
Data to model the effect of Inventory turnover Efficiency on Automobile firm's Profitability and Enterprise value: A partial least squares structural equation modeling approach (PLS-SEM)

M.PURUSHOTTAM NAIDU¹, G.V.K. KASTHURI^{2*}

*Corresponding Author

Email: purumudadla6@gmail.com*

Abstract: Purpose: Inventory turnover or efficiency an essential element in the automobile industry. This study aimed to identify paths and model fit for cash profitability and enterprise value due to the inventory turnover ratio using partial least square structural equation modeling (PLS-SEM).

Methods: sample includes 8 active Indian automobile companies (2-3 Wheeler) listed and traded on BSE (Bombay stock exchange). The present study covers consolidation financial statements for a period of 10 years (2010-20120). A conceptual structural model was developed for testing six hypotheses. H1: What was the effect of the inventory turnover ratio on operating profit per share?; H2: What was the effect of inventory turnover ratio on return on assets ?; H3: What was the effect of return on assets on cash earnings per share ?; H4: What was the effect of operating profit margin per share on cash earnings per share?; H5: What was the effect of inventory turnover ratio on enterprise value ?; H6: What was the effect of operating profit per share on enterprise value ?.

Results: 75 samples in the study, using structural equation modeling all effect size, collinearity (inner) issues, predictive accuracy was confirmed. All path coefficients were positive and statistically significant(H1: $\beta = 0.854$, $P < 0.001$; H2: $\beta = 0.703$, $P < 0.001$; H3: $\beta = 0.161$, $P < 0.001$; H4 : $\beta = 0.856$, $P < 0.001$; H5 : $\beta = 0.428$, $P < 0.001$; H6 : $\beta = 0.502$, $P < 0.001$).The in-sample predictive power was substantial for cash earnings per share ($R^2=0.939$), earnings before interest tax per share ($R^2=0.729$), enterprise value ($R^2=0.803$), and moderate for return on assets($R^2=0.494$). Overall model fit is established (SRMR <0.021 at 95% & 99%).

Originality: This article provides how operating efficiency influences enterprise value and cash profitability for the investors of 2-3 wheeler automobile firms. This result supports management performance towards operating efficiency that creates both profit and enterprise value.

Keywords: Operating efficiency; Enterprise value; Least-square analysis; Cash EPS, Indian automobile industry.

INTRODUCTION

Efficiency in an organization's operations relates to the optimum utilization of its resources and creating value for the firm. Enterprise value defines the value of the company's core business operations to all the investors in the company. Enterprise value requires both that past 'profits' remain 'sustainable' into the future and that the profit potential be 'transferable' to a new owner. Operational changes like higher or lower revenue growth and operating margin highly impact enterprise value.

Managing inventory is one of the core business operations for the automobile industry. Inventory management is largely a function of operations management (Parrino, Kidwell, et al, 2012). Manufacturing and merchandise companies can easily be carrying inventory equivalent to between 50% and 100% of the revenue of the business. The financial manager makes sure that the firm maintains "optimal" inventory levels that reconcile these conflicting objectives. Therefore, the CFO will compare the firm's inventory-to-sales ratio with those of its benchmarks to see if things look "reasonable." The inventory turnover ratio gives an overview of a company's overall inventory position and is a useful method of monitoring a company's overall stock position (Parrino, Kidwell, et al, 2012).

The firm's goal should be to move inventory quickly in order to minimize its investment, but it must be careful to maintain adequate inventory to meet demand and minimize stock-outs, which can result in lost sales.

The major objectives of inventory management are

i)To maintain a large size of inventories of raw material and work-in-process for efficient and smooth production and of finished goods for uninterrupted sales operations.

ii) To maintain a low level of investment in inventories to improve profitability.

Inventory management has traditionally been about minimizing the total cost of inventory without running the risk of stock-outs (Parrino, Kidwell, et al, 2012).

Some of the findings of these studies reviewed reveal the diverse outcome. Previous studies in this area have reported, (e.g. Gaur et al., 2005; Roumiantsev and Netessine, 2007) investigate inventory management efficiency with a focus on accounting concepts considering that balance sheet and income statement may adequately categorize some activities related to the operation and financial management.

