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Exploration and comparison of value-based financial performance measures of Indian manufacturing industries

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Abstract
Purpose: The main objective of this study to compare and access the value-based financial performance measures such as Economic Value Added (EVA), Cash Value Added (CVA), Shareholders Value Added (SVA), Cash Flow Return on Investment (CFROI), and Economic Profit (EP) in Indian manufacturing industries.
Design/Methodology: The total 534 Indian manufacturing companies considered for the study and these grouped into various industries. Study period started from 1999-2000 to 2017-2018 financial years. Descriptive analysis including t-test is used as a statistical tool to compare and access value-based financial performance measures of Indian manufacturing companies.
Findings: Financial performance measured by Value-based financial performance measures exhibits sound financial health of Indian manufacturing companies. Though, the financial performance decreases in 2007-2008 but afterward sample companies able to revive the sound financial vitality. Some industries outperform the other as well as aggregate sample companies' *vis-à-vis* value-based financial performance measures. The average of matrices of industries presents mix results as some are not significantly different whereas, some are significantly different.
Originality: This is the first paper which examines the comparison and accessibility of the value-based financial performance measures in Indian manufacturing industries.

Keywords: value-based financial performance measures, economic value added, cash value added, shareholders value added, cash flow return on investment, and economic profit

Introduction
Value maximization or shareholder's wealth is an important objective among corporate financial managers in modern time. Objective of shareholder value creation has arrived at an extraordinary level because of regulatory reforms (investor protection and disclosure obligations) and integration of financial markets. This trend has raised pressure on firms to boost shareholder value continuously. Currently, many corporations give preference to shareholder value creation (Sharma and Kumar, 2010). The latest role of consulting companies such as Stern Stewart and Company (Economic Value Added: EVA), Boston consulting Group's HOLT Value Associates (Cash Flow Return on Investment: CFROI), KPMG Peat Marwick (Economic Value Management: EVM), and Marakon Associates (Discounted Economic Profit: EP) and Shareholder Value Added (SVA) in the area of value-based management financial performance measurement has gained new momentum in modern era. These consulting companies have been developed modern value-based financial performance measures such as cash value added (CVA), shareholders value added (SVA), economic value added (EVA), cash flow return on investment (CFROI), and economic profits (EP) in recent times. Traditional accounting-based financial performance measures such as EPS, ROI, ROE, PAT, and ROA have no capability to integrate complete cost of capital because of this inability, these have been condemned. So, accounting earnings is not reliable forecaster of corporation value and cannot be used for assessing corporate performance. As emphasized by Weissenrieder (1999) in his paper that corporation will practice a requirement for more accurate tools, mutually when it approaches to metrics and relevance of tools because of boosting competition in world finance markets in all-purpose and increasing influence of investors, have started the upward appreciation of value-based financial performance metrics.

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Literature review

The empirical study is broad for the significance of the value-based performance measures but with contentious results. Introduction part of this paper highlighted that there are different studies to investigate the claim that performance measures better describe the variance in the stakeholder value. This segment explains some of famous studies about value -based performance measures.

Stewart (1991) [8] examined the evidence of the relationship between EVA and MVA with employing US companies' samples. In this study, statistics tools tested equally constant and changes in EVA and MVA. The results indicated that there is a relationship between EVA and MVA. It is also supported that there is a highly association between EVA and MVA. Similar study by Stern *et al.* (1994) [7] presented those traditional accounting-based measures such as ROE, dividend, earnings are not suitable to examine corporate performance. EVA is one measure that suitable for examine the corporate performance because of its highly association with market value of the firm. The same results achieved by the study, Milunovich and Tsuei (1996) [6] observed the relationship between EVA and MVA in US companies and concluded that EVA has more highly correlation with MVA. Companies can boost their market value and MVA with continuous improvements in EVA.

O'Byrne (1996) wrapped up that EVA explains more than twice variation in market value of firm rather than NOPAT. The results indicated that value-based performance measures like EVA have better explain in changes in market value of company and it is superior to accounting-based measure like NOPAT.

Lehn & Makhija (1996) [5] concluded that EVA and MVA are significantly positively correlated with stock price performance, attesting to their effectiveness as performance measures. The result revealed an inverse relation between performance in terms of EVA and VA and CEO turnover. Finally, it revealed that firms with greater focus in their business activities have significantly higher MVA than their less focused counterparts. The results suggest that EVA and MVA are effective performance measures that contain information about the quality of strategic decisions and serve as signals of strategic change.

Ferguson, Rentzler and Yu (2009) [1] reviewed the 1000 companies time period from 1993 to 2000 from database the Stern Stewart & Co with highest MVA. These companies are ranked with descending order. They divided companies into 10 portfolios with ranking. Every portfolio has 100 companies with ranking. High rank portfolio labelled as winner and low rank portfolio labelled as loser. They examined companies with high adjusted- MVA or adjusted-EVA. Both measures are scaled by market capitalisation. This study found that relationship between financial performance measures and stock return. Portfolios with high risk provided highest return and vice-versa. Adjusted-MVA shows low indication of earning momentum.

Further, Ismail (2008) [2] observed the explanatory supremacy of EVA and accounting-based measures in Malaysian companies. The results of study exposed that EVA is better measure to explain the variations in the stock market rather than accounting-based measures in unstable economic situation.

Lee and Kim (2009) [4] examined the relationship refined EVA (REVA) , EVA and MVA with traditional accounting based measures such as Return on Assets (ROA) Return on Equity (ROE) and Cash Flow from Operation (CFO) in hospitality industry. The results of study exposed that REVA and MVA are better measures to explain the variations in the stock market rather than accounting-based measures in hospitality industry (such as hotel, restaurant and casino). Both REVA and MVA considerably explain the market-adjusted return that presented by positive coefficients.

The assessment of literature on the effectiveness of a variety of performance measures conveys the main problems. First and main is that most of study on traditional accounting-based performance measure as well as value-based performance measures conducted in developed countries such as USA and UK. But in recent years, developing countries like India and China boost their economy and compete with developed countries in the area of trade and services. But research on performance measures is less than developed countries. So this study is necessity for India like developing country to explore the financial performance measure.   Secondly, most of studies, selected only one or two variables of cash flow-based in their research. So there is a clear requirement to examine the importance of value - based performance measures in Indian manufacturing industries.

Sampling and database

A sample of 534 Indian manufacturing companies listed on Bombay Stock Exchange limited are taken from PROWESS database maintained by Centre for Monitoring Indian Economy (CMIE) barring banking and financial services companies. The sample grouped into various industries. The sample was created using the criteria (a) only those companies considered which were to be top in the criteria of the market capitalization of the year 2016. (b) Only Indian manufacturing companies considered (c) and the sample companies' data must exist during this time period. The study period started from 1999-2000 to 2017-2018.

