From the above discussion it is clear that in order to calculate a firm's shareholder value creation, it is of the utmost importance to identify those drivers that create value.

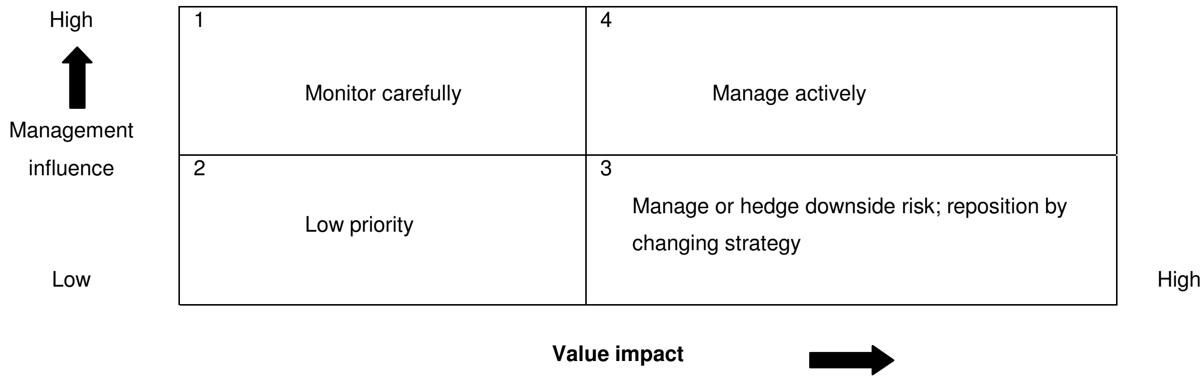
The value drivers

The process of identifying the value drivers starts with an analysis of shareholder value, as the drivers represent the building blocks of shareholder value.
Rappaport (1998) breaks down the process of creating shareholder value into three levels. At the top level, shareholder returns and value are stated as a corporate objective. The second level consists of the valuation components, namely the cash flow from operations, the discount rate and debt. At the third level, value drivers are identified. These value drivers can be grouped into an operating group (sales growth, operating profit margin and income tax rate), investment group (working and fixed capital investment drivers) and financing group (cost of capital). However, the question arises: What are the value drivers that have the biggest influence in a business unit or firm? The value driver assessment process shows that the value drivers cannot be too broad. Copeland et al. (2000) contend that generic drivers such as sales growth, operating margins and asset efficiency ratios apply to all business units, but lack specificity and cannot be used at grassroots level. Micro-value drivers that influence or determine the macro-value drivers need to be identified.

Rappaport (1998) proposed that in order to identify the micro-value drivers a business unit value driver analysis consisting of three steps should be undertaken. The first step is to develop a value driver map of the business which will contain the seven macro-value drivers. From them, key micro-value drivers can be developed, depending on the type of firm (e.g. manufacturing, retail and service). The second step is to identify the drivers that have the biggest influence on value. Rappaport (1998) emphasises that the quantification of the sensitivities of the value drivers is very valuable for both operating and senior management. The last step is to identify those drivers that management can influence. In any business, management might have a great deal of control over certain production inputs, but not over others. Raw material prices, labour rates, interest rates and the exchange rates are examples of production inputs over which manufacturing companies' managers have no or very little influence. The objective of this study was to identify those value drivers that have a high shareholder value impact and that can be controlled by management.

A matrix (adapted from Waldron, 2010) setting out the value impact of the micro-value drivers against the level of control that management have over them is presented in Figure 1.

Figure 1: Micro-value driver matrix



From Figure 1 it is clear that the task of management is to identify those drivers that fall into quadrant four. These drivers have a high impact on shareholder value and at the same time they can be controlled by management. However, value drivers that reside in the other quadrants need to be monitored or managed as well, as they do have an influence on value, albeit small.

The value drivers that were used as independent variables in the statistical analysis of this study are those used by Waldron (2010). The seven manufacturing value drivers that were used are discussed below.

- Cost of goods is comprised mostly of the direct expenses related to the manufacturing process and will therefore have a direct relationship to sales (CGS%). One will expect that a lower cost of goods to sales ratio will indicate greater manufacturing efficiency and higher value creation potential.
- The degree of manufacturing leverage (DML) measures the relationship between changes in sales and gross profit. Companies that manufacture efficiently should experience an increasing or relatively high DML, where an increase in sales will result in a more than proportionate increase in gross profit.
- Inventory turnover (IT) is best measured by relating inventory to cost of goods sold, instead of to sales (which includes a profit mark-up). Since inventory

includes raw material, work in progress and finished goods, a high inventory turnover ratio is an indication of good inventory management practices and the possible use of sophisticated inventory control models. This should enhance shareholder value creation.

