

# Drivers Creating Shareholder Value In South African Manufacturing Firms

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## ABSTRACT

*The objective of this study was to determine shareholder value drivers for South African manufacturing firms listed on the Johannesburg Securities Exchange (JSE) from 2006 to 2010. In order to optimise shareholder value creation, management must be able to recognise value drivers that it can control. A multiple regression analysis was used to identify the value drivers of manufacturing firms in South Africa. The value drivers found to be significant in explaining 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 toward optimal shareholder value creation.*

**Keywords:** Shareholder Value; Value Drivers; Value-Based Management; Manufacturing

## INTRODUCTION

South Africa has undergone a remarkable political transformation in the last 16 years, but on the economic front, however, the country has not fared well. Since 1994, South Africa's per capita GDP has admittedly 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 South Africa's biggest competitors - South Asia (3.7%) and East Asia (6.2%). The most worrying aspect of this performance is the South African unemployment rate, which at 26%, or 40% (depending on which definition of unemployment is used), is among the highest in the world (Rodrik, 2008). One of the reasons for this state of affairs may 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 in the South African economy.

The manufacturing industry is important because it remains among the top four economic sectors to 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 South Africa (Allix, 2011). Local manufacturers struggle 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. In September 2011, a new R20 billion tax incentive to encourage investment in new manufacturing assets and employee training was launched by the government. Trade and Industry Minister Rob Davies claimed that this would "create confidence in the manufacturing sector and support efforts by manufacturers to raise their competitiveness and improve their productivity" (Reuters, 2011). The South African economy, and specifically the manufacturing industry, must create more jobs, but must also compete internationally against more efficient competitors. At the same time, the goal of creating shareholder value for their shareholders remains critical.

This article reports on a study identifying those manufacturing value drivers that influence shareholder value creation. As far as could be ascertained, such a study had not been undertaken in South Africa before. Hence, the findings of this study contribute to the existing body of knowledge by providing important information for managers and shareholders to optimise manufacturing processes and activities and ultimately to facilitate shareholder value creation. This may persuade investors to invest more time and money in (South African) manufacturing opportunities.

The first objective of this study was to identify the manufacturing value drivers that 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 identified by Waldron (2010) in the U.S. The current study introduced five measures that measure value creation as a dependent variable to achieving the study's main objective; namely, to see how the seven manufacturing value drivers influence the actual value created by a firm's management. The last objective was to present management of manufacturing firms with a value driver map that indicates the impact of each micro-value driver on value creation and how management might influence 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 set out, followed by a discussion of the results of the statistical analysis. Lastly, conclusions are drawn and recommendations are made on the basis of 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 the measurement of manufacturing financial performance and its link to value creation, rather than on engineering systems or technical efficiency. In this literature review, performance management in a manufacturing firm is discussed, followed by the measurement of value creation. 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 has over them.

### **Performance Management In Manufacturing Firms**

Manufacturing companies face increasing competitive pressure due to the globalisation of manufacturing activities, so 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 to achieve and retain a competitive advantage. In their literature review on the evolution of performance measurement systems, Gomes, Yasin and Lisboa (2004) cite studies by Schmenner and Vollmann in 1994, Birchard in 1995 and Clinton and Chen in 1998 which indicate the frustration of managers of manufacturing companies at the lack of practical performance management systems.

Plossl (1991) argues that performance measures in modern manufacturing operations must attain three objectives: customer satisfaction, cutting costs and more effective use of capital – wrong measures lead to poor decisions.

Kaplan and Norton's (1992) balanced scorecard approach is one option to measure performance. Neely, Gregory and Platts (2005) state that the balanced scorecard approach 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) point out a serious flaw in the balanced scorecard, namely that if a manager used 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?" (competitor's perspective). Similarly, Plossl (1991) warns that conventional accounting and financial reporting systems fail to aid manufacturing management in making decisions affecting a competitive position.

Based on the literature, it was thus clear that there is a need for improving measurement of manufacturing firms' performance.

### **Value Creation Measures In Manufacturing Firms**

One of this study's goals was using 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. Manufacturing firms' value drivers differ from those of retail, service or mining firms.

Ittner, Larcker and Randall (2003) link strategic performance management to value creation measures with a contingency theory, which states that strategic performance measures must be aligned with a 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 should align performance measures with strategic objectives, selecting 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 EVA as a financial performance measure. They argue that reducing costs by using tools such as Just-in-Time (JIT) and Total Quality Management (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.