Selection of variables

This study compared and accessed of value-based financial performance measures of Indian manufacturing companies. The reviewed literature enabled to identify a number of key financial variables for the purpose of achieving stated objective. These variables consist of modern value-based financial performance measures such as Cash Value Added (CVA), Shareholders Value Added (SVA), Economic Value Added (EVA), Cash Flow Return on Investment (CFROI), and Economic Profit (EP). Table No-1 précised the computation of selected variables of study.

Table 1: Explanation of Study Variables

Variables	Computation	Symbols
Economic Value Added	EVA = NOPAT – WACC (CAPITAL)	EVA
Shareholder Value Added	SVA = (Present value of cash flow from operations during the forecast period + residual value + marketable securities) – Debt	SVA
Cash Value Added	CVA= Operating cash flow - Economic depreciation - Capital charge	CVA

	(Gross investment × cost of capital)	
Economic Profit	Operating profit - Taxes - Cost of Capital	EP
Cash Flow Return on Investment	Cash flow/ Market Value of Capital Employed	CFROI

Objectives and hypothesis

The main objective of this study is to compare and access the value-based financial performance measures of Indian manufacturing companies. To complete this, value-based financial performance measures are analysed and accessed. On the other hand, this study provides industry-wise comparison among these measures. On the basis of existing literature, the hypothesis is created as there is no significant difference of value-based financial performance measures among Indian manufacturing industries.

Empirical results and discussion

Economic Value Added (EVA) is the value-based financial performance measure that calculated by subtracting cost of capital from net operating profit after tax (NOPAT). The average EVA registered by sample companies ranges from Rs. 59.79 Crore in 1999-2000 to Rs. 530.82 Crore in 2017-

2018. The average EVA shows upward increasing trend as depicted in Table - 2. Chemicals and Chemicals Products Industry, Miscellaneous Manufacturing Industry, and Metal and Metal Products Industry registered higher average EVA as compare the average EVA of all sample companies whereas rest of the industries registered lower average EVA than the average EVA of all sample companies throughout the study period. But in recent years Transport Equipments Industry registered higher average EVA as compare the average EVA of all sample companies.

Figure-1 presents upward increasing trends by all industries through the study period. EVA shows downfall in years 2008-2009 may be due to beginning of recession which was continued up to 2014-2015 thereafter the sample companies and the industries registered increasing trend because of eradication of recession period.

Table 2: Average Economic Value Added (EVA) of All Sample Companies and Industries.

Figures are in crore rupees

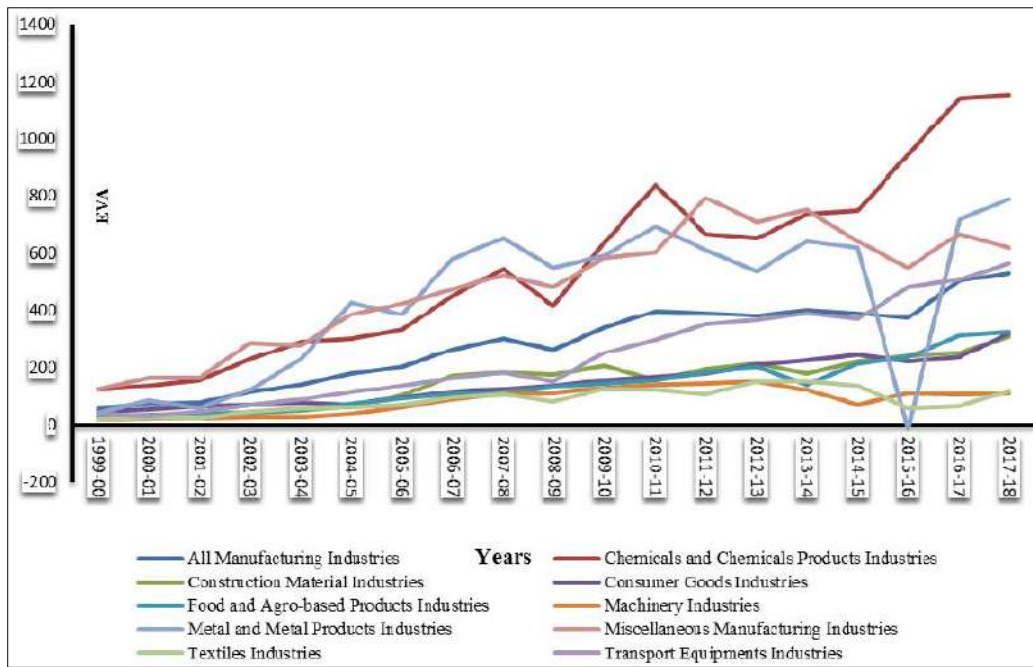| Years	All Manufacturing Industry	Chemicals and Chemicals Products Industry	Construction Material Industry	Consumer Goods Industry	Food and Agro-based Products Industry	Machinery Industry	Metal and Metal Products Industry	Miscellaneous Manufacturing Industry	Textiles Industry	Transport Equipments Industry
1999-00	59.79	125.77	27.72	48.21	27.18	20.05	43.37	125.46	19.64	41.06
2000-01	72.45	136.56	33.12	56.13	35.07	25.5	84.14	166.27	27.86	30.21
2001-02	76.75	158.38	37.39	65.92	38.78	24.52	58.02	164.57	25.21	46.01
2002-03	115.34	229.04	41.68	71.31	43.06	26.03	123.73	285.32	46.85	68.05
2003-04	142.07	290.9	51.79	76.41	54.44	28.76	229.81	279.67	59.46	88.97
2004-05	181.65	301.25	64.27	71.5	74.57	40.45	426.5	384.65	62.54	115.34
2005-06	201.39	332.2	103.41	94.7	93.76	60.6	387.29	424.69	69.83	137.16
2006-07	265.16	450.52	173.95	116.89	106.08	89.02	580.15	475.56	95.58	165.8
2007-08	303.26	544.76	184.75	125.22	114.42	107.01	652.32	524.83	108.46	183.93
2008-09	262.74	417.32	176.31	136.55	133	111.69	550.51	482.81	79.86	154.44
2009-10	341.1	636.07	205.84	158.3	144.86	128.95	590.6	582.91	126.11	253.72
2010-11	397.21	841.06	158.01	169.23	158.12	143.11	696.94	605.24	124.59	297.7
2011-12	389.63	667.05	195.46	180.94	183.79	146.98	609.47	793.97	107.34	351.67
2012-13	384.12	654.49	215.12	211.84	205.07	154.94	538.52	711.07	155.36	365.86
2013-14	403.17	735.91	181.63	224.7	141.15	124.59	641.81	753.79	153.5	391.08
2014-15	391.26	750.23	221.8	246.67	215.71	70.74	617.14	640.13	137.82	371.01
2015-16	373.56	948.34	242.65	223.4	236.3	110.82	-15.47	551.09	56.91	479.95
2016-17	504.02	1142.63	253.39	238.6	314.18	106.71	716.52	669.63	67.48	507.9
2017-18	530.82	1153.06	309.49	322.67	326.89	113.07	791.81	617.67	121.08	566.87

*Source***:** Prowess IQ

Fig 1: Average EVA of All Sample Companies and Industries

To test the assumption of no significant difference in the average EVA of overall sample companies and the average EVA of different industries an independent sample t-test has been applied on the average pooled data of EVA of all sample companies and industries.