We further analyze the changes in inventory performance and financial performance over time (from 1980 through 2005) and find a decrease in inventory levels scaled by sales (increase in inventory performance), consistent with Rajagopalan and Malhotra (2001) and Chen et al. (2005). In addition, Warnes (2013) using the data of listed conglomerate companies in Pakistan from 2007-2011 found that return on asset is significantly and positively impacted by the number of days inventory.

However, Hayajneh and Yassine (2011) show a significant negative association between profitability and the average inventory transformation period. Similarly, Pouraghajan, Rekabdarkolaei, and Shafie (2013) using the list of automotive companies registered in the Tehran Stock Exchange between 2006 and 2010 found a significant negative relationship between inventory turnover and ROA. Furthermore, Iqbal and Zhuquan (2015) found a significant negative relationship between ITP and profitability. It is recommended that managers can improve the profitability and value of their firms by reducing inventory turnover in days.

Further, building unnecessary working capital in due course increases adverse effects on investors' wealth (Gill, Mand, Obradovich, & Mathur, 2019). Lazaridis and Tryfonidis (2006) have investigated the relationship between working capital management and corporate profitability of the listed company in the Athens Stock Exchange. The result from regression analysis indicated that there was a statistical significance between profitability, measured through gross operating profit, and the cash conversion cycle. From those results, they claimed that the managers could create value for shareholders by handling correctly the cash conversion cycle and keeping each different component to an optimum level. Charitou et al., (2010) claim that if the components of the cash conversion cycle are managed efficiently, it should add value to the firm because it increased the profitability of the firm.

Our study sought to determined

I) Inventory turnover/efficiency impact on operating profitability to shareholders and

II) Causal inference among the inventory efficiency, cash earnings per share and enterprise value.

Structural equation modeling (SEM) represents a group of statistical sciences search techniques that have become very popular in business and social science search (Henseler J, Hubona, et al 2016). Partial least squares structural equation modeling (PLS-SEM) is a prediction-oriented variance-based approach that focuses on endogenous target constructs in the model and aims at maximizing their explained variance (e.g., looking at the coefficient of determination (R² value) (Ringle, Sarstedt, et al 2012). To the best of our knowledge no study conducted for inventory turnover ratio impact on operating profitability and enterprise value using partial least structural equation modeling. Further, this study aimed to identify the relationship between operating profit per share to enterprise value and cash earnings per share. The results have established the opportunity of developing and testing an inventory turnover ratio/operating efficiency using PLS-SEM for the evolution of path coefficients and overall model fit with respect to cash earnings per share and enterprise value.

METHODS

Study design

Study population: This study is based on historical panel data analysis, includes consolidated financial statements. Our hypotheses were tested on eight Indian automobile companies, 2 & 3 wheeler industries listed on BSE (Bombay Stock Exchange) from 2010 -2020. The population includes Atul auto, Bajaj Auto, Hero Motor Corporation, Kinetic Eng, Maharashtra Scooters, Majestic auto, Scooters India & TVS motors of this study.

Table 1: Measurement of variables

Variable	Classification	measures	Ratio definition
ITR	Inventory turnover ratio	Operating efficiency	Operating revenue / inventory
EBIT/share	Earnings before interest and tax per share	Operating profit per share	Operating Profit / Number of shares outstanding
EV	Enterprise value	Firm total value measured by market participants/economic value	Market value of Equity + debt + minority interest + preference capital – cash & cash equivalents
ROA	Return on Assets	Assets efficiency	Net income/Total assets

Cash EPS	Cash earnings per share	Cash profit per share	Cash from operating activities/ number of shares outstanding
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Model development

Conceptual Model: structural model represent the theory that specifies how constructs are related to other constructs. The first step in using PLS-SEM involves creating a path model that connects variables and constructs based on theory and logic (Hair et al., 2014).

