Exploring Organizational Performance : A Multidimensional Construct

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Abstract

Purpose : Organizational performance (OP) is one of the most important topics in management study. Combs et al. (2005) proposed growth, the stock market, and accounting returns as the three elements of OP. Using construct validity research, Hamann et al. (2013) built on the work of Combs et al. to support four-dimensional OP concepts in the US setting. The OP construct was examined in this paper with reference to India.

Methodology : Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted to establish construct validity. The NSE 500 companies for the period 2018–2019 financial year were considered for the study.

Findings : Our results supported an OP model with four dimensions as proposed by Hamann et al. (2013): growth, profitability, liquidity, and stock market measures. We also proposed OP as a second-order reflective formative concept and used PLS-SEM to assess it.

Practical Implications : The scholars that examined variance in the OP in an Indian context could now adopt a validated four-dimensional model of the OP construct. The profitability, liquidity, growth, and stock market performance constructs are to be considered while evaluating firm performance.

Originality : This study proposed a higher-order construct for OP along with extending Hamann et al.'s (2013) work in the Indian context.

Keywords : **organizational performance, construct validity, measurement models, India**

JEL Classification Codes : L25, L29, M0

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Organizational performance (OP) is a critical element of management research. OP is considered the most researched construct in organizational literature (Hamann et al., 2013). Why some organizations perform better than others has always intrigued researchers. OP construct captures this variance and lends itself to empirical analysis in a variety of organizational sub-domains (Arora & Bodhanwala, 2018; Maji, 2022; Mishra, 2023; Pattnaik & Sahoo, 2020; Pattnaik & Sahoo, 2021; Sharma & Sharma, 2020; Srivastava &

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Bhatia, 2022). Though they are employed to characterize actual occurrences like OP, constructs are unobservable (Hamann et al., 2013). The problems arising from the unobservable aspect of OP consequently affect the OP construct.

According to the predictive validity framework, relationships between constructs are conceptually explained by theories; however, at the operational level, where indicators are used to measure the construct, the relationship is empirically tested (Bisbe et al., 2007; Tayal et al., 2021). The link between the unobservable construct and its observed indicators is critical for the advancement of theoretical relationships between constructs. It is achieved by establishing construct validity. According to Schwab (2004), construct validity requires proving nomological validity, discriminant validity, convergent validity, and reliability.

The assessment of the OP construct was measured using a single indicator in previous research in the OP domain, which deprioritized the focus on the construct and made it difficult to conduct construct validity analyses (Arora & Bodhanwala, 2018; Mishra, 2023). Therefore, conclusions made from these kinds of investigations are questionable (Combs et al., 2005; Venkatraman & Ramanujam, 1986).

Two important concerns have been brought to light by previous evaluations of the measurement of OP in organizational research (Capon et al., 1990; Combs et al., 2005; Farooq, 2014; Hamann et al., 2013; Katsikeas et al., 2016; Richard et al., 2009; Tayal et al., 2021; Venkatraman & Ramanujam, 1985). Initially, we measured the OP construct using a wide range of distinct and unrelated variables (for example, Venkatraman & Ramanujam, 1985, 1986). Furthermore, there is disagreement regarding the precise number of dimensions in the OP construct, despite the fact that scholars have argued for its multidimensionality. Combs et al. (2005) attempted a systematic study to address the construct validity of the OP construct. Based on a review of prior work, they identified three subdimensions of the OP construct – accounting returns, stock market performance, and growth. Their investigation was not without limits, though. First, there were ambiguities in their investigation regarding the dimensions of the OP concept. Second, the two-indicator rule of model identification is broken by their study's confirmatory factor analysis (CFA), which used three components and five indicators. Finally, the construct validity of the OP concept was not tested in their study.