Table 3: The Independent Samples t-test matrix of EVA of All Sample Companies and Industries

	Chemicals and Chemicals Products Industries	Construction Material Industries	Consumer Goods Industries	Food and Agro-based Products Industries	Machinery Industries	Metal and Metal Products Industries	Miscellaneous Manufacturing Industries	Textiles Industries	Transport Equipments Industries	All Manufacturing Industries
Chemicals and Chemicals Products Industries	t-value p-value	5.242 0.000*	5.299 0.000*	5.387 0.000*	6.246 0.000*	1.205 0.236	0.766 0.449	6.248 0.000*	3.706 0.001*	3.314 0.002*
Construction Material Industries			0.076 0.940	0.425 0.673	2.899 0.006*	-4.486 0.000*	-6.567 0.000*	2.925 0.006*	-2.086 0.044*	-3.397 0.002*
Consumer Goods Industries				0.369 0.714	3.013 0.005*	-4.555 0.000*	-6.694 0.000*	3.048 0.004*	-2.170 0.037*	-3.528 0.001*
Food and Agro-based Products Industries					2.290 0.028*	-4.659 0.000*	-6.765 0.000*	2.303 0.027*	-2.344 0.025*	-3.672 0.001*
Machinery Industries						-5.710 0.000*	-8.311 0.000*	-0.043 0.966	-3.869 0.000*	-5.617 0.000*
Metal and Metal Products Industries							-0.628 0.534	5.714 0.000*	2.701 0.010*	2.221 0.033*
Miscellaneous Manufacturing Industries								8.331 0.000*	3.981 0.000*	3.505 0.001*
Textiles Industries									-3.876 0.000*	-5.642 0.000*
Transport Equipments Industries										-0.795 0.432

Sources: Computed from Annual Reports

The table – 3 contains two statistics, the first one is t-value and second one is their respective p-value. The null hypothesis is accepted in case of all samples companies and average EVA of Transport Equipments Industry where p-value is 0.432, means that the average EVA of all samples Indian manufacturing companies has no difference with the average EVA of Transport Equipments Industry because p-value is insignificant at five percent whereas the average EVA of all samples companies and the average EVA of Transport Equipments Industry is not significantly different. Further, as depicted by the table - 3 the pairs of Chemicals and Chemicals Products Industries-Metal and Metal Products Industries, Chemicals and Chemicals Products Industries-Miscellaneous Manufacturing Industry Construction Material Industry-Consumer Goods Industry, Construction Material Industry-Food and Agro-based Products Industry, Consumer Goods Industry-Food and Agro-based Products Industry, Machinery Industry-Textiles Industry, Metal and Metal Products Industry-Miscellaneous Manufacturing Industry accept the null hypothesis of equality of average EVA because p-value is insignificant at the level of five percent.

Further, the rest of pairs of different industries rejected the null hypothesis that average EVA of inter industries is different as p-value are significant at five percent.

Cash value added (CVA) is determined as residual income of sustainable cash flows, i.e. gross cash flows (GCF), less economic depreciation (ED), after capital charge for gross investment (GI). The average CVA registered by sample companies ranges from Rs. 55.87 Crore in 1999-2000 to Rs. 507.59 Crore in 2017-2018. The average EVA shows upward increasing trend as depicted in Table - 4. Chemicals and Chemicals Products Industry, Miscellaneous Manufacturing Industry, and Metal and Metal Products Industry registered higher average CVA as compare the average CVA of all sample companies whereas rest of the industries registered less average CVA than the average CVA of all sample companies throughout the study period.

Figure - 2 depicts decrease CVA in year 2008-2009 that may be due to beginning of recession which was continued up to 2014-2015 thereafter the sample all Industries companies and the companies of different industries registered increasing trend of CVA that may be due to end of recession period.

Table 4: Average Cash Value Added (CVA) of All Sample Companies and Industries.

Figures are in crore rupees

Years	All Manufacturing Industry	Chemicals and Chemicals Products Industry	Construction Material Industry	Consumer Goods Industry	Food and Agro-based Products Industry	Machinery Industry	Metal and Metal Products Industry	Miscellaneous Manufacturing Industry	Textiles Industry	Transport Equipments Industry
1999-00	55.87	114.35	28.88	49.86	37.08	21.53	44.64	96.79	17.25	41.82
2000-01	67.08	130.02	33.29	55.21	41.75	26.71	75.31	133.88	24.5	27.99
2001-02	68.73	140.63	33.11	60.67	44.61	25.57	39.45	150.26	15.03	40.18
2002-03	95.6	187.23	33.92	66.02	44.88	25.54	93.17	232.87	34.54	56.11
2003-04	116.65	243.12	41.16	70.54	55.94	22.7	188.31	212.77	44.02	72.77
2004-05	149.69	243.7	49.97	68.51	74.79	33.56	373.63	294.02	47.84	92.94
2005-06	162.01	255.2	88.04	88.83	90.42	53.42	330.01	313.05	53.92	113.37
2006-07	224.87	376.51	152.96	110.68	105.12	79.1	522.2	355.44	80.35	143.48
2007-08	267.51	474.4	163.99	122.11	115.5	100.8	609.62	414.66	97.44	160.83
2008-09	253.58	451.8	160.51	137.39	137.41	106.74	541.32	388.77	66.21	140.8
2009-10	295.97	505.69	182.5	161.94	152.18	119.96	614.05	424.64	113.58	238.62
2010-11	340.75	681.07	126.45	172.45	170.53	132.68	695.59	428.76	111.34	273.19
2011-12	339.39	532.73	154.82	188.41	207.06	140	669.13	578.38	103.38	310.36
2012-13	338.26	549.92	173.38	229.69	230.12	145.38	582.18	500.25	147.4	320.28
2013-14	354.86	619.68	139.36	254.23	152.45	112.78	733.15	516.41	137.3	345.35
2014-15	352.66	650.79	173.04	276.85	215.01	62.8	743.47	440.65	135.42	315.94
2015-16	346.22	898.45	196.88	265.2	240.47	96.62	27.52	423.38	54.94	431.76
2016-17	477.06	1129.0	193.12	262.23	312.24	93.82	751.15	521.07	96.5	433.53
2017-18	507.59	1148.6	261.64	331.04	313.89	102.6	813.52	517.08	149.78	480.97