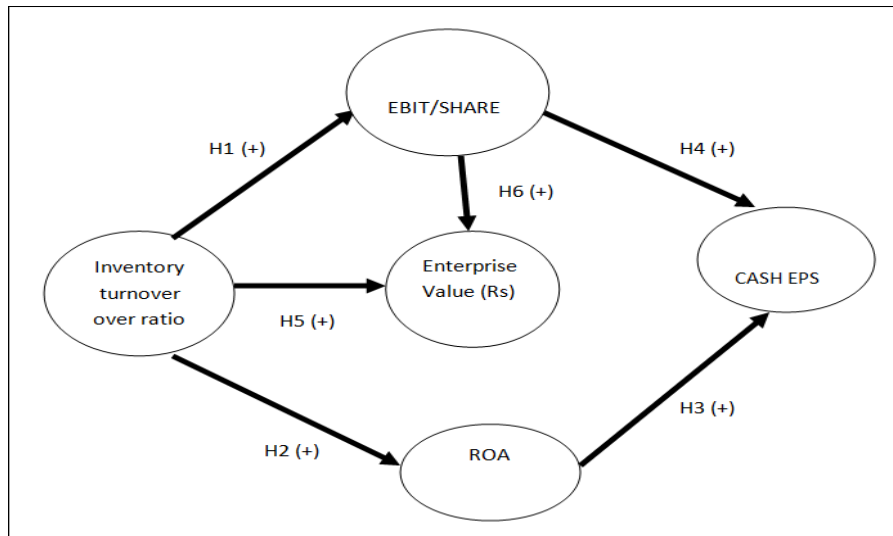


Fig. 1: Hypothesized framework

A path model is a diagram that displays the hypotheses and variable relationships to be estimated in an SEM analysis. The proposed model was analyzed according to the flow chart developed. (Sarstect and Ringle 2017) . secondary data are mainly used in exploratory research to propose causal relationships in situations which have little clearly defined theory (Hair et al., 2017a,2017b).such settings require researchers to put greater emphasis on examining all possible relationships rather than achieving model fit (Nitzl, 2016).

The conceptual model summarises the research questions (hypothesis) that this study was aiming to test (Fig. 1): (1) Hypothesis 1 (H1): what was the effect of inventory turnover ratio(ITR) on operating profit (EBIT) per share?; (2) Hypothesis 2 (H2): what was the effect of inventory turnover ratio(ITR) on return on assets (ROA)?; (3) Hypothesis 3 (H3): what was the effect of return on assets (ROA) on cash earnings per share (EPS)?; (4) Hypothesis 4 (H4): what was the effect of operating profit margin (EBIT) per share on cash earnings per share?; (5) Hypothesis 5 (H5): what was the effect of inventory turnover ratio (ITR) on enterprise value (EV)?; (6) Hypothesis 6 (H6): what was the effect of operating profit (EBIT) per share on enterprise value (EV)?.

Model assessment

Structural model coefficients for the relationships between the constructs are derived from estimating a series of regression equations. Before assessing the structural relationships, collinearity must be examined to make sure it does not bias the regression results.

Empirical study and results

Model estimation and results

The data set of the study refers to 8 automobile companies listed at BSE (Bombay Stock Exchange) for a period of years 2010 to 2020 and the sample size was 75 observations (n=75).

Assessment of the model goodness of fit

To assess the quality of the whole model, the overall fit standardized root means square (SRMR) is used, it obtained through the difference between the observed correlation and the model implied correlation matrix. In our model, all values of discrepancy measures were below the 95% & 99% of their corresponding reference distribution (HI₉₅ & HI₉₉), indicating that the estimated model was not rejected at 5% and 1% significance level (see table 1). Using SmartPLS3 complete bootstrapping with 6000 resample, the SRMR was 0.021 (Table II) it was below the threshold of 0.080, indicating an acceptable model fit.

Table 2: Overall model fit

Discrepancy	Overall saturated model fit evaluation			
	Estimated value	HI ₉₅	HI ₉₉	conclusion
SRMR	0.021	0.042	0.057	supported
d_ULS	0.007	0.027	0.048	supported
d_G	0.024	0.067	0.105	supported

Further, for the exact fit criteria (i.e., d_ULS and d_G), we compare their original value against the confidence interval created from the sampling distribution. The confidence interval should include the original value. Hence, the upper bound of the confidence interval should be larger than the original value of the exact d_ULS and d_G fit criteria to indicate that the model has a “good fit”. Our results revealed d_ULS and d_G below the threshold at 95% and 99% confidence intervals, indicating that the estimated model was not rejected at 5% and 1% significant level, hence overall fit had been established.