- Inventory represents an investment in assets which should be managed carefully as it could directly affect a firm's profitability. Growth in sales inevitably results in growth in inventory. Relating sales growth to inventory growth (EI = %Λ Inventory ÷ %Λ Net sales) will indicate if inventory is managed efficiently. A lower ratio will be an indication of better inventory management while an increase in this ratio will be viewed as relatively less effective inventory management.
- Plant and equipment intensity (CIPE) measures the investment in manufacturing non-current assets necessary to generate one Rand of sales. Although this figure could vary among different types of manufacturers, one would expect that an optimal level of manufacturing equipment employed would result in a relatively lower level of CIPE.
- A metric that is closely related to CIPE and at the same time represents an extension of the inventory turnover measure is that of fixed asset turnover (FAT). It measures management's ability to convert investment in manufacturing assets into sales. A relatively bigger ratio will indicate greater efficiency in asset management.
- Finally, the incremental manufacturing cash outflow rate (IMCO) measures management's ability to control manufacturing cash outflows associated with changes in sales, (Δ CGS + Δ I + Δ $P\&E_{NET}$) ÷ Δ Net sales. A higher IMCO rate will result in lower profitability and will hamper the firm's ability to create value due to the relatively higher values of direct manufacturing cost, inventory levels and higher levels of non-current assets used in the manufacturing process.

There are six dependent variables that were used in the statistical analysis of this study. A discussion of the six dependent variables follows:

- Market capitalisation (V_0), is the weighted average monthly share price at financial year-end multiplied by the number of shares issued.

- Market value added (MVA) is a value performance indicator that is forward-looking and incorporates the market's view of the current and future performance of the enterprise. Moreover, MVA is a criterion used to gauge the overall success or failure of the firm's ability to create value. The calculation of MVA is based on the difference between the total market value of debt and equity (MV) and total capital (TC) provided by lenders and shareholders for management (Stewart, 1991). However, the approach that was used in this study was to express the MVA performance indicator as a ratio (MV ÷ TC), which effectively standardised all the enterprises in the sample to have the same size and further facilitated comparisons between large and small firms.
- The market to book value (M-B) is a ratio often used to analyse whether or not value is created or destroyed by the enterprise. It is calculated by taking the market value of equity at year end (market capitalisation, V_0) divided by the book value of equity at year end.
- An alternative for calculating the market to book value could be to divide the return on equity (ROE) by the cost of equity (Ke). (ROE is calculated by dividing profit attributable to ordinary shareholders by the total book value of equity; Ke is calculated by using the capital asset pricing model, CAPM.) This ratio is therefore also an equity-based indicator of value creation. A value of less than one will be an indication that management is destroying value, while a value of greater than one indicates that management is using capital in a manner that creates value.
- While MVA can be viewed as an external value creation indicator, EVA is an internal value measurement. EVA, which was developed by the Stern Stewart consulting firm, is calculated in the following way (Stewart, 1991):

$$EVA = \left(\frac{NOPAT}{CE} - WACC\right) \times CE$$

where

NOPAT	= net operating profit for the year after tax;
CE	= capital employed at the beginning of the year; and
WACC	= weighted average cost of capital.

It fell outside the scope of this study to engage in the debate or even to list some of the numerous references to arguments in favour of EVA as shareholder value measurement, as opposed to earnings as value measurement. One would expect that the seven manufacturing value drivers would provide a relatively high R^2 to the EVA of a firm, as EVA contains both operating (income statement) efficiency and financing (balance sheet) efficiency.

- The Q-ratio is an overall wealth-creation indicator, seeing that it represents a market to book multiple. Tobin's Q-ratio can be described as the market value of a firm's equity plus the book value of interest-bearing debt divided by the replacement cost of its non-current assets. Several important differences distinguish the Q-ratio from the market to book ratio, which makes it a valuable addition to the dependent variable list of this study. Firstly, the numerator of the Q-ratio includes the book value of debt and not just the ordinary shareholder's equity as is the case with the market to book ratio. Secondly, and more importantly for manufacturing efficiency, the denominator of the ratio contains the productive assets valued at replacement cost where the market to book ratio is based on the total shareholder's equity.