These issues were addressed in a study conducted by Hamann et al. (2013). Their study provided definitions of the OP dimensions, provided an empirical test of the proposed OP construct, and demonstrated the construct validity of the OP construct. They performed a CFA based on 19 indicators using objective secondary data from a large sample of publicly listed US organizations over 21 years beginning in 1990. Their research supported the notions put forth by Combs et al. (2005) that growth and stock market performance are two separate aspects of OP. Nonetheless, they concluded that accounting returns, which Combs et al. (2005) presented as a dimension of OP, needed to be broken down into separate dimensions for profitability and liquidity. Their study's main drawback was that it was conducted only in the US and included data from the industrial, consumer services, and technology sectors. Therefore, it restricts the findings' applicability to other industry sectors and countries other than the USA, such as India. Our study aims to overcome these constraints by conducting an empirical examination of the OP framework, as suggested by Hamann et al. (2013), using a sample of 457 publicly traded Indian companies spanning several economic sectors. Our findings demonstrate that the four-dimensional concept of OP put out by Hamann et al. (2013) may also be applied to the Indian setting.

Our study is one of the first to examine the conceptual and empirical features of OP in the context of OP in India. For research on OP in the Indian setting to yield significant findings, a high degree of rigor in construct formulation and operationalization is necessary. We contribute to the literature on OP in two ways: First, we improve the generalizability of the OP construct by examining it in an Indian context and across industries and provide a valid measurement model of OP dimensions in the Indian context. Second, we provide empirical support for the use of the OP construct as a reflective formative second-order construct.

Review of Literature

Dimensions of Organizational Performance

OP is part of a broader domain of organizational effectiveness (Das, 2013; Katsikeas et al., 2016; Tayal et al., 2021; Venkatraman & Ramanujam, 1985). OP and other performance constructs, such as corporate environmental performance or corporate social performance, can be considered as part of organizational effectiveness (Katsikeas et al., 2016; Tayal et al., 2021; Venkatraman & Ramanujam, 1985). In extant research, management scholars have defined and examined OP as a measure of the economic performance of an organization. For example, Combs et al. (2005) defined it as the economic outcomes resulting from the interplay among an organization's attributes, actions, and environment. Similarly, scholars have primarily used economic indicators to measure OP in management research (Arora & Bodhanwala, 2018; Mishra, 2023).

Extant research in OP suffers from various limitations. The first major limitation is in the use of several indicators, such as ROA, ROE, and Tobin's *Q* (Jain et al., 2023; Parmar et al., 2015). Most researchers used either three or four indicators to measure dimensions of OP (Hamann et al., 2013). However, such small numbers of indicators may not be sufficient to adequately represent the conceptual domain of the OP construct. A second important issue with extant OP research is that the choice of indicators is not based on logic and analysis and, hence, may not adequately represent the conceptual domain of the OP construct. For example, extant research has used absolute measures of size (number of employees) as an indicator of OP construct (Murphy et al., 1996). Size as an absolute measure is not an indicator of OP. Finally, there is a lack of cash flow-based indicators in extant research on OP construct. These limitations were addressed by Hamann et al. (2013).

Hamann et al. (2013) proposed a four-dimensional construct valid measurement model of OP. Their proposed four dimensions are liquidity and profitability dimensions for assessing the accounting returns, stock market performance, and growth. Accounting returns are an indicator of the historical performance of the organization published in its annual report. Some researchers, for example, Combs et al. (2005), argued for a single accounting return dimension of OP; whereas, other researchers, for example, Murphy et al. (1996), argued for multiple accounting returns dimensions (such as liquidity, profitability, and efficiency) as part of OP construct. Hamann et al. (2013) conceptually and empirically demonstrated that accounting returns as a dimension of OP construct are reflected in two separate dimensions – liquidity and profitability. It concurs well with the extant research in the accounting domain that has highlighted that revenue and expense accrual cause differences in indicators of profitability (net profit) and liquidity (cash flow). The liquidity dimension is defined as a firm's ability to meet its financial obligations based on cash flows generated from its current operations (Hamann et al., 2013). The profitability dimension, on the other hand, is defined as an organization's efficiency in utilizing production factors to generate earnings (Hamann et al., 2013).