*Source***:** Prowess IQ

To test the assumption of that there is no significant difference in the average CVA of overall sample companies and the average CVA of different industries as well. To test this claim an independent sample t-test has been implied on the average pooled data of CVA. The null hypothesis is accepted in case of all samples Indian manufacturing companies and average CVA of Transport Equipments Industry where p-value is 0.385, means that the average CVA of all samples Indian manufacturing companies has no difference with the average CVA of Transport Equipments Industry because p-value is insignificant at 5 percent whereas the average CVA of all samples Indian manufacturing companies and the average CVA of Transport Equipments Industry is not significantly different.
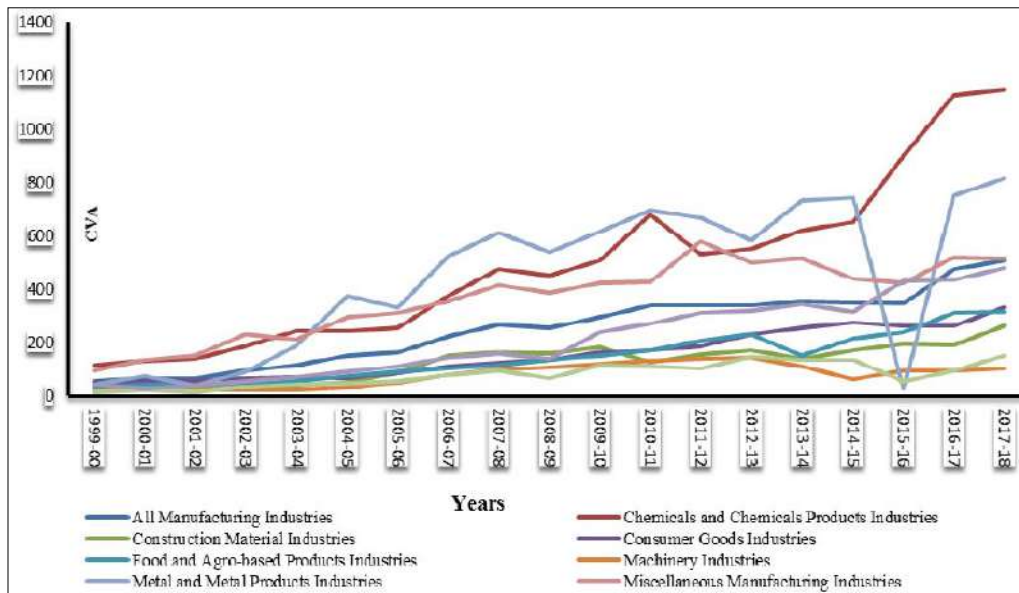
Fig 2: Average CVA of All Sample Companies and Industries

Table 5: The Independent Samples t-test matrix of CVA of All Sample Companies and Industries

	Chemicals and Chemicals Products Industries	Construction Material Industries	Consumer Goods Industries	Food and Agro-based Products Industries	Machinery Industries	Metal and Metal Products Industries	Miscellaneous Manufacturing Industries	Textiles Industries	Transport Equipments Industries	All Manufacturing Industries
Chemicals and Chemicals Products Industries	t-value p-value	4.958 0.000*	4.473 0.000*	4.639 0.000*	5675 0.000*	0.481 0.634	1.589 0.121	5.651 0.000*	3.500 0.001*	3.029 0.005*
Construction Material Industries			-1.172 0.249	-0.715 0.479	2.450 0.019*	-4.757 0.000*	-6.514 0.000*	2.351 0.024*	-2.308 0.027*	-3.609 0.001*
Consumer Goods Industries				0.417 0.679	3.366 0.002*	-4.220 0.000*	-5.358 0.000*	3.282 0.002*	-1.411 0.167	-2.574 0.014*
Food and Agro-based Products Industries					2.865 0.007*	-4.403 0.000*	-5.687 0.000*	2.783 0.009*	-1.721 0.094	-2.906 0.006*
Machinery Industries						-5.552 0.000*	-8.291 0.000*	-0.104 0.917	-3.765 0.001*	-5.278 0.000*
Metal and Metal Products Industries							1.085 0.285	5.526 0.000*	3.158 0.003*	2.645 0.012*
Miscellaneous Manufacturing Industries								8.227 0.000*	3.219 0.003*	2.454 0.019*
Textiles Industries									-3.714 0.001*	-5.218 0.000*
Transport Equipments Industries										-0.879 0.385

*Sources***:** Computed from Annual Reports

Further, matrix table value presented in bold, these pair's null hypothecs accepted because p-values of these pairs are not significant at five percent. The rest of pairs of different industries rejected the null hypothesis that average CVA of inter industries is different as p-value is significant at five percent.

Table 6: Average Shareholder Value Added (SVA) of All Sample Companies and Industries

Figures are in crore rupees

Years	All Manufacturing Industry	Chemicals and Chemicals Products Industry	Construction Material Industry	Consumer Goods Industry	Food and Agro-based Products Industry	Machinery Industry	Metal and Metal Products Industry	Miscellaneous Manufacturing Industry	Textiles Industry	Transport Equipments Industry
1999-00										
2000-01	-223	-584	-171	-43	-36	-161	-130	2006	-275	-372
2001-02	-268	-759	-177	153	-60	-138	-1251	708	245	368
2002-03	638	651	-100	0.00	-145	-205	598	31428	159	347
2003-04	-912	912	-19	-102	140	295	3268	101162	-116	532
2004-05	2027	-1797	138	-144	310	104	17237	42771	-327	869
2005-06	51	-546	559	420	144	-154	1066	5014	-205	741
2006-07	2008	1782	3002	753	28	775	10999	12254	408	654
2007-08	322	562	58	-235	-242	-111	866	12560	-442	1.00
2008-09	-1147	-4158	-1402	464	-63	5127	-6259	8404	-1546	-1445
2009-10	871	3825	-223	-96	-452	-166	-964	9857	130	2093
2010-11	-275	101	-2127	-110	-599	-71	2806	2632	-750	-916
2011-12	305	-8399	-1073	93	73	-515	-2610	159892	-1367	1042
2012-13	-2402	-3458	-834	137	-134	-1068	-5274	41079	-509	-1486
2013-14	-964	-3442	-2157	-453	822	145	2636	9172	-938	-1232
2014-15	2744	-1882	-431	726	472	1828	41457	55195	-1077	-153
2015-16	-1187	12038	-79	-909	-723	9535	-49687	29320	-2166	6028
2016-17	5750	2071	-986	-1246	851	-1643	64467	25044	-1271	-481
2017-18	-1217	-2822	724	1629	480	390	-8247	12348	-597	77