The fully specified regression model with market capitalisation as dependent variable (V_0) may be expressed as follows:

$$V_0 = a \pm b_t(x_{tn}) \pm b_j(x_{jn}) \pm b_k(x_{kn}) \pm b_l(x_{ln}) \pm b_m(x_{mn}) \pm b_n(x_{nn}) \pm b_o(x_{on}) + e$$

Where:

$b_t(x_{tn})$ = *beta coefficient, the predictor for cost of goods sold÷net sales*

$b_j(x_{jn})$ = *beta coefficient, the predictor for %∆ gross profit÷%∆net sales*

$b_k(x_{kn})$ = *beta coefficient, the predictor for cost of goods sold÷inventory*

$b_l(x_{ln})$ = *beta coefficient, the predictor for %∆inventory÷%∆net sales*

$b_m(x_{mn})$ = *beta coefficient, the predictor for plant & equipment net of depreciation÷net sales*

$b_n(x_{nn})$ = *beta coefficient, the predictor for net sales÷plant & equipment net of depreciation*

$b_o(x_{on})$ = *beta coefficient, the predictor for* $(\Delta CGS + \Delta I + \Delta P\&E_{NET}) \div \Delta$*net sales*

E = *unexplained variance*

The multiple stepwise regression analysis was then repeated with each of the other dependent variables, namely market value added (MVA), market to book value (M-B), return on equity to cost of equity net of equity growth (ROE÷K_e), economic value added (EVA) and the Q-ratio. The objective was to obtain value drivers that were statistically significant in explaining shareholder value.

Value-based management

Finding the value drivers presents management with an important tool to attempt the process of shareholder value creation. In order to facilitate this process, value-based management should be practised.

Copeland et al. (2000) propose that value-based management (VBM) consists of processes and steps that need to be incorporated in the daily activities and decisions made in the company. Value-based management must involve all decision-makers in the company. The four key management processes that collectively guide and govern VBM in an organisation are strategy development, target setting, action plans and budgeting, and performance management and incentive schemes. The relationship between VBM, shareholder value creation and the value drivers are briefly discussed below.

All measures that are used to evaluate strategies need to be based on maximising value. Research by Van der Merwe and Visser (2008) among South African motor manufacturers showed that profitability and growth were most popular as performance measures, and that shareholder value-based measures such as EVA were used by only 9% of the respondents. This is a matter of concern, as the goal of the firm is to create value and the difference between value and profit could differ substantially (Stewart, 1991; Rappaport, 1998; Ehrbar, 1998).

In setting targets, the targets should be based on a business unit's key value drivers and should include both financial and non-financial targets. When action plans are drawn up and budgeting is done, steps to achieve value-based targets need to be set out. In developing performance management and incentive schemes, operating and financial measures are combined based on key value drivers.

The importance of the value drivers in value-based management is evident from the above discussion – they feature in all aspects of the process.

There are a number of features that distinguish this study from others. Firstly, with the exception of the Waldron (2010) study, no studies that link performance measurement of manufacturing firms to their value creation have been conducted. As mentioned in the literature study above, a number of research studies merely mentioned the link between various performance measurement systems and value creation (Christopher & Ryals, 1999; Roztocki & Needy, 1999; Fletcher & Smith, 2004). However, none of these studies attempts to identify the value drivers statistically by using a multiple regression analysis. The same applies to the examples in Rappaport (1998) and Copeland et al. (2000). This gap in knowledge is even more profound in South Africa, as is seen from the findings by Van der Merwe and Visser (2008). In a study among South African motor manufacturers they found that of the four BSC perspectives, the most important was the customer perspective. They also found that shareholder value measures were largely ignored. It is this gap in knowledge that this study attempted to address.

In the next section the research design and methodology of the study on which this article is based are discussed.

RESEARCH DESIGN AND METHODOLOGY

The population of this study comprised the JSE-listed manufacturing companies in South Africa. In order to compile the final sample, the companies had to be engaged in manufacturing activities and should have been listed on the JSE for at least six years (to compute data for five years: 2006 – 2010). Further, the companies had to report data on its sales, cost of goods, inventory as well as plant and equipment net of depreciation, in order for the seven value drivers to be calculated. The final sample consisted of 49 companies providing 245 observations and producing a ratio of observations to variables of 35, well beyond the desired level of between 15 and 20 necessary to justify a multivariate parametric technique, and a high enough ratio to generalise results (Hair et al., 2010). The data was obtained from McgregorBFA, a large supplier of value-added financial data in South Africa.

The data was subjected to tests for outliers, stationarity, heteroskedasticity, serial correlation and endogenity. Graphical analysis of the series indicated that there are very few outliers in the dataset; therefore outliers are predicted not to play an important role in the overall analysis. Measure corrections for heteroskedasticity were made using White's cross-section coefficient variance method. Since the corrections were only monotonic transformations of the data points, these corrections did not alter the information and relationships inherent in the dataset.

Table 1 provides a summary of the data correction results and indicates the overall model fit for each of the dependent variables.