While accounting returns indicate the past performance of an organization, stock market returns capture the perception of the future performance of the organization in the minds of investors. It is a forward-looking indicator. There is consistency in how researchers have defined and measured this dimension of the OP construct (Hamann et al., 2013; Richard et al., 2009). It is mostly measured using market-based indicators such as total shareholder returns. Growth is a measure of change over time in the size of operations. As such, it is a dynamic measure of the OP construct. Past research on OP dimensions has generally concentrated on sales growth alone as a measure of growth (Capon et al., 1990), with Hamann et al. (2013) being an exception. However, the organizational size is typically measured in terms of sales, personnel, and assets.

Research Objectives

The following goals are developed, taking into account the shortcomings and restrictions of earlier research:

(1) To test the OP construct as proposed by Hamann et al. (2013) across all industries in the Indian context.

(2) To extend the current research in OP construct by proposing OP as a second-order reflective formative construct.

Research Methodology

Sample Selection

The main financial market in India is the National Stock Exchange of India Limited (NSE) (National Stock Exchange of India Limited, 2021). Based on the volume of equities trading, it is rated fourth globally (National Stock Exchange of India Limited, 2021). NSE Nifty 500 Index companies for the year 2018–2019 were considered for this study. Nifty 500 is made up of the 500 largest publicly listed Indian companies by market capitalization. It provides a good representation of publicly listed Indian companies for two reasons. First, based on a free-float market capitalization of the company's shares on the NSE, for March 2019, the Nifty 500 Index represented 96.1% market capitalization. Second, for the six months that ended in March 2019, the NSE 500 index provided over 96.5% of the total traded value on the NSE (NSE - National Stock Exchange of India Ltd.). Based on the Global Industry Classification, the NIFTY 500 companies comprise 11 industries (see Table 1). Organization performance measures for these NIFTY 500 companies were collected from Bloomberg. In the final sample, the financial sector companies, with a 17.29% share, had the highest representation, followed by the materials sector, with a 17.07% share. The real estate sector was represented least with a 2.63% share (see Table 1). Four hundred fifty-seven out of the initial 500 companies were part of the final sample.

Data Cleaning

Company performance measures were collected for each firm. Forty-three companies with missing values on three or more measures were removed. It largely consisted of employee-related measures. Out of 457 companies

Table 1. ***Sample Selection***

No.	Sector	No. of Companies	Missing Data	Final Sample	Percentage
1	Communications	18	1	17	3.72
2	Consumer Discretionary	72	4	68	14.88
3	Consumer Staples	36	3	33	7.22
4	Energy	13	0	13	2.84
5	Financials	92	13	79	17.29
6	Health Care	45	3	42	9.19
7	Industrials	81	7	74	16.19
8	Information Technology	24	3	21	4.60
9	Materials	86	8	78	17.07
10	Real Estate	12	0	12	2.63
11	Utilities	21	1	20	4.38
	Total	**500**	**43**	**457**	**100**

left as part of the sample, 38 companies had missing value on one or two measures. This dataset of 457 companies was analyzed using the Little MCAR test (Baid & Rao, 2017; Meyers et al., 2013). Results suggested that values were completely missing at random. Hence, missing values were replaced using the regression approach (Meyers et al., 2013). Extreme outliers were winsorized (Baid & Rao, 2017; Hoaglin et al., 1986). Finally, sample data were standardized for factor analysis.

Identification of Indicators

Different financial measures exist in accounting, which can be broadly classified as absolute (net income, cash flow, employee size, etc.) or hybrid (cash flow growth and income growth) and relative measures (return on assets, return on sales, return per employee, etc.). The relative measures provide comparatively more robust results than the hybrid measures (Hamann et al., 2013). The effectiveness of an organization can be measured only with these relative performance measures.