Collinearity Assessment

Assessment of structural model for collinearity (inner VIF values) is required, the estimation of path coefficients in the structural models is based on OLS regressions of each endogenous latent variable on its corresponding predecessor constructs, collinearity must be examined to make sure that it does not bias the regression results. Collinearity among these indicators occurs due to the type of financial data. In particular, financial ratios that share a common numerator or denominator can suffer from multi-collinearity (Serrano-Cinca & Gutiérrez-Nieto, 2013). Probable (i.e. critical) collinearity issues when $VIF \geq 5$, possible collinearity issues when $VIF \geq 3-5$, ideally show that $VIF < 3$ (F.Hair, J.Risher & Marko 2019). In our model (Table III) showed that out of 6 constructions two constructs were possible collinearity issues ($VIF \geq 3-5$), the remaining four constructs were ideal ($VIF < 3$), Therefore, the inner model did not present collinearity issue.

Table 3: Inner model quality criteria

Constructs	f square	VIF (Inner values)
ITR -> EBIT	2.688	1.00
ITR -> ROA	0.975	1.00
ROA->EPS	0.240	1.754
EBIT->EPS	6.811	1.754
ITR->EV	0.251	3.688
EBIT->EV	0.347	3.688

Evaluation of effect size (f^2):

The effect size (f^2) shows how strong one exogenous construct contributes to explaining a certain endogenous construct in terms of R^2 . A weak effect is $0.02 \leq f^2 < 0.15$, moderate effect $0.15 \leq f^2 < 0.35$, and strong effect $f^2 \geq 0.35$. Table (Z) showed that Earnings before interest tax per share (EBIT), return on assets (ROA), had strong predictive power, cash earnings per share (EPS) and enterprise value had strong/moderate predictive power (Table III).

Testing the hypothesis (H1 to H6)

Evaluation of path coefficients and their significance levels

In smart PLS-3 using bootstrapping, a large number of (e.g., 6000) subsamples were taken from the original sample with replacement to give bootstrap standard errors, which gives approximate T-values for significance testing of each structural path. The bootstrap result approximates the normality of data (kwnong&wong,2013).

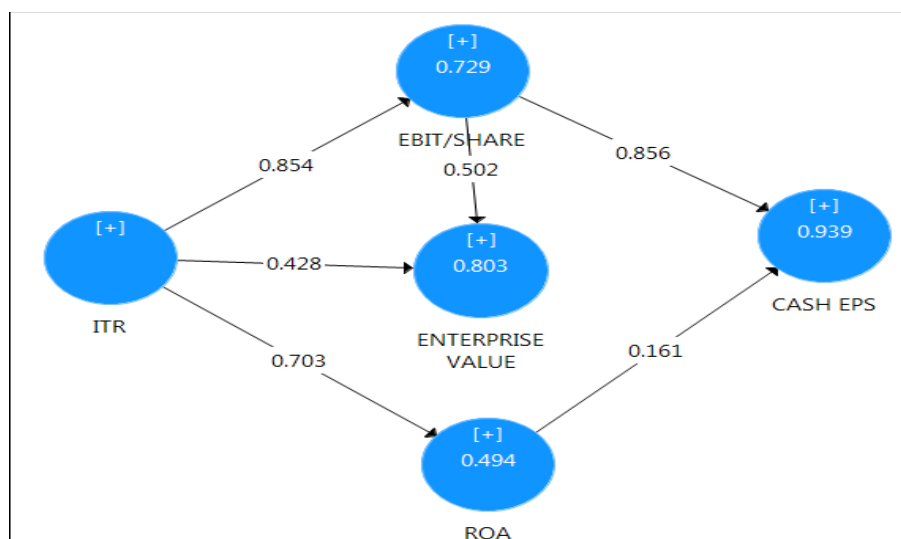


Fig.2:Path model. The values inside the circles represent the coefficient of determination (R²). The values overlapping the arrows between the circles (constructs) represent the path coefficients (standardized beta=beta coefficients).