Christopher and Ryals (1999) discuss the influence of a company's supply chain on shareholder value, EVA and ultimately the incorporation supply chain decisions in value-based management. They identified the drivers of shareholder value as being revenue growth, operating cost reduction, fixed capital efficiency and working capital efficiency, which can all four be influenced by a firm's supply chain strategy. 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 as a performance measurement tool has been discussed above. Fletcher and Smith (2004) used an analytical hierarchy process to develop a comprehensive performance measurement system, and they link the balanced scorecard to EVA. Young and O'Byrne (2001) found these two concepts to be highly complementary. The analytical hierarchy process includes the identification of value drivers such as on-time delivery, which improves customer satisfaction, sales and the collection rate of debtors (and therefore lower working capital), which can in turn lead to a higher EVA. The balanced scorecard focuses management's attention on causal relationships that can lead to improved shareholder value creation. Fletcher and Smith (2004) illustrate how the analytical hierarchy process identifies 17 value drivers across the four balanced scorecard perspectives and assign a weight factor to each. The financial perspective's value drivers are net assets (RONA), sales growth, the weighted average cost of capital (WACC), inventory turnover and the debtors' collection period. Non-financial drivers are included among the remainder of the 17 drivers.

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

### **The Value Drivers**

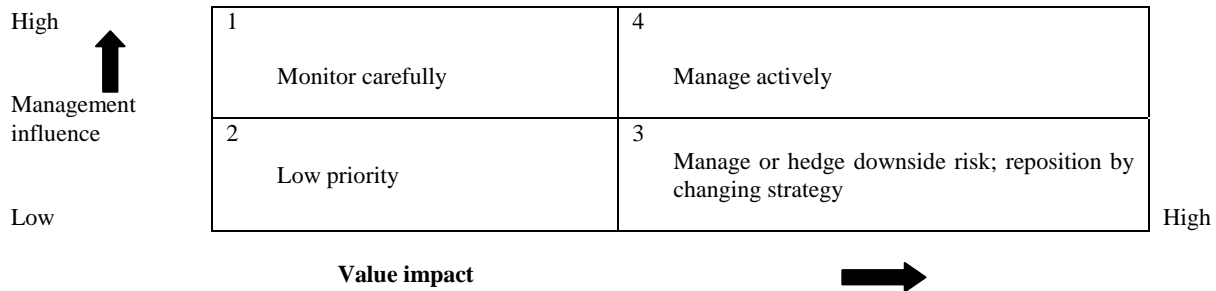
The process of identifying value drivers starts with an analysis of shareholder value, because these drivers represent the building blocks of shareholder value.

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 can be divided into an operating group (sales growth, operating profit margin and income tax rate), an investment group (working and fixed capital investment drivers) and a financing group (cost of capital). Which value drivers have the biggest impact on shareholder value creation? 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 hence cannot be used at grassroots level. Micro-value drivers that influence or determine the macro-value drivers need to be identified.

Rappaport (1998) proposes that, in order to identify the micro-value drivers, a three-step business unit value driver analysis should be undertaken. The first step is developing a value driver map of the business containing the seven macro-value drivers. From them, key micro-value drivers can be developed, depending on the type of firm (e.g. manufacturing, retail or service). The second step is identifying which drivers 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 identifying those drivers that management can influence, as, in any business, management may have considerable control over some production inputs, but not over others (such as raw material prices, labour rates, interest rates and the exchange rates). The main objective of this study was to identify those value drivers that have a high shareholder value impact and that management can control.

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



**Figure 1: Micro-value Driver Matrix**

From Figure 1, it is clear that management’s task is identifying drivers that fall into quadrant four, because these drivers have a high impact on shareholder value and management can control them. However, value drivers that reside in the other quadrants need to be monitored or managed as well, as they do influence value, however little.

In the statistical analysis in this study, the value drivers used as independent variables 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 are therefore directly related to sales (CGS%). One expects a lower cost of goods to sales ratio to 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 results in a higher than proportionate increase in gross profit.
- Inventory turnover (IT) is best measured by relating inventory to the 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 must be managed carefully, because it could affect a firm’s profitability directly. Growth in sales inevitably results in growth in inventory. Relating sales growth to inventory growth ( $EI = \% \Delta \text{ Inventory} \div \% \Delta \text{ Net sales}$ ) indicates whether inventory is managed efficiently. A lower ratio indicates better inventory management, while an increase in this ratio suggests 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, normally an optimal level of manufacturing equipment employed should result in a relatively lower CIPE level.
- 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 indicates 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,  $(\Delta \text{ CGS} + \Delta \text{ I} + \Delta \text{ P\&E}_{\text{NET}}) \div \Delta \text{ Net sales}$ . A higher IMCO rate results in lower profitability and hampers a 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.