Accounting performance measures are calculated using the company's historical data as reported in the annual reports. Combs et al. (2005) advocated for a single accounting return dimension, but with the evolution in the complexity of the business environment, experts advocated multifaceted dimensions. Hamann et al. (2013) decomposed the accounting dimension into liquidity and profitability dimensions. The liquidity dimension talks about how effectively the organization meets its current obligations. With the operating cash flow (CF) as the base, the ratio of CF to sales (CFTS), CF to total average assets (CFTA), and CF per employee (CFPE) were used as the indicators of liquidity dimension. Likewise, the net income is the base for profitability, and return on sales (ROS), return on total assets (ROA), and return per employee (RPE) were used as the indicators. The growth dimension is defined as the percentage change in sales (SG), total assets (AG), and the number of employees over the year (EG). The stock market performance dimension consisted of four indicators, namely, total shareholders' return (TSHR), Sharpe ratio (SR), Treynor index (TI), and Jensen alpha (JA).

Empirical Methods

In this study, EFA and CFA were conducted to establish the OP construct for Indian companies. To establish construct validity, four criteria of reliability and validity, namely, composite reliability, convergent validity, discriminant validity, and criterion-related validity, were examined (Agrawal, 2019; Hamann et al., 2013; Sajjad et al., 2023; Schwab, 2004). First, reliability was examined as reliability is a prerequisite for establishing validity. Reliability was assessed using Cronbach's alpha and composite reliability (CR) (Hair et al., 2019). The average variance explained (AVE) was examined in order to determine convergent validity (Hair et al., 2019). Discriminant validity proves that every element is distinct. The discriminant validity was established using the Fornell–Larcker criterion (Hair et al., 2019). Finally, for nomological validity, the relationship of the construct with other variables in the nomological network is examined. The relationship of OP with Capex to sales (CTS), Herfindahl Index (HI), and market share (MS) was examined to establish nomological validity.

Data Analysis and Results

The Kaiser–Meyer–Olkin (KMO) and Bartlett tests were used to determine the sampling adequacy of the sample and the significance of the correlation matrix. Together, the results of KMO (KMO value = 0.655) and Bartlett's test (p = 0.000) suggested that the sample was adequate and that there are significant correlations among the measures of OP dimensions (refer to Table 2).

As a next step, EFA was conducted using principal component analysis (PCA) and promax rotation for both the

Table 2. ***KMO and Bartlett's Test***

KMO measure of sampling adequacy.		0.655
Bartlett's Test of Sphericity	Approx. Chi-Square	6482.634
	df	78
	Sig.	0.000

Table 3. ***Total Variance Explained***

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	Percent of Variance	Cumulative Percent	Total	Percent of Variance	Cumulative Percent	Total
				Model I - Three-Factor Model			
1	4.286	32.972	32.972	4.286	32.972	32.972	3.892
2	2.752	21.169	54.141	2.752	**21.169**	54.141	3.293
3	1.545	11.888	66.029	1.545	11.888	**66.029**	2.054
4	1.172	9.018	75.047				
5	.879	6.759	81.806				
				Model II - Four-Factor Model			
1	4.286	32.972	32.972	4.286	32.972	32.972	3.934
2	2.752	21.169	54.141	2.752	**21.169**	54.141	2.706
3	1.545	11.888	66.029	1.545	**11.888**	66.029	2.693
4	1.172	9.018	75.047	1.172	9.018	**75.047**	1.659
5	0.879	6.759	81.806				

construct model and the four construct model. Both the three-factor model and four-factor model emerged as per the proposed structure when the number of factors was made explicit. The four-factor model also emerged when the eigenvalue for factor development was defined as one. The three-factor model explained a total variance of 66.03%, while the four-factor model explained a 75.05% variance (see Table 3). In both models, stock market return was the first factor, while growth was the last factor. The difference in explained variance between the two models was primarily due to the decomposition of the accounting returns dimension into liquidity and profitability in the four-factor model. In the case of the four-factor model, liquidity preceded profitability, explaining 21.17% variance, followed by profitability, explaining 11.89% variance with a total variance of 33.06% for two factors of accounting returns dimension as compared to single-factor accounting returns dimension under a three-factor model, which explained a total of 21.17% variance only.