Table 4: Structural estimates

	Hypothesis	β Coefficient	T value	Decision
H1(+)	ITR -> EBIT	0.854	19.177**	supported
H2(+)	ITR -> ROA	0.703	13.322**	supported
H3(+)	ROA-> CASH EPS	0.161	2.759**	Supported
H4(+)	EBIT-> CASH EPS	0.856	17.836**	Supported
H5(+)	ITR -> EV	0.428	2.897**	supported
H6(+)	EBIT -> EV	0.502	3.522**	supported

Note: Critical t- value,*1.96(P<0.05), **2.57(P<0.01)

Table 5: Structural estimates

Evaluation of total effect				
	Constructs	β Coefficient	T value	Decision
	ITR->CASH EPS	0.844	18.701**	supported
	ITR->EV	0.857	22.995**	supported

Note: Critical t- value,*1.96(P<0.05), **2.57(P<0.01)

Path coefficients also called standardized beta (β) usually vary between -1 and +1. The higher the absolute value, the stronger is the predictive relationship between the constructs. As depicted in (Table.IV) all four direct hypothesis were empirically supported. H1: inventory turnover ratio had a positive impact on earnings before interest and tax (β = 0.854, t = 19.177, P < 0.01); H2: inventory turnover ratio had a positive impact on return on assets (β = 0.703, t = 13.322, P < 0.01); H3: return on assets had a positive impact on cash earnings per share (β = 0.161, t = 2.759, P < 0.01); H4 :earnings before interest and tax per share had a positive impact on cash earnings per share(β = 0.856, t = 17.836, P < 0.01), H5 :earnings before interest and tax per share had a positive impact on enterprise value(β = 0.428, t = 2.897, P < 0.01), H6 :inventory turnover ratio had a positive impact on enterprise value (β = 0.502, t = 3.522, P < 0.01), showed that all path coefficients estimates were statistically significant at 1% (p<0.01) level.

The significance and relevance of the path coefficients were also evaluated, looking at the effects (Table.V). The higher effect was represented by the total effect of ITR to cash EPS (0.844) and ITR to EV (0.857).

Coefficients of determination (R²)

Sample predictive power

The primary evaluation criteria for the structural model are the R² measures and the level and significance of the path coefficients (Hair & Ringler, 2011). R² is a measure of the model's predictive accuracy; it represents the amount of variance in the endogenous construct (e.g., return on equity) explained by all of the exogenous constructs linked to it (e.g., return on equity, return on assets, net interest margin, operating profit margin). The R² usually ranges between 0 and 1 with higher values indicating higher levels of predictive accuracy. According to Henseler et al., 2009; Hair et al., 2011, the R² values of 0.75, 0.50, and 0.25 can be considered substantial, moderate, and weak. In our example, R² values for cash earnings per share, earnings before interest tax, enterprise values were substantial predictive powers, and return on assets was moderate predictive power (Table VI).

Table 6: Sample predictive power (R²)

Endogenous variables	R square	T value	P value
Cash EPS	0.939	50.744	<0.01
EBIT/share	0.729	9.814	<0.01
ROA	0.494	6.756	<0.01
Enterprise value	0.803	21.175	<0.01

T-value (statistics) threshold: ±1.96.

The R² values should be judged relative to studies that investigate the same dependent variable. Acceptable R² values are based on the context and in some disciplines, an R² value as low as 0.10 is considered satisfactory, for example, when predicting stock returns (Raithel et al., 2012).

Out-of-sample predictive power: (inner model)

Partial least squares (PLS) path modeling is an effective tool for building theories that offer both explanation and prediction. An assessment of predictive relevance (Q²) is required for theory development model validation. The measure builds on a sample re-use technique, which omits a part of the data matrix, estimates the model parameters, and predicts the omitted part using the estimates. The smaller the difference between predicted and original values the greater the Q² and thus the model's predictive accuracy. Specifically, a Q² value larger than zero for a particular endogenous construct indicates the path model's predictive relevance for this particular construct. Whereas values below zero are an indication of insufficient predictive relevance. From the outcomes of the analysis, we found that cash earnings per share (Q² = 0.649), profit before interest and tax per share (Q² = 0.721), enterprise value (Q² = 0.718) and return on assets (Q² = 0.478) had strong predictive relevance. Being an exogenous construct, the inventory turnover ratio does not have a Q² predictive relevance score.