*Source***:** Prowess IQ

Shareholder Value Added (SVA) is the alternative of discount cash flow model. It uses weighted average cost of capital such as discount rate. The average SVA registered by sample companies ranges from Rs. 222.91Crore in 2000-2001 to Rs. 1217.44 Crore in 2017-2018. The average SVA shows downward trend as depicted in the table - 6. Chemicals and Chemicals Products Industry, Miscellaneous Manufacturing Industry, Metal and Metal Products Industry registered higher average SVA as compare the average SVA of all sample companies whereas rest of the industries registered less average SVA than the average SVA of all sample companies throughout the study period. Most of industries showed zigzag pattern in this study period. Figure - 3 presented constant increasing in trends by all industries through the study period. SVA shows downfall in years 2008-2009 may be due to beginning of recession which was continued up to 2014-2015 thereafter the sample companies and the industries registered increasing trend because of eradication of recession period.
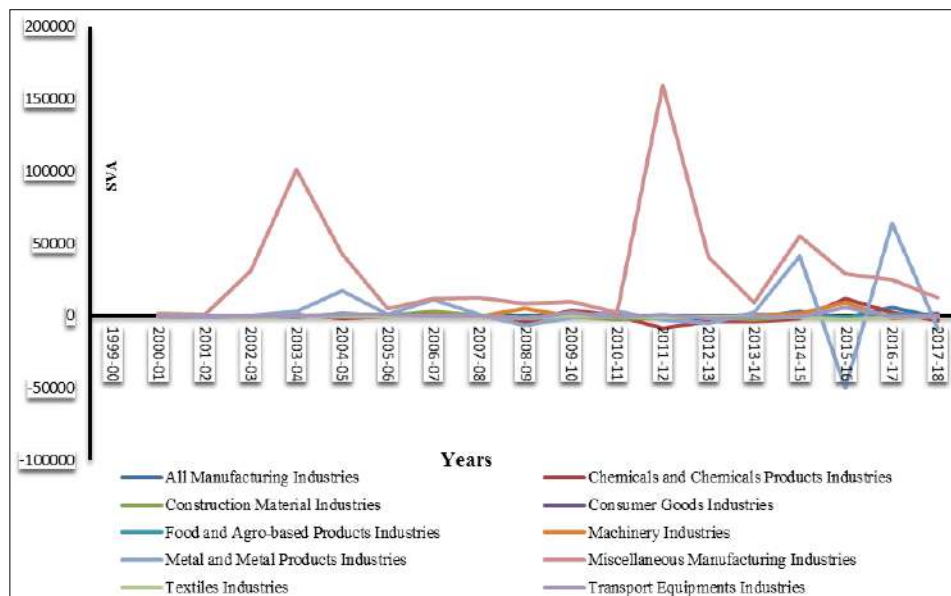

Fig 3: Average SVA of All Sample Companies and Industries

To test the assumption of that there is no significant difference in the average SVA of overall sample companies and the average SVA of different industries as well. To test this claim an independent sample t-test has been implied on

the average pooled data of SVA. The null hypothesis is accepted in case of all samples Indian manufacturing companies and average SVA of all different sectors except Miscellaneous Manufacturing Industries where p-value is more than five percent means that the average SVA of all samples Indian manufacturing companies is not significantly different than the average SVA of all different sectors except Miscellaneous Manufacturing Industries because p-value is insignificant five percent.

Table 7: The Independent Samples t-test matrix of SVA of All Sample Companies and Industries

	Chemicals and Chemicals Products Industries	Construction Material Industries	Consumer Goods Industries	Food and Agro-based Products Industries	Machinery Industries	Metal and Metal Products Industries	Miscellaneous Manufacturing Industries	Textiles Industries	Transport Equipments Industries	All Manufacturing Industries
Chemicals and Chemicals Products Industries	t-value p-value	-0.033 0.974	-0.389 0.700	-0.381 0.705	-0.955 0.346	-0.790 0.435	-3.268 0.002*	0.265 0.743	-0.660 0.514	-0.621 0.539
Construction Material Industries			-1.135 0.264	-1.181 0.246	-1.597 0.120	-0.796 0.432	-3.280 0.002*	0.937 0.356	-1.378 0.177	-1.221 0.230
Consumer Goods Industries				0.052 0.958	-1.139 0.262	-0.730 0.470	-3.244 0.003*	2.929 0.006*	-0.735 0.467	-0.605 0.549
Food and Agro-based Products Industries					-1.172 0.249	-0.732 0.469	-3.296 0.003*	3.322 0.002*	-0.784 0.439	-0.643 0.525
Machinery Industries						-0.592 0.558	-3.163 0.003*	2.156 0.038*	0.555 0.583	0.577 0.568
Metal and Metal Products Industries							-2.483 0.018*	0.852 0.400	0.670 0.507	0.675 0.504
Miscellaneous Manufacturing Industries								3.312 0.002*	3.209 0.003*	3.212 0.003*
Textiles Industries									-2.231 0.032*	-1.974 0.057
Transport Equipments Industries										0.051 0.960

Sources: Computed from Annual Reports

Further, matrix table value presented in bold, these pair's null hypothecs accepted because p-values of these pairs are not significant at five percent. The rest of pairs of different industries rejected the null hypothesis that average SVA of inter industries is different as p-value is significant at five percent.

Economic profit (EP) is calculated by net operating profit less adjusted taxes (NOPLAT), less Weighted Average Cost of Capital (WACC) multiply by Capital Employed. The average EP registered by sample companies ranges from Rs.4.41Crore in 1999-2000 to Rs. 67.88 Crore in 2017-2018. The average EP shows upward increasing trend as depicted in the table – 8.

The table - 8 also gives the average EP of all sample companies along with the average EP of industries. The table showed that Food and Agro-based Products Industry, Chemicals and Chemicals Products Industry, Miscellaneous Manufacturing Industry, and Metal and Metal Products Industry registered higher average EP as compare the average EP of all sample companies whereas rest of the industries registered less average EP than the average EP of all sample companies throughout the study period. In recent years, Transport Equipments Industry registered higher average EP as compare the average EP of all sample companies.