The factor loadings were arranged in size order in Table 4. All loadings on the corresponding construct in the three-factor model were higher than the cutoff value of 0.5, with the exception of EG, which reported a loading of 0.438. Regarding the four-factor model, all loadings on the corresponding construct were greater than the acceptable threshold of 0.5; AG had the lowest loading, at 0.511. The four-factor model's loadings were superior to those of the three-factor model, as Table 4's highlighted values demonstrate. In the four-factor model, loadings of profitability and growth items, in particular, grew significantly. These results are in line with Hamann et al. (2013). They also reported the highest loadings for the stock market performance dimension and the lowest loading for the growth dimension. The four-factor model was selected for CFA analysis.

Table 4. ***Structure Matrix Showing Loadings***

	Loading – Three-Factor Model			Loadings – Four-Factor Model			
Indicators	**Stock Market**	**Accounting**	**Growth**	**Stock Market**	**Liquidity**	**Profitability**	**Growth**
SR	**0.978**	0.205	0.231	**0.979**	0.132	0.235	0.181
TSHR	**0.975**	0.215	0.235	**0.976**	0.139	0.244	0.181
JA	**0.972**	0.148	0.214	**0.972**	0.079	0.198	0.167
TI	**0.910**	0.116	0.203	**0.909**	0.054	0.169	0.168
CFTS	0.121	**0.801**	–0.064	0.120	**0.886**	0.298	0.009
CFPE	0.068	**0.813**	–0.020	0.070	**0.859**	0.363	0.002
CFTA	0.162	**0.797**	–0.016	0.163	**0.850**	0.346	0.020
RPE	0.061	**0.631**	0.510	0.172	0.308	**0.842**	0.097
ROS	0.141	**0.637**	0.533	0.091	0.306	**0.854**	0.097
ROA	0.236	**0.650**	0.412	0.259	0.425	**0.702**	0.136
EG	0.060	0.032	**0.420**	0.125	–0.055	0.189	**0.735**
SG	0.112	0.023	**0.630**	0.061	0.112	–0.050	**0.748**
AG	0.264	0.065	**0.752**	0.288	–0.174	0.449	**0.628**

Note. The bold figures depict the major item loadings on the factor.

According to Taber (2018), alpha values exceeding 0.6 are acceptable, and CR values exceeding 0.7 are necessary to satisfy reliability standards (Nunnally, 1967). With the exception of growth, all of the alpha values in Table 5 are above 0.6. Every factor's CR value was higher than the cutoff amount. The CR value was maximum for the stock market factor (0.98) and least for the growth factor (0.75). Convergent validity is measured through AVE, and values are required to be above 0.5 (Fornell & Larcker, 1981). All the AVE values except for the growth dimension are above 0.5. It depicts that overall item loadings on a factor are significantly contributing to that factor; hence, convergent validity is established. The Fornell–Larcker Criterion (FLC), maximum shared variance (MSV), and cross-loadings are used to establish discriminant validity (Hair et al., 2019). All cross-loadings of items are high on their own factor, and less on the other factor (see Table 4), and the AVE is above the square root of MSV (factor correlation); hence, discriminant validity is established (see Table 5). Furthermore, in the case of FLC, all diagonal elements are above the off-diagonal elements, establishing discriminant validity (see Table 5).