TABLE 1: Summary of data correction results

	V_o	MVA	MAR to BOOK	ROE÷K_e	Q-RATIO	EVA
Poolability						
(i) Individual (cross-section) effects	Include	Include	Include	Exclude	Include	Include
Endogeneity						
(i) Hausman Test	Correctly specified	Misspecified	Misspecified	Correctly specified	Misspecified	Correctly specified
Serial correlation						
(i) Durbin-Watson	Positive SC	Positive SC	Positive SC	Positive SC	Positive SC	Positive SC
Heteroskedasticity						
Test for heteroskedasticity	-	-	-	-	-	-
Stationarity						
Levin, Lin and Chu (LLC) test	Stationary	Stationary	Stationary	Stationary	Stationary	Stationary
Breitung T-stat test	Non-stationary	Non-stationary	Non-stationary	Non-stationary	Non-stationary	Non-stationary
Im, Pesaran and Shin (IPS) test	Stationary	Stationary	Stationary	Stationary	Stationary	Non-Stationary
ADF Fisher test	Non-stationary	Non-stationary	Non-stationary	Non-stationary	Non-stationary	Non-stationary
PP Fisher test	Stationary	Stationary	Stationary	Stationary	Stationary	Non-stationary
Overall model fit						
R^2	0.987790	0.895017	0.894375	0.336397	0.886323	0.221041
Adjusted R^2	0.982993	0.853774	0.852880	0.311688	0.841664	0.192037

The statistical tests and corrections conducted on the data improved the overall model fit of the dependent variables (compared to the unadjusted data). The descriptive statistics of the data will provide important characteristics of the sample, setting the stage for the multiple regression results.

DESCRIPTIVE STATISTICS

Table 2 sets out the descriptive statistics for the dependent variables.

Table 2: Descriptive statistics for the dependent variables

STATISTICS	V_o (Rbn)	MVA	MAR to BOOK	ROE÷K_e	EVA (Rm)	Q-RATIO
Mean	9.42	1.83	2.67	0.8708	-105.95	2.29
Median	1.67	1.54	1.87	0.5050	108.90	1.81
Maximum	24.9	9.61	30.90	419.72	486.94.	13.36
Minimum	7.59	0.37	-1.57	-441.51	-113.23	0.39
Std. Dev.	3.05	1.27	3.71	47.006	147.83	1.94
PERCENTILES						
25	3.05	1.09	1.19	-0.36	-33.48	1.26
50	1.71	1.58	1.93	0.52	13.46	1.86
75	6.84	2.32	2.9	1.27	145.61	2.74

The average market capitalisation (V_0) for the sample was R9.42 billion with a maximum of R24.9 billion and a minimum of R7.59 billion. MVA was expressed as a performance indicator, market value ÷ total capital. Therefore, a ratio greater than 1 is an indication that value has been created. From the statistics it is evident that on average the companies in the sample had a market value 83% greater than their capital employed, with a maximum of 9.61 times greater than the capital invested. A similar trend is noted with the market value of equity ÷ book value of equity, where on average the market value was nearly three times larger than the book value. The next value indicator, ROE ÷K_e indicates that on average the ROE was 13% less than the cost of equity, K_e, an indication that if measured in this way, value is destroyed on average by the companies in the sample. EVA on average was a negative figure of R105 million, indicating that on average the sample companies destroyed shareholder value. One of the reasons for this might be that during the research period under review (2006 – 2010) the local and global economy went through possibly the worst slump in decades and is currently just recovering from it. The median EVA, however, was positive and the maximum amount was R486 million. The last independent variable, the Q-ratio, had an average value of 2.29 with a maximum of 13.36. This indicator shows that, on average, value was created by the companies in the sample.

Table 3 shows the descriptive statistics for the seven micro-value drivers, the independent variables.

Table 3: Descriptive statistics for the independent variables

STATISTICS	CGS%	DML	IT	EI	CIPE	FAT	IMCO
Mean	0.7063	1.16	6.45	0.44	0.1794	43.47	0.9981
Median	0.7153	1.05	5.43	0.90	0.1295	7.72	0.9741
Maximum	1.1144	80.24	31.10	31.03	0.6694	5779.51	18.6757
Minimum	0.1617	-101.84	1.34	-125.30	0.0002	1.50	-7.7771
Std. Dev.	0.1313	11.80	4.45	10.48	0.1450	412.51	2.3586
PERCENTILES							
25	0.6291	0.60	3.87	0.03	0.0749	4.21	0.4834
50	0.7103	1.05	5.45	0.90	0.1291	7.74	0.9646
75	0.7934	1.93	7.69	1.78	0.2374	13.34	1.2295