Six dependent variables were used in the statistical analysis in this study, as discussed below.

- Market capitalisation ( $V_0$ ), is the weighted average monthly share price at the 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 used in this study was to express the MVA performance indicator as a ratio ( $MV \div TC$ ), which effectively standardised all the enterprises in the sample to 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 an enterprise. It is calculated by taking the year-end market value of equity (market capitalisation,  $V_0$ ) divided by the year-end book value of equity.
- An alternative for calculating the market to book value could be to divide the return on equity (ROE) by the cost of equity ( $K_e$ ). (ROE is calculated by dividing profit attributable to ordinary shareholders by the total book value of equity;  $K_e$  is calculated by using the capital asset pricing model, CAPM.) This ratio is therefore also an equity-based indicator of value creation. A value less than one indicates that management is destroying value, while a value greater than one indicates that management is using capital to create value.
- MVA is an external value creation indicator, whereas EVA is an internal value measurement. EVA (developed by the Stern Stewart consulting firm) is calculated as follows (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 is beyond the scope of this study to engage in the debate or list some of the numerous references to arguments in favour of EVA as shareholder value measurement, as opposed to earnings as a value measurement. One would expect the seven manufacturing value drivers to 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, as 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, 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 the dependent variable ( $V_0$ ) may be expressed as follows:

$$V_0 = a \pm b_i(x_{im}) \pm b_j(x_{jm}) \pm b_k(x_{km}) \pm b_l(x_{lm}) \pm b_m(x_{mm}) \pm b_n(x_{nn}) \pm b_o(x_{on}) + e$$

where:

$$b_i(x_{im}) = \text{beta coefficient, the predictor for cost of goods sold} \div \text{net sales}$$

$$b_j(x_{jm}) = \text{beta coefficient, the predictor for } \% \Delta \text{ gross profit} \div \% \Delta \text{ net sales}$$

$$b_k(x_{km}) = \text{beta coefficient, the predictor for cost of goods sold} \div \text{inventory}$$

$$b_l(x_{lm}) = \text{beta coefficient, the predictor for } \% \Delta \text{ inventory} \div \% \Delta \text{ net sales}$$

$$b_m(x_{mm}) = \text{beta coefficient, the predictor for plant \& equipment net of depreciation} \div \text{net sales}$$

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

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

$$e = \text{unexplained variance}$$

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

There are a number of features that distinguish this study from others. Firstly, with the exception of Waldron's (2010) study, no studies that link the performance measurement of manufacturing firms to their value creation have been conducted. As mentioned in the literature review above, a number of studies merely mention the link between various performance measurement systems and value creation (Christopher and Ryals, 1999; Roztocky and Needy, 1999; Fletcher and 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) who found, in a study among South African motor manufacturers, that of the four balanced score card perspectives, the most important was the customer perspective, and that shareholder value measures were largely ignored. It is this gap in knowledge that the current 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 consisted of the JSE-listed manufacturing companies in South Africa (2005-2010). To qualify for the final sample, companies had to be engaged in manufacturing activities and had to be listed on the JSE for at least six years (to compute data for five years: 2006–2010). Furthermore, the companies had to report data on sales, cost of goods, inventory and plant and equipment, net of depreciation, in order for the seven micro-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, Black, Babin and Anderson, 2010). The data were obtained from McGregor BFA, a large supplier of value-added financial data in South Africa.

The data were subjected to tests for outliers, stationarity, heteroskedasticity, serial correlation and endogeneity. Graphical analysis of the series indicated that there were 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 done 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.

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 provided important characteristics of the sample, setting the stage for the multiple regression results.

**DESCRIPTIVE STATISTICS**

Table 1 sets out the descriptive statistics for the dependent variables.