CFA is used to test the model further. After excluding the JA from the stock market factor, the model fit indices were generally good (see Table 6 and Figure 1). The chi-square value is significant; the χ^2/df value is 2.34, conforming with the rule of thumb (Byrne, 2016). There are three different values for the comparative fit index

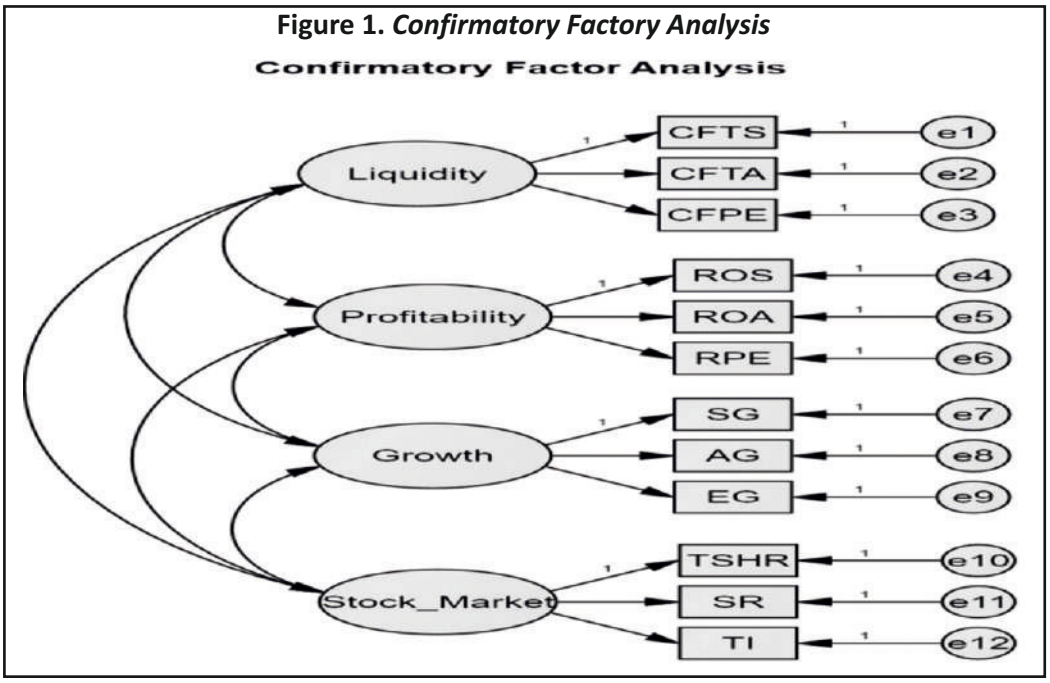
Table 5. ***Reliability and Validity Values***

Construct	**Reliability**		**Convergent Validity**		**Discriminant Validity**			
	Cronbach Alpha	**CR**	**AVE**	**Sqrt of MSV**	**Fornell–Larcker Criterion**			
					Liquidity	**Profitability**	**Growth**	**Stock Market**
Liquidity	0.853	0.90	0.75	0.380	0.75	0.09	0.00	0.01
Profitability	0.766	0.84	0.64	0.335		0.64	0.04	0.06
Growth	0.507	0.75	0.50	0.286			0.50	0.04
Stock Market	0.972	0.98	0.92	0.286				0.92

Table 6. ***Model Fit***

Chi-Square(*df*)	CFI	GFI	NFI	RMSEA
105.537(45)	0.983	0.964	0.971	0.054

Figure 1. ***Confirmatory Factory Analysis***



(CFI), goodness fit index (GFI), and normed fit index (NFI): 0.983, 0.964, and 0.971, respectively. Byrne (2016) stated that these numbers are above the thumb rule or above 0.95. The approximation's root mean square error (RMSEA) came out to be 0.054.

To establish nomological validity, we examined the relationship between OP and capex to sales (CTS), Herfindahl Index (HI), and market share (MS) (Hamann et al., 2013). We modeled OP as a higher-order construct (HOC). The HOC makes the model parsimonious by reducing the number of relationships in the structural model (Sarstedt et al., 2019). The hierarchical model may be reflective-reflective, reflective-formative, formative-reflective, and formative-formative (Becker et al., 2012). We argued that a reflective-formative higher-order model where the first/low order constructs (LOC) are measured as reflective constructs and the second/HOC are measured as formative is the best approach to the model OP as a HOC. Within the preceding EFA and CFA analysis, it is determined that every one of the four OP dimensions is unique and does not pertain to the same concept domain (for instance, stock market return indicators represent the company's expected future performance while accounting return indicators capture the company's past performance).