The average cost of good percentage (CGS%) was 71%, which implies a gross profit percentage of 29%. The average degree of manufacturing leverage (DML) is 1.16, an indication that if sales change, gross profit will change with 16% more. Ideally, one would like to see a ratio greater than 1. The maximum DML was 80 and the median was 1.05. The inventory turnover rate (IT) varied from a maximum of 31 to a minimum of 1.34, with an average of 6.45. This means that firms in the sample had to invest R0.16 on average in inventory (finished goods and work-in-progress) for each Rand in sales. The higher the inventory turnover ratio, the lower the investment in inventory in relation to sales, and the greater the manufacturing efficiency and the profit potential of that firm. The average inventory elasticity (EI) was 0.44, indicating that, on average, inventory was grown by the sample firms at a rate lower than sales. Actually, the ratio is substantially below 1, which could be an indication of under investing in inventory. The median, however, was closer to 1 at 0.90. The average capital investment in plant and equipment (CIPE) relative to sales was R0.18, ranging from a low of less than R0.01 to a high of R0.66. This figure will vary according to the type of manufacturing operations and can be reduced through a policy of buying certain components rather than manufacturing them. The fixed asset turnover (FAT) has a relatively high average of 43 with a minimum of 1.5. This is a variable that could also be influenced by outsourcing certain manufacturing activities. Lastly, the incremental manufacturing cash outflow rate (IMCO), which measures the manufacturing cash outflows (operating costs, inventory and non-current assets) in relation to sales, has an average of nearly R1, an indication of a relative high outflow of funds in relation to sales.

REGRESSION RESULTS

The results of the multiple regression analysis are presented in the tables below. The manufacturing value drivers (CGS%, DML, IT, EI, CIPE, FAT and IMCO) were correlated and regressed against each of the six dependent variables, namely V_0, MVA, market to book ratio, ROE $\div K_e$, EVA and the Q-ratio. Where there was a statistically significant relationship at a 1%, 5% or 10% level, it was highlighted as a value driver whose regression coefficient can explain a variance in the applicable dependent variable.

The dependent variable market capitalisation (V_0) was logged to reduce the size of the coefficients and to make interpretations easier. The regression results of the original, unadjusted data indicates the presence of statistically significant results for value drivers DML, EI and CIPE. The Durbin-Watson statistic is below 2, indicating the presence of some positive autocorrelation, and the adjusted R^2 is low (0.04), indicating a poor fit for the model.

However, after correcting the model for serial correlation and taking heterogeneity and heteroskedasticity into account, the Durbin-Watson statistic improves to 2.3, indicating no positive autocorrelation. The adjusted R^2 also improves (0.99) to show that this model is a better fit. These results are presented in Table 4.

Table 4: Regression coefficients with V_0: corrected model

Variable	Beta	Std. Error	t-Statistic	Sig.
C	14.49491	0.268340	54.01705	0.0000***
CGS%	-1.391249	0.417997	-3.328370	0.0011***
DML	-0.014163	0.004408	-3.212797	0.0016***
IT	-0.012151	0.008250	-1.472796	0.1431
EI	-0.000991	0.003439	-0.288170	0.7736
CIPE	0.293397	0.595618	0.492592	0.6231
FAT	-9.56E-05	7.48E-05	-1.278668	0.2031
IMCO	-0.039581	0.016156	-2.449924	0.0155**
Model summary				
R^2	0.987790	Durbin-Watson stat		2.320751
Adjusted R^2	0.982993			
S.E. of regression	0.396099			
F-statistic	205.9244			
Sig.(F-statistic)	0.000000			

***Significant at 10% level; **Significant at 5% level; ***Significant at 1% level**

Two of the micro-value drivers, CGS% and DML, are significant at the 1% level and IMCO at the 5% level of significance, using the conventional t-test to evaluate the explanatory power of the predictor variable. A 1% increase in CGS% decreases market capitalisation by 1.4%. These results are different from those obtained by Waldron (2010), who found DML, IT and CIPE to be significant at the 5% level, and two drivers, FAT and IMCO, to be significant at the 10% level. The reason for this might be the compilation of the samples: the Waldron study used only the top 50 manufacturing companies in the USA and in this current study no such distinction could be made: all listed manufacturing companies in South Africa that met the requirements were included. Different results might be obtained if it was possible to obtain the names of the 'best' listed manufacturing companies in South Africa.

Generally, when a high R^2 and significant F-test occur with non-significant t-tests, there may be some multi-collinearity present, which is common with financial data, as most variables are usually derived using similar bases. Estimation of the regression coefficients is still possible; however, the estimates and their standard errors become very sensitive to even the slightest change in data (Gujarati, 1995). Hence, what may have been significant in the original model may no longer be significant in the corrected model and vice versa.

The regression coefficients of the value drivers with MVA were disappointing because the only significant value driver was IMCO at a 5% level of significance. The regression of the micro-drivers with the market to book ratio (M-B) was slightly better. The model had an overall R^2 of 0.89 and the CIPE were significant at the 1% level while the CGS% were significant at the 5% level.