Table 8: Averages Economic Profit (EP) of All Sample Companies and Industries

Figures are in crore rupees

| Years	All Manufacturing Industry	Chemicals and Chemicals Products Industry	Construction Material Industry	Consumer Goods Industry	Food and Agro-based Products Industry	Machinery Industry	Metal and Metal Products Industry	Miscellaneous Manufacturing Industry	Textiles Industry	Transport Equipments Industry
1999-00	-	-	-	-	-	-	-	-	-	-
2000-01	-4.41	3.53	-11.85	-0.21	2.09	-8.19	-29.94	32.52	-27.84	-16.75
2001-02	-4.26	-3.6	-9.8	4.16	0.98	-2.97	-62.21	48.55	-18.91	-10.38
2002-03	22.64	49.81	-11.05	8.51	5.09	-3.3	-12.47	130.23	-5.11	1.51
2003-04	37.02	90.69	2.61	14.19	10.35	-1.96	63.18	91.38	6.00	11.49
2004-05	58.99	72.69	13.97	7.97	13.2	8.97	223.37	159.96	7.66	13.9
2005-06	56.51	80.56	28.95	5.01	22.87	20.69	180.07	129.98	7.09	10.97
2006-07	83.58	121.88	53.94	9.66	27.99	48.92	281.37	144.93	7.89	19.84
2007-08	93.13	159.11	59.13	9.77	28.55	51.63	277.27	160.72	1.14	27.38
2008-09	81.13	37.74	67.14	16.86	46.7	178.12	212.1	125.79	-21.39	20.8
2009-10	74.99	84.52	65.87	30.79	51.14	38.62	167.74	162.05	0.65	58.21
2010-11	100.68	183.84	27.32	58.81	56.37	58.01	215.62	159.71	-4.89	63.2
2011-12	103.43	173.43	44.74	82.31	64.7	74.52	126.9	230.02	-24.22	60.24
2012-13	88.71	125.5	55.83	108.75	81.83	61.76	125.22	161.06	-29.06	60.06
2013-14	93.3	167.23	32.31	58.74	128.75	29.31	109.27	197.42	-44.77	72.49
2014-15	74.53	138.22	42.51	63.57	135.39	-25.92	72.23	170.29	-49.57	77.02
2015-16	63.07	215.52	49.59	65.35	126.71	-16.5	-151.5	100.35	-75	108.54
2016-17	77.99	232.95	57.97	88.21	139.27	13.92	-96.32	102.39	-66.18	80.78
2017-18	67.88	174.39	86.75	97.84	166.52	1.59	-50.2	79.4	-165.7	112.71

*Source***:** Prowess IQ
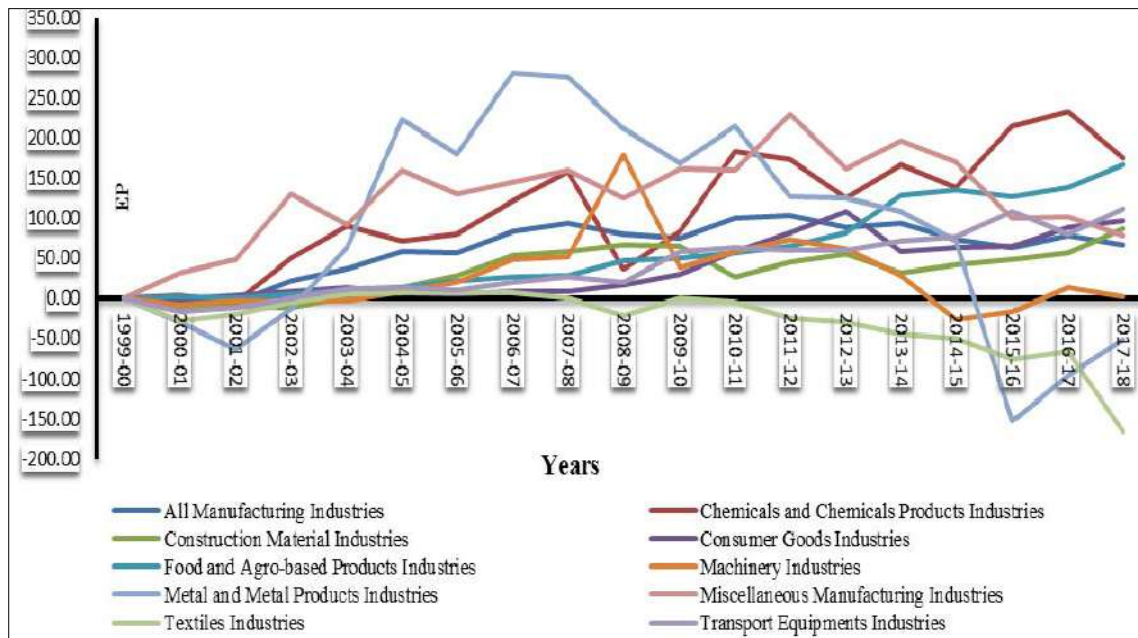
Fig 4: Average EP of All Sample Companies and Industries.

Figure - 4 depicted the zigzag average EP pattern in different industries during the study period. It showed that decline in EP in year years 2008-2009 that may be due to beginning of recession which was continued up to 2014-2015 thereafter the sample All Indian Manufacturing Industries companies and the companies of different industries registered increasing trend of EP that may be due to eradication of recession period.

Table 9: The Independent Samples t-test matrix of EP of All Sample Companies and   Industries

	Chemicals and Chemicals Products Industry	Construction Material Industry	Consumer Goods Industry	Food and Agro-based Products Industry	Machinery Industry	Metal and Metal Products Industry	Miscellaneous Manufacturing Industry	Textiles Industry	Transport Equipments Industry	All Manufacturing Industry
Chemicals and Chemicals Products Industry	t-value p-value	4.237 0.000*	3.870 0.000*	2.513 0.017*	4.201 0.000*	0.700 0.488	-0.690 0.495	7.126 0.000*	3.707 0.001*	2.668 0.011*
Construction Material Industry			-0.358 0.723	-1.656 0.106	0.534 0.597	-1.705 0.097	-6.129 0.000*	5.145 0.000*	-0.539 0.593	-2.553 0.015*
Consumer Goods Industry				-1.305 0.200	0.782 0.439	-1.557 0.128	-5.550 0.000*	5.032 0.000*	-0.177 0.861	-1.967 0.057
Food and Agro-based Products Industry					1.848 0.073	-0.879 0.385	-3.682 0.001*	5.326 0.000*	1.140 0.262	-0.212 0.833
Machinery Industry						-1.861 0.071	-5.768 0.000*	3.763 0.001*	-0.922 0.363	-2.526 0.016*
Metal and Metal Products Industry							-1.182 0.245	3.601 0.001*	1.480 0.148	0.819 0.418
Miscellaneous Manufacturing Industry								9.299 0.000*	5.318 0.000*	4.148 0.000*
Textiles Industry									-5.072 0.000*	-6.992 0.000*
Transport Equipments Industry										-1.727 0.093

Sources: Statistical Analysis

An attempt has been made to test the hypotheses that there is no significant difference in the average EP of overall sample companies and the average EP of different industries To test this claim an independent sample t-test has been applied on the average data of EP of all sample companies industries.