There are three approaches for examining a reflective formative model – repeated indicators approach, two-stage approach, and hybrid approach (Becker et al., 2012). We used a two-stage approach for the reflective-formative model as OP is an endogenous variable in modeled relationships (Becker et al., 2012). In the two-stage approach, factor scores of LOCs were given as inputs to HOC. Collinearity/variance inflation factor (VIF) scores and factor weights were taken into account while establishing the measurement model because HOC is modeled as a formative model (Becker et al., 2012; Sarstedt et al., 2019). According to Hair et al. (2012), the discriminant validity of the HOC is not necessary because the LOCs affect the HOC. Three constructions on HOC, i.e., OP, have outer weights that are significant out of four LOCs. The growth's weight is negligible. The weight of profitability (0.599) is the maximum on OP, followed by that of liquidity (0.499). There is no multicollinearity issue among the

Table 7. ***Outer Weights and VIF Values of LOCs on HOC***

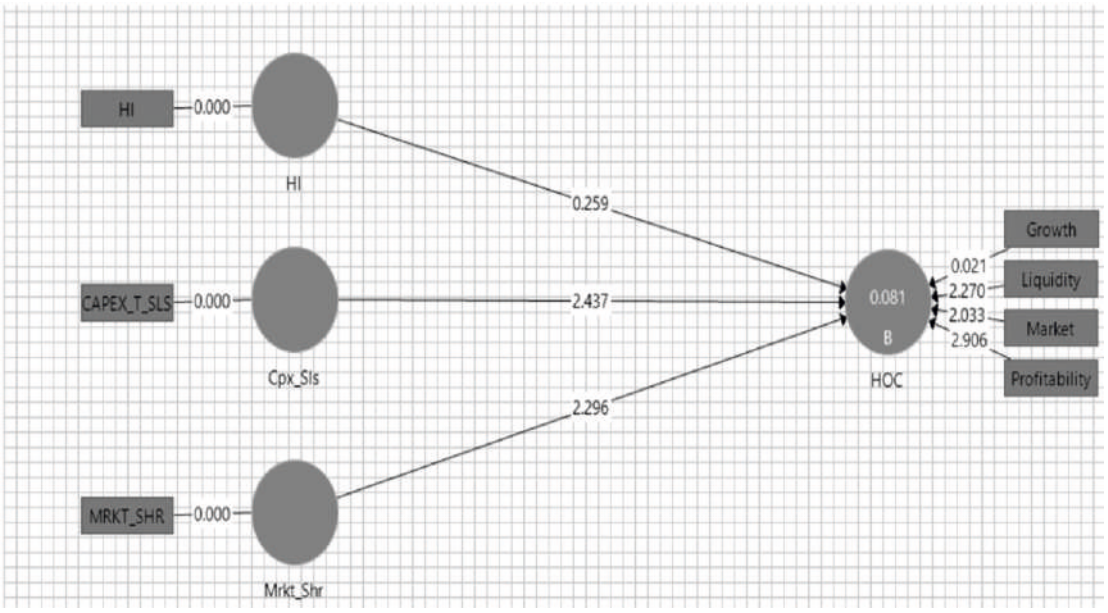
	Growth	Liquidity	Market	Profitability
Weights (*p* - values)	0.003 (0.984)	0.499 (0.025)	0.308 (0.045)	0.599 (0.005)
VIF	1.041	1.238	1.023	1.255

Table 8. ***PLS-SEM Results, Dependent Variable : OP***

	Coefficients	*t*-Statistics	*p*-values
CTS	0.158	2.437	0.017*
HI	–0.031	0.259	0.796
MS	0.271	2.296	0.024*
R-square	0.087		
R-square Adjusted	0.081		

Note. * significant at the 5% level.