The regression of the value drivers with $ROE \div K_e$ provided more encouraging results, as shown in Table 5.

Table 5: Regression coefficients with ROE ÷ K_e: corrected model

Variable	Beta	Std. Error	t-Statistic	Sig.
CGS%	0.256724	2.251944	0.114001	0.9094
DML	0.080079	0.137702	0.581538	0.5616
IT	0.204901	0.069442	2.950671	0.0036***
EI	-1.388455	0.172235	-8.061392	0.0000***
CIPE	-0.515999	2.599313	-0.198514	0.8429
FAT	-0.000228	0.001640	-0.139270	0.8894
IMCO	1.572977	0.537608	2.925883	0.0039***
C	-1.123724	1.715704	-0.654964	0.5133
Model summary				
R^2	0.336397	Durbin-Watson stat		2.033566
Adjusted R^2	0.311688			
S.E. of regression	30.32048			
F-statistic	13.61456			
Sig.(F-statistic)	0.000000			

***Significant at 10% level; **Significant at 5% level; ***Significant at 1% level**

The model has an overall explanation of 34% of the variance in the ROE÷K_e dependent variable. Three value drivers, namely IT, EI and IMCO, were significant at the 1% level. This is an indication that in order to achieve a return on equity in excess of the cost of equity, inventory management is very important. Also, the rate at which manufacturing cash outflows occur, including investment in inventory, plays a significant role in value creation for shareholders. As with the previous dependent variables (except V_o), due to lack of similar studies in this regard, comparisons cannot be done.

The regression coefficients of the value drivers with the Q-ratio were once again disappointing, with only CIPE found to be significant at the 5% level.

As indicated in the literature review, the model or dependent variable that should express value creation the best among the models used in this research should be EVA. The number of value drivers of this model (with a R^2 of 22%) that were significant was then also the most obtained from any other model in this study. The CGS% and CIPE were significant at the 1% level while the DML and IMCO were significant at the 5% level. The fact that two income statement (or profitability ratios) and two balance sheet value drivers were found to be significant, is meaningful in itself. Value creation is driven from both the profitability and the financing actions of management.

Table 6 provides a summary of the value drivers and the dependent variables where significant regression coefficients were obtained. The results obtained by the Waldron (2010) study are also included.

Table 6: Regression coefficients with all dependent variables: corrected models

VARIABLE	WALDRON V_o	V_o	MVA	MAR to BOOK	ROE÷ K_e	EVA	Q-RATIO
CGS%		***		**		***	
DML	**	***				**	
IT	**				***		
EI					***		
CIPE	**			***		***	**
FAT	*						
IMCO	*	**	**		***	**	
C	***	***	***	***		***	***
Model summary							
R^2	0.164	0.99	0.90	0.89	0.34	0.22	0.89
F-statistic	4.307	205.92	21.70	21.55	13.61	7.62	19.85
Durbin-Watson stat	1.282	2.32	2.14	1.95	2.03	1.90	2.08

***Significant at 10% level; **Significant at 5% level; ***Significant at 1% level**

From Table 6 it is evident that that the explanatory power of the regression coefficients as expressed by the R^2 was very good for most models. As indicated by the model summary statistics as well as by Hair et al. (2010), reliable conclusions can be made from this data.

It is evident from the summary of the value driver's significances that fixed asset turnover (FAT) made no contribution in any of the models. The inventory-related value drivers, IT and EI, featured only once and in the same model, namely ROE÷K_e. From this one can deduce that inventory on its own is not an important contributor to shareholder value creation, although it appeared at a 1% level of significance for that dependent variable. These value drivers should therefore not be management's highest priority. This is contrary to the view of Plossl (1991) who states that the single most important indicator of the effectiveness of the management of a manufacturing company is that of inventory turnover. This perhaps underlines the difference between 'manufacturing effectiveness' and value creation.