**Table 1: Descriptive Statistics for the Dependent Variables**

Statistics	$V_0$ (Rbn)	MVA	M-B	$ROE \div K_e$	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	24.90	9.61	30.90	419.7200	486.94	13.36
Minimum	7.59	0.37	-1.57	-441.5100	-113.23	0.39
Std. Dev.	3.05	1.27	3.71	47.0060	147.83	1.94
<b>Percentiles</b>						
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	2.90	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,  $ROE \div K_e$  indicates that on average the ROE was 13% less than the cost of equity,  $K_e$ , an indication that if value is measured in this way, value is destroyed by the companies in the sample, on average. 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 2 shows the descriptive statistics for the seven micro-value drivers - the independent variables.

**Table 2: 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
<b>Percentiles</b>							
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) was 1.16, an indication that if sales change, gross profit would 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 varies according to the type of manufacturing operation and can be reduced through a policy of buying some components rather than manufacturing them. The fixed asset turnover (FAT) has a relatively high average of 43, with a minimum of 1.5. This variable can 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 relatively 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 micro-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, the 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, that value driver was highlighted as a value driver whose regression coefficient can explain a variance in the applicable dependent variable.

The natural logarithm of the dependent variable market capitalisation ( $V_0$ ) was used 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 micro-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 improved to 2.3, indicating that there was no positive autocorrelation. The adjusted  $R^2$  also improved (0.99) to show that this model is a better fit. These results are presented in Table 3.



**Table 3: 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**
<b>Model summary</b>				
R <sup>2</sup>	0.987790	Durbin-Watson stat		2.320751
Adjusted R <sup>2</sup>	0.982993			
S.E. of regression	0.396099			
F-statistic	205.9244			
Sig.(F-statistic)	0.000000			

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

Two of the micro-value drivers, CGS% and DML, are significant at a 1% level and IMCO at a 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 a 5% level, and two drivers, FAT and IMCO, to be significant at a 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, while in the 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<sup>2</sup> and significant F-test occur with non-significant t-tests, some multi-collinearity may be 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 value drivers with the market-to-book ratio was slightly better. The model had an overall R<sup>2</sup> of 0.89 and the CIPE was significant at a 1% level, while the CGS% was significant at a 5% level.

The regression of the value drivers with  $ROE \div K_e$  provided more encouraging results, as shown in Table 4.

**Table 4: Regression Coefficients with  $ROE \div K_e$ : 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
<b>Model summary</b>				
R <sup>2</sup>	0.336397	Durbin-Watson stat		2.033566
Adjusted R <sup>2</sup>	0.311688			
S.E. of regression	30.32048			
F-statistic	13.61456			
Sig.(F-statistic)	0.000000			

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

The model has an overall explanation of 34% of the variance in the ROE÷K<sub>e</sub> dependent variable. Three value drivers, namely IT, EI and IMCO, were significant at a 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<sub>o</sub>), due to lack of similar studies in this regard, comparisons could not 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 a 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<sup>2</sup> of 22%) that were significant was then also that most obtained from any other model reviewed in this study. The CGS% and CIPE were significant at a 1% level while the DML and IMCO were significant at a 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 5 provides a summary of the value drivers and the dependent variables where significant regression coefficients were obtained. The results obtained by Waldron (2010) are also included.

**Table 5: Regression Coefficients with All Dependent Variables: Corrected Models**

Variable	Waldron V <sub>o</sub>	V <sub>o</sub>	MVA	M-B	ROE÷K <sub>e</sub>	EVA	Q-Ratio
CGS%		***		**		***	
DML	**	***				**	
IT	**				***		
EI					***		
CIPE	**			***		***	**
FAT	*						
IMCO	*	**	**		***	**	
C	***	***	***	***		***	***
<b>Model summary</b>							
R <sup>2</sup>	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 a 10% level; \*\*Significant at a 5% level; \*\*\*Significant at a 1% level

From Table 5 it is evident that that the explanatory power of the regression coefficients as expressed by the R<sup>2</sup> 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) did not contribute in any of the models. The inventory-related value drivers, IT and EI, featured only once and in the same model, namely ROE÷K<sub>e</sub>. 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 Plossl’s (1991) argument that the single most important indicator of the effectiveness of the management of a manufacturing company is inventory turnover. This perhaps underlines the difference between ‘manufacturing effectiveness’ and value creation.