Figure 2. ***Two-Stage PLS-SEM Results for Nomological Validity***



LOCs, as the VIF values of all the factors are less than two (see Table 7). Hence, OP is established as an HOC of four underlying constructs.

In the model, exogenous variables explain about 8.1% of the variability in OP. Out of the three exogenous variables, CTS (*t*-value = 2.437) and MS (*t*-value = 2.296) are significantly associated with the OP, establishing the nomological validity of the OP construct (see Table 8 and Figure 2). Our results are largely in line with Hamann et al. (2013).

Conclusion and Managerial Implications

Our study contributes to the research on the OP construct in two ways. First, this study validates Hamann et al.'s (2013) four-dimensional model to measure OP, i.e., liquidity, profitability, growth, and stock market in the Indian

context. Second, this study proposes and establishes OP as a higher-order reflective - formative construct. Our findings are relevant for management research in the Indian context. First, scholars who examine variance in the OP in an Indian context can now adopt a validated four-dimensional model of the OP construct. The link with all four OP dimensions can be examined, or only some of the dimensions can be examined by scholars based on theory and circumstance. This will enable us to narrow down the selection of metrics that are currently in use. This will also improve rigor in management research as it will aid in the comparison of studies leading to the development of collective knowledge on OP in the Indian context. It leads to the generalization of organizational performance as constructs rather than individual indicators. Second, we propose and validate OP as a higher-order reflective-formative construct. By doing this, we offer a parsimonious measurement model for OP.

Limitations of the Study and Scope for Further Research

Though our sample comprised of companies from all 11 sectors (GIC classification), allowing for generalization across industry sectors, it was for one time period only and for Indian companies only. Hence, the results of this study cannot be generalized across time and countries. Future studies should use data across periods and across countries for validating the OP model.

Authors' Contribution

Prof. Chandresh Baid initiated the idea and did the requisite literature review to conceptualize the study. Prof. Devesh Baid finalized the methodology. The data was gathered and filtered by Prof. Aswini Kumar Bhuyan and jointly analyzed by Prof. Aswini and Prof. Devesh Baid using Excel, SPSS, and Smart PLS. The conclusion and managerial implications sections were prepared by Prof. Devesh Baid. The research article was written by Prof. Chandresh Baid and Prof. Aswini Kumar Bhuyan with consultations with Prof. Devesh Baid. Prof. Chandresh Baid and Prof. Devesh Baid checked the final draft of the manuscript.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

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Appendix *(Explanation of Indicators)*

Indicators	Formula
Cash Flow per Employee *(CFPE)*	Total cash flow in the year divided by average number of employees.
Cash Flow to Sales *(CFTS)*	Total cash flow in the year divided by total operating sales revenue.
Cash Flow to Total Assets *(CFTA)*	Total cash flow in the year divided by average total assets.
Return per Employee *(RPE)*	Net income after tax is divided by an average number of employees.
Return on Sales *(RoS)*	Net income after tax is divided by total operating sales revenue.
Return on Assets *(RoA)*	Net income after tax divided by average total assets.
Employee Growth *(EG)*	Percentage growth of employees of the firm during the year.
Sales Growth *(SG)*	Percentage growth of operating sales revenue of the firm during the year.
Total Assets Growth *(AG)*	Percentage growth of total assets growth of the firm during the year.
Total Shareholder Return *(TSHR)*	The movement of share price over the period after adjusting dividend and bonus and split.
Sharpe Ratio *(SR)*	(Stock annualized return – risk-free rate) /Volatility of the stock
Treynor Index *(TI)*	(Stock annualized return – risk-free rate)/Beta of the stock
Jensen's Alpha *(JA)*	Stock annualized return – cost of equity
Capex to Sales *(CTS)*	Capital investment/Total sales
Herfindahl Index *(HI)*	Square of percentage market share of each firm in an industry/ Sum of all the percentage squares.
Market Share *(MS)*	Firm's sales/Total sales in its industries

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