The table - 9 contains two statistics, t-value and p-value. The null hypothesis is accepted in case of all samples Indian manufacturing companies and average EP of Transport Equipments Industry, Consumer Goods Industry, Food and Agro-based Products, and Metal and Metal Products Industry respectively   where p-values are more than five percent   means that the average EP of all samples Indian manufacturing companies is not significantly different than the average EP of Transport Equipments Industry, Consumer Goods Industry, Food and Agro-based Products, and Metal and Metal Products Industry because p-values are insignificant five percent whereas the average EP of all samples Indian manufacturing companies and the average EP of these industries are not significantly different . Further, matrix table value presented in bold, these pair's null hypothecs accepted because p-values of these pairs are not significant at five percent. The rest of pairs of different industries rejected the null hypothesis that average EP of

inter industries is different as p-values are significant at five percent.

Cash Flow Return on Investment (CFROI) is calculated by dividing gross cash flow (GCF) after economic depreciation (ED) by gross investment (GI). The average CFROI registered by sample companies ranges from 24.42 percent in 1999-2000 to 22.13 percent in 2017-2018. The table – 10 presented the average CFROI shows upward increasing trend. But in recent years, average declined slightly.

The figure – 5 depicted that Consumer Goods Industry, Chemicals and Chemicals Products Industry, Machinery Industry, and Transport Equipments Industry registered higher average CFROI as compare the average CFROI of all sample companies whereas rest of the industries registered less average CFROI than the average CFROI of all sample companies throughout the study period. Most of industries showed zigzag pattern in this measure from1999-2000 to 2017-2018 years.

An attempt has been made to test the hypotheses that there is no significant difference in the average CFROI of overall sample companies and the average CFROI of different industries To test this claim an independent sample t-test has been applied on the average data of CFROI of all sample companies industries.

Table 10: Average Cash Flow Return on Investment (CFROI) of All Sample Companies and Industries

Figures are in %

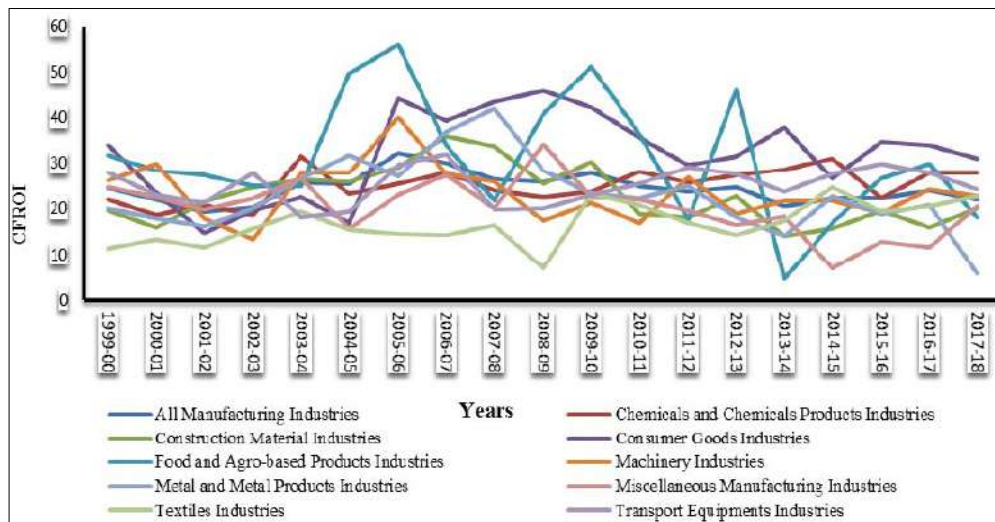| Years	All Manufacturing Industry	Chemicals and Chemicals Products Industry	Construction Material Industry	Consumer Goods Industry	Food and Agro-based Products Industry	Machinery Industry	Metal and Metal Products Industry	Miscellaneous Manufacturing Industry	Textiles Industry	Transport Equipments Industry
1999-00	24.42	22.01	19.75	34.12	31.79	26.23	20.13	24.79	11.45	27.95
2000-01	22.06	18.71	16.01	23.42	28.47	29.9	17.95	22.49	13.3	23.02
2001-02	19.46	20.96	21.65	14.89	27.34	18.05	16.19	19.87	11.68	21.23
2002-03	20.36	18.75	24.78	19.57	25.03	13.36	20.11	22.43	15.85	27.8
2003-04	25.78	31.47	26.57	22.48	25.07	27.88	26.73	26.75	19.39	18.21
2004-05	25.41	23.24	25.9	17.08	49.74	28.02	31.91	15.77	15.42	19.43
2005-06	32.2	25.57	29.13	44.13	56.27	40	27.1	23.01	14.56	29.53
2006-07	30.17	28.02	35.91	39.45	33.94	27.66	36.91	27.49	14.4	31.97
2007-08	26.54	24.08	33.68	43.44	21.91	25.98	41.98	20.05	16.41	19.99
2008-09	26.06	22.51	25.43	45.91	40.86	17.41	28.41	34.13	7.05	20.17
2009-10	27.95	23.7	30.38	42.36	51.35	21.38	23.22	22.65	23.27	23.14
2010-11	24.99	28.06	18.84	35.74	36.48	16.97	22.34	22	20.8	25.46
2011-12	23.67	25.66	18.07	29.59	17.75	26.92	24.93	19.62	16.88	29.18
2012-13	24.86	27.32	22.89	31.59	46.15	18.93	18.3	16.37	14.28	27.66
2013-14	20.74	28.63	14.17	37.96	4.59	21.9	13.99	18.44	17.4	23.88
2014-15	22.21	31.17	15.68	26.59	16.85	21.79	22.89	7.02	24.83	27.57
2015-16	22.26	22.41	19.76	34.75	26.79	19.1	19.01	12.86	19.51	29.81
2016-17	24.05	28	16.09	33.89	29.94	24.39	20.8	11.68	20.73	27.86
2017-18	22.13	27.98	20.11	31.19	18.29	22.86	5.75	20.73	22.91	24.31

Source: Prowess IQ

Fig 5: Average CFROI of All Sample Companies and Industries.