Table 7: Structural model evaluation

Structural estimates (Hypothesis)				
Relationship	β Coefficient	T value	Decision	
H1(+)	ITR -> EBIT	0.854	19.177**	supported
H2(+)	ITR -> ROA	0.703	13.322**	supported
H3(+)	ROA-> EPS	0.161	2.759**	Supported
H4(+)	EBIT-> EPS	0.856	17.836**	Supported
H5(+)	ITR -> EV	0.428	2.897**	supported
H6(+)	EBIT -> EV	0.502	3.522**	supported
Structural estimates(Total effect)				
Relationship	β Coefficient	T value	Decision	
	ITR->CASH EPS	0.844	18.701**	supported
	ITR->EV	0.857	22.995**	supported
Overall saturated model fit				
Discrepancy	Estimated value	HI95	HI99	Conclusion
SRMR	0.021	0.042	0.057	supported
d_ULS	0.007	0.027	0.048	supported
d_G	0.024	0.067	0.105	supported
Sample predictive power				
Endogenous variable	R square	T value	Q square	
Cash EPS	0.939	50.744**	0.649	
EBIT/share	0.729	9.814**	0.721	
ROA	0.494	6.756**	0.478	
Enterprise value	0.803	21.175**	0.718	
Effect size & Collinearity				
Constructs	f square	VIF (Inner values)		
ITR -> EBIT	2.688	1		
ITR -> ROA	0.975	1		
ROA->EPS	0.24	1.754		
EBIT->EPS	6.811	1.754		
ITR->EV	0.251	3.688		
EBIT->EV	0.347	3.688		

DISCUSSIONS

The purpose of this study is to identify the relationships between inventory turnover to profitability and enterprise value in the Indian automobile industry. Our study developed the conceptual for visualizing paths (inner structure) among the variables which displayed the hypothesis and variable relationship predicted by the PLS-SEM analysis.

The hypothesis H1 to H6 was using significance and relevance of path coefficients all of them reflected a positive linear relationship and statistically significant between the variables in each hypothesis. The major values were for ITR- EV (0.857), EBIT-EPS (0.856), ITR-EBIT (0.854), ITR-cash EPS (0.844), ITR-ROA (0.703), and EBIT/share-EV (0.502), the lower for ROA-EPS (0.161), which were statistically significant. The in-sample predictive power of the model indicated that cash EPS ($R^2:0.939$), EV ($R^2:0.803$), EBIT/share ($R^2:0.729$), had substantial predictive power, and ROA ($R^2:0.494$) indicated that moderate predictive power respectively.

Interpretation

However, building unnecessary working capital in due course increases adverse effects on investors' wealth (Gill, Mand, Obradovich, & Mathur, 2019). This study implies that the automobile industry inventory turnover ratio significant impact on shareholder's cash profitability and enterprise value. Based on the evidence the operating efficiency highly influences the automobile industrial economic performance.

Soekhoe (2012), using 70 Dutch companies showed a positive significant effect of inventory conversion period on profitability which means that the more inventory the firm has the more benefits it gets. Further, the inventory efficiency impacts return on assets, it leads to the profitability of the firm.

CONCLUSIONS

This study has demonstrated the possibility of developing and testing a conceptual model using operating efficiency influences investor's profitability and an enterprise value of Indian 2-3 wheeler automobile firms over the 10 years period from 2010-2020, and the application of PLS-SEM for the evaluation of its path coefficients, predictive power and model fit. The results revealed a strong positive correlation between inventory turnover to enterprise value and cash profit of automobile firms. Further, the inventory turnover ratio has a strong positive correlation with return assets and the operating profit margin has a strong positive correlation with enterprise value. Our results support the inventory turnover ratio/operating efficiency highly affects profitability and enterprise value. Further research is needed, using other additional influencing variables for testing and validating the model.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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