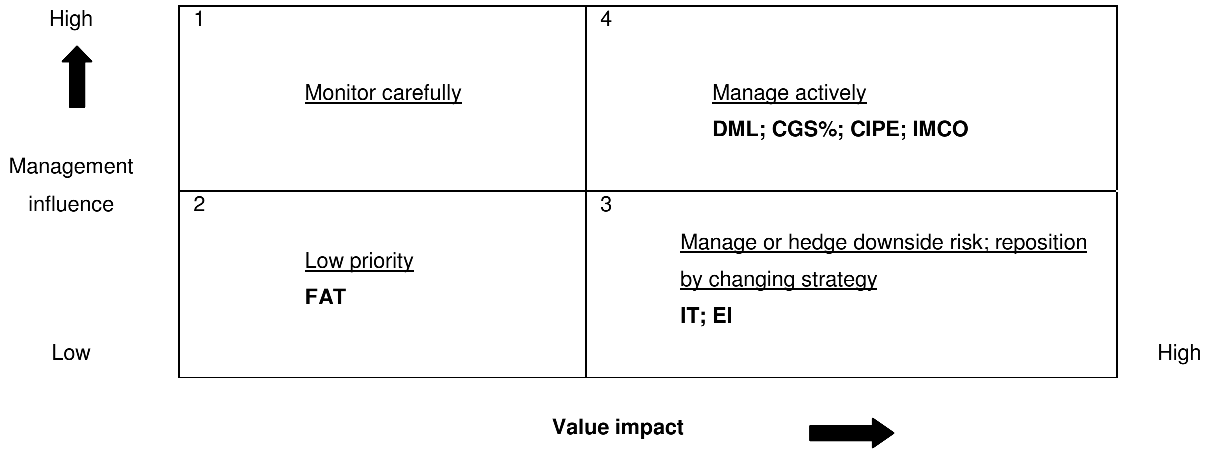
The DML featured twice and the CGS% three times, which indicates that the profitability value drivers are significant for shareholder value creation. Cost control, effective purchasing methods and policies, optimising production inputs and deciding between different suppliers and markets become grass root level decisions that can influence this micro-driver and therefore shareholder value creation for manufacturers. In South Africa, wage costs with the accompanying strength of labour unions in wage demands, together with a relative low level of productivity, will put upward pressure on the input costs. However, research by Fedderke et al. (2006) found that the South African manufacturing sector has a high mark-up ratio and therefore seems to pass on these cost pressures to their selling price. Sales or the selling price is the other input (besides the cost factor) in the manufacturing value drivers' CGS% and DML. The lack of domestic competition in the South African manufacturing industry, together with the ability to achieve high marks-ups (Aghion et al., 2008), may be one of the reasons why these value drivers achieve significant explanations of shareholder value. However, South African manufacturers competing on the international stage fared poorly, as indicated in the literature study. This might be due to the high mark-ups that the South African firms apply, as well as a low level of productivity, which lower their competitiveness in relation to their international competitors.

The value driver that measures capital intensity, CIPE, made three significant appearances in the various models. Most manufacturing operations are capital-intensive by nature, some more than others. To a certain extent, management can determine the capital investment necessary to manufacture a product. For example, the buy or make decision for certain components will influence the total capital invested to produce the end product. Factors such as the reliability of suppliers, geographical location of suppliers, import levies and even the tax laws of a country are grass roots level decisions that will influence this value driver and its effect on shareholder creation.

The manufacturing cash outflow rate, IMCO, proved to be the most prominent of all the value drivers, as it featured four times. It made significant contributions in all but two of the models. This value driver measures the change in costs, inventory and non-current manufacturing assets, relative to sales. Its prominence can therefore be understood – it is an all-encompassing measure to improve shareholder value, pointing to efficient management of all its inputs, namely costs, inventory and manufacturing assets.

The analysis identified a number of value drivers that can be placed in the micro-driver matrix in order to assign their significance to management. This is presented in Figure 2.

Figure 2: Micro-value drivers from the analysis



The value drivers in quadrant four are placed there because they obtained a high significance or they re-occurred when using the different dependent variables. In essence, both the DML and the CGS% are profitability value drivers that are influenced by cost input and control. Active management of these variables will imply an optimal mix of direct labour, materials and overhead inputs into the manufacturing process. According to Waldron (2010), this means that there must be a focus on the labour versus capital trade-off, selecting, training and developing talent, compensation that rewards output quality, innovation and productivity. Organisational waste must be eliminated and a higher level of efficiency attained.

Regarding CIPE, investment in plant and equipment in South Africa is relatively expensive due to the high interest rates that the country has in relation to its overseas competitors. Also, as indicated in the introduction, South Africa is faced with strong unions, labour laws that can be seen by investors as detrimental to employment and a labour force that has a doubtful productivity record. This will favour investment in capital-intensive rather than labour-intensive processes. In this context, the make versus buy decision becomes important. If the decision is to do the work in-house and manufacture instead of buying components, managing shareholder value reverts to the DML and CGS% value drivers. On the other hand, if the decision is to buy certain inputs, selecting reliable suppliers becomes very important, together with the implementation of a reliable supply chain that will measure and assist value creation, as proposed by Christopher and Ryals (1999). Outsourcing certain production inputs can free up capital, thus favourably influencing the financing structure of the firm. It can even have a positive influence on one of the seven macro-value drivers, namely the WACC of the firm.