Table 11: The Independent Samples t-test matrix of CFROI of Sample Companies and Industries

	Chemicals and Chemicals Products Industries	Construction Material Industries	Consumer Goods Industries	Food and Agro-based Products Industries	Machinery Industries	Metal and Metal Products Industries	Miscellaneous Manufacturing Industries	Textiles Industries	Transport Equipments Industries	All Manufacturing Industries
Chemicals and Chemicals Products Industries	t-value 1.364 p-value 0.181		-2.958 0.005*	-1.828 0.076	0.949 0.349	1.007 0.321	2.871 0.007*	6.136 0.000*	0.003 0.997	0.593 0.557
Construction Material Industries			-3.539 0.001*	-2.397 0.022*	-0.367 0.716	-0.086 0.932	1.222 0.229	3.404 0.002*	-1.335 0.190	-0.992 0.328
Consumer Goods Industries				0.275 0.785	3.287 0.002*	3.131 0.003*	4.519 0.000*	6.363 0.000*	2.929 0.006*	3.312 0.002*

Food and Agro-based Products Industries						2.193 0.035*	2.199 0.034*	3.135 0.003*	4.375 0.000*	1.819 0.077	2.061 0.047*
Machinery Industries							0.227 0.822	1.614 0.115	3.899 0.000*	-0.927 0.360	-0.554 0.583
Metal and Metal Products Industries								1.133 0.265	2.903 0.006*	-0.992 0.328	-0.694 0.492
Miscellaneous Manufacturing Industries									2.046 0.048*	-2.810 0.008*	-2.549 0.015*
Textiles Industries										-5.950 0.000*	-5.951 0.000*
Transport Equipments Industries											0.566 0.575

Sources: Statistical Analysis

The table - 11 contains two statistics, t-value and p-value. The null hypothesis is accepted in case of all samples Indian manufacturing companies and average CFROI of Transport Equipments Industry, Chemicals and Chemicals Products Industry, Construction Material Industry, Machinery Industry, and Metal and Metal Products Industry where p-values are more than five percent means that the average CFROI of all samples Indian manufacturing companies is not significantly different than the average CFROI of Transport Equipments Industry, Chemicals and Chemicals Products Industry, Construction Material Industry, Machinery Industry, and Metal and Metal Products Industry. Further, matrix table value presented in bold, these pair's null hypothecs accepted because p-values of these pairs are insignificant at five percent. The rest of pairs of different industries rejected the null hypothesis that average CFROI of inter industries is different as p-values are significant at five percent.

Findings and conclusion
A sample of 534 Indian manufacturing companies listed on Bombay Stock Exchange limited are taken from PROWESS IQ database maintained by Centre for Monitoring Indian Economy (CMIE) barring banking and financial services companies. The study period started from 1999-2000 to 2017-2018. Number of research studies supported the supremacy of Value-based financial performance measures for measuring the financial performance of the companies. Therefore, the objective of this study is to compare and access the value-based financial performance measures of Indian manufacturing companies.
The study found that Chemicals and Chemicals Products Industry, Miscellaneous Manufacturing Industry, and Metal and Metal Products Industry depicted that higher average EVA from aggregate EVA of all sample companies as well from the average EVA of rest of industries through the study period. The average EVA of Transport Equipments Industry and all samples companies is not different and also pairs of Chemicals and Chemicals Products Industries-Metal and Metal Products Industries, Chemicals and Chemicals Products Industries-Miscellaneous Manufacturing Industry Construction Material Industry-Consumer Goods Industry, Construction Material Industry-Food and Agro-based Products Industry, Consumer Goods Industry-Food and Agro-based Products Industry, Machinery Industry-Textiles Industry, Metal and Metal Products Industry-Miscellaneous

Manufacturing Industry accept the null hypothesis of equality of average EVA because p-value is insignificant at the level of five percent.
Chemicals and Chemicals Products Industry, Miscellaneous Manufacturing Industry, and Metal and Metal Products Industry outperformed in term of average CVA. These registered higher average CVA as compare the average CVA of all sample companies whereas rest of the industries underperformed in term of average CVA than the average CVA of all sample companies throughout the study period. And these industries and pairs average CVA is significantly different as the p-value is significant at five percent.
Results also shows that Chemicals and Chemicals Products Industry, Miscellaneous Manufacturing Industry, Metal and Metal Products Industry registered higher average SVA as compare the average SVA of all sample companies whereas rest of the industries registered less average SVA than the average SVA of all sample companies throughout the study period. Most of industries showed zigzag pattern in this study period. The average SVA of all samples Indian manufacturing companies is not significantly different than the average SVA of all different sectors except Miscellaneous Manufacturing Industries because p-value is insignificant at five percent.
Further, Food and Agro-based Products Industry, Chemicals and Chemicals Products Industry, Miscellaneous Manufacturing Industry, and Metal and Metal Products Industry registered higher average EP as compare the average EP of all sample companies whereas rest of the industries registered less average EP than the average EP of all sample companies throughout the study period. In recent years, Transport Equipments Industry registered higher average EP as compare the average EP of all sample companies. The average EP of Transport Equipments Industry, Consumer Goods Industry, Food and Agro-based Products, and Metal and Metal Products Industry because p-values are insignificant 5 percent whereas the average EP of all samples Indian manufacturing companies and the average EP of these industries are not significantly different. The average CFROI of aggregate sample companies shows up and down trend through the study period. Consumer Goods Industry, Chemicals and Chemicals Products Industry, Machinery Industry, and Transport Equipments Industry outperformed the higher average CFROI as compare the average CFROI of all sample companies whereas rest of the industries underperformed the average

CFROI than the average CFROI of all sample companies. The average CFROI of all samples Indian manufacturing companies is not significantly different than the average CFROI of Transport Equipments Industry, Chemicals and Chemicals Products Industry, Construction Material Industry, Machinery Industry, and Metal and Metal Products Industry.

Therefore, the study concludes that financial performance measured by value-based financial performance measures exhibits sound financial health of Indian manufacturing companies. Though, the financial performance decreases in 2007-2008 but afterward sample companies able to revive the sound financial vitality. Some industries outperform the other as well as aggregate sample companies' *vis-à-vis* value-based financial performance measures. The average matrices of industries presents mix results as some are not significantly different whereas, some are significantly different.

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