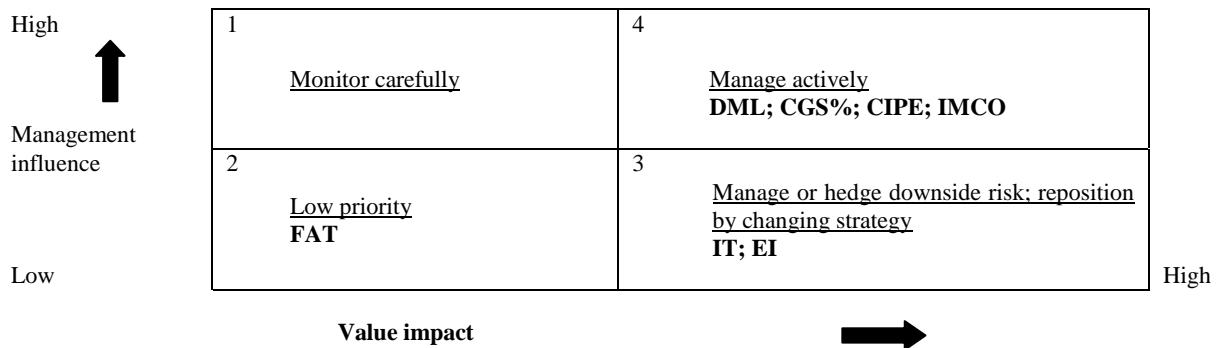
The DML featured twice and the CGS% three times, which suggests that the profitability value drivers are significant for shareholder value creation. Cost control, effective purchasing methods and policies, optimising production inputs and deciding between different suppliers and markets become grass root level decisions that can influence this value 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 relatively low level of

productivity, put upward pressure on input costs. However, Fedderke, Kularatne and Mariotti (2006) found that the South African manufacturing sector has a high mark-up ratio and therefore seems to pass on these cost pressures to the consumer. 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, Braun and Fedderke, 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 compared to that of international competitors.

The value driver that measured capital intensity, CIPE, made three significant appearances in the various models. Most manufacturing operations are capital-intensive by nature, some more than others. To some extent, management can determine the capital investment necessary to manufacture a product. For example, the buy or make decision for certain components influences 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 in a particular country lead to grass roots level decisions that 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 is understandable – 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 value 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 recurred 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 implies an optimal mix of direct labour, materials and overhead inputs into the manufacturing process. According to Waldron (2010), this requires 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 high local interest rates compared to those of 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 favours 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 measures and assists value creation, as proposed by Christopher and Ryals (1999). Outsourcing some 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 in 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 that drivers which have a greater influence need to be identified. 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 4 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 at least six years (2005–2010). There were 49 companies. For the purposes of this study, the seven manufacturing value drivers determined and used by Waldron (2010) were employed - CGS%, DML, IT, EI, CIPE, FAT, and IMCO. In order to determine their influence on shareholder value, six dependent variables were used - market capitalisation ( $V_0$ ), MVA, the market-to-book ratio,  $ROE \div K_e$ , EVA, and the Q-ratio. Before the data were subjected to a multiple regression analysis, they were 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%  $R^2$  has the CGS% and the DML as Quadrant 4 value drivers and IMCO as a Quadrant 3 value driver. These results differ from those of Waldron (2010) who found DML, IT and CIPE to be Quadrant 4 value drivers with FAT and IMCO as Quadrant 3 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 MVA value drivers provided a  $R^2$  of 90% with one significant value driver (IMCO), the market-to-book ratio ( $R^2$  of 89%), one significant value driver (CIPE),  $ROE \div K_e$  ( $R^2$  of 34%), two significant value drivers (IT and EI), and the Q-ratio ( $R^2$  of 89%), one significant value driver (CIPE).

When EVA was used in this study as a dependent measure of value creation, the value drivers provided an  $R^2$  of 22%. There were no fewer than four significant Quadrant 4 value drivers; namely, CGS%, DML, CIPE and IMCO. Having 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, is 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, as well as the "buy or make" decision of component inputs, are examples of 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 spends time and money on inventory management, with the possible use of the JIT inventory system.

Finding the value drivers will only get a company half way. It is recommended that value-based management, using the value drivers as an integral component, be practiced. Performance management and incentive schemes must combine operating and financial measures based on key value drivers. As indicated on the value driver matrix, management should 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 results may be different if only companies producing a positive EVA were selected, as opposed to the current sample which contained companies with both positive and negative EVAs. Furthermore, 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 automatically 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 be committed by means of value-based management to make decisions and improvements in the process of creating shareholder value. This research contributes toward that process which, if followed, could, over time, enhance the potential of the manufacturing sector to create value in the South African economy.

#### **AUTHOR INFORMATION**

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