CONCLUSION AND RECOMMENDATIONS

The objective of this study was to determine in a statistically rigorous manner which value drivers of a manufacturing firm contribute to or explain shareholder value created by management. The concept of value drivers stems from the notion that in order to create value, certain variables need to be present – and those drivers that have a greater influence need to be identified. The value drivers need to be broken down from a generic to a business-specific to grass roots level. If management is able to identify those value drivers that have a high impact on value and at the same time are under the control of management (quadrant four value drivers), shareholder value creation can be optimised by actively managing those value drivers. At the same time, value drivers that are less important and reside in the other quadrants on the value driver matrix should be monitored and managed to sustain and contribute to the creation of shareholder value.

The data sample consisted of manufacturing companies listed on the JSE for a period of at least six years (2005 – 2010). There were 49 companies. For the purposes of this study, the seven manufacturing value drivers as determined and used by Waldron (2010) were used. They are the CGS%, DML, IT, EI, CIPE, FAT and IMCO. In order to determine their influence on shareholder value, six dependent variables were used. They were the market capitalisation (V_0), market value added (MVA), market to book ratio, ROE $\div K_e$, Economic Value Added (EVA) and the Q-ratio. Before the data was subjected to a multiple regression analysis, it was corrected for serial correlation, heterogeneity and heteroskedasticity.

The results of the regression analysis indicated a statistically significant relationship between the six value creation measures used as dependent variables and the seven micro-value drivers. If the regression with market capitalisation is used, a 99% R^2 have the CGS% and the DML as quadrant four value drivers and IMCO as a quadrant three value driver. These results were different from those of Waldron (2010), who found DML, IT and CIPE to be quadrant four value drivers with FAT and IMCO quadrant three value drivers. However, as indicated before, market capitalisation cannot be seen as a pure measure of value creation, because it only measures the size of the company, without taking into account the capital needed to create that size. Therefore, the actual value creation measures and their regression coefficients need to be analysed. The value drivers of MVA provided a R^2 of 90% with 1 significant value driver (IMCO), market to book ratio (R^2 of 89%), 1 significant value driver (CIPE), ROE÷K_e (R^2 of 34%), 2 significant value drivers (IT and EI) and the Q-ratio (R^2 of 89%) 1 significant value driver (CIPE).

When EVA was used in this study as a dependent measure of value creation, the value drivers provided a R^2 of 22%. There were no fewer than four significant quadrant four value drivers, namely CGS%, DML, CIPE and IMCO. To have 22% of shareholder value explained by the manufacturing-based value drivers can be viewed as a result of some significance for manufacturing management. The implications for management, based on the prominence of these value drivers are firstly to concentrate on cost control, including effective purchasing methods and control over wage costs. Secondly, the capital intensity of a firm needs to be carefully monitored – the efficient use of assets to generate sales and the buy or make decision are grass roots decisions that will assist in the creation of shareholder value. Lastly, optimal inventory levels (as part of the IMCO value driver) can play a role in efficient manufacturing operations. It is therefore suggested that management spend time and money on inventory management, with the possible use of the just-in-time (JIT) inventory system.

Finding the value drivers will only get one halfway home. It is recommended that value-based management, which has the value drivers as integral component, be practised. Performance management and incentive schemes must combine operating and financial measures based on key value drivers. As indicated on the value driver matrix, management could dedicate time and effort to those value drivers that are within its control and thus add significantly to the creation of shareholder value. This does not mean that management should neglect those factors and drivers over which it has no control. Instead, management should use alternative methods such as insurance and hedging to manage exposure to these (unavoidable) variables.

Future studies could probably improve on what has been achieved by this research. To achieve a significant explanation in value created that varies between 22% and 90% still means that up to 78% (or 10%) is not explained. This provides a rich opportunity for future research. The compilation of the sample for this study provided some challenges. There are relatively few listed manufacturing firms in South Africa compared to those of the USA or European countries. To obtain statistically significant results, the researcher was compelled to use all South African manufacturing companies without having the luxury of choosing the best or the top manufacturers. This had a negative impact on the results. For example, the results could be different if only companies producing a positive EVA were selected, as opposed to the current sample that contained companies with positive EVAs as well as companies with negative EVAs. However, such a distinction will result in a sample size that will become too small to produce statistically significant results. If one could differentiate between manufacturers on the basis of capital intensity or sector, more meaningful results might be obtained.

Finally, identifying, using and integrating value drivers in the manufacturing process will not result in improvements in the business process, but it will provide management with information that can direct and optimise value creation improvement efforts. Manufacturing management, with shareholder value as a goal and the controllable high impact value drivers at hand, must by means of value-based management be committed to make decisions and improvements in the process of creating shareholder value. This research contributes towards that process, which, if followed, could over time enhance the potential of the manufacturing sector to create value in the South African economy.

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