



STOCK SELECTION USING MANOVA FOR INTRADAY TRADING

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Abstract

Short term investment in stock market was considered to produce unsustainable market condition due to its low rate of stability. In this market, selection of stock involves strategies that guide traders from market predators, projected advertisements, and factors that decrease the intraday profit. This paper proposes a Multivariate Analysis of Variance (MANOVA) to select intraday stocks in this challenging condition by comparing its significant factors.

Keywords - MANOVA, Intraday stock selection

I. INTRODUCTION

In the competitive global economy, Gross Domestic Product (GDP), rate of inflation and the purchasing power of an individual are determined by global factors. Hence the growth in economy of a country and of an individual is biased to these factors. In this situation, the high rate of return on small investments in short term attracts intraday traders to earn an additional income. However, stock trading is dominated by institutional investors and agile intelligent software traders. Hence market trend is decided by heavy institutional investors who in turn deflate the return on investment of individual traders. Several rules and procedures were presented by Aziz (2015) to gain control in intraday stock trading. Many financial indicators with its

implementation are available in chart school websites to predict the market trend. But the combined understanding of financial data analysis is not studied to sustain, earn profit and design trading strategies. Hence the influencing factors that are considered important in selecting stocks are explored. They are

- Company's Assets - Investments that are expected to generate payout.
- Shareholder's Equity - Claim by the owners.
- Liabilities - Claims to the payoffs by claimants other than owners.
- Net Income - It measures the value added to shareholder's equity.
- Expenses - Value that goes out in earning revenue.
- Return on Equity (ROE) - It measures the rate of return on the ownership interest (shareholders' equity) of the common stock owners
- Operating Margin - It is a measurement of what proportion of a company's revenue is left over, before taxes and other indirect costs (such as rent, bonus, interest, etc.), after paying for variable costs of production as wages, raw materials
- Earnings Per Share (EPS) - It is the amount of earnings per each outstanding share of a company's stock.

These factors are considered to be predominant in choosing the stocks for trading. But the

analysis of variance (ANOVA) among and between these factors rejected the true null hypothesis when multiple dependent variables and tests were performed. The joint probability of rejecting a true null hypothesis also increases with each additional test. But Multivariate ANOVA (MANOVA) extends the capabilities of analysis of variance (ANOVA) by assessing multiple dependent variables simultaneously. It can also detect patterns between multiple dependent variables with greater statistical power. Therefore, this paper uses MANOVA to analyze the significance of multiple dependent variable factors to identify the market trend and choose intraday stock for individual investors. The review of literatures is presented in Section 2. Section 3 presents the MANOVA methodology, Section 4 evaluates the methodology, Section 5 presents the results, and Section 6 concludes with future research directions.

II. LITERATURE REVIEW

The literatures are reviewed to analyze the state of the art in multivariate analysis, and assess the importance of stock selection to earn profit. In this regard, Van der Hart et al. (2003) presented the examination of profitability in stock selection strategies using multivariate analysis, and found beneficial to large investor who faces lack of liquidity and substantial transaction costs. Further, Rachev et al. (2008) analyzed momentum strategies for two different criteria, and concluded that cumulative return criteria provided more profit with higher tail risk acceptance than reward risk stock selection criteria that adjusts risk lower tail risk acceptance. It also pointed that the profit and risk-reward ratio could be controlled by proper selection of stocks. In addition, Lee et al. (2009) conducted empirical study to evaluate the relative weight of eight influencing factors in stock selection. Based on expert opinion, the selection factors were prioritized as market beta, earnings growth rate, risk-free rate, industry outlook, earnings, dividend payout growth rate, operating cash flow, and dividend

payout rate. Groysberg et al. (2012) confirmed by examining the stocks and showed that by controlling the selection effects in sell side and buy size data analysis. A knowledge architecture system to study the intraday price patterns posted by technical indicators was studied by Goumatianos et al. (2013) to optimize the portfolio of stock. Further the selection ability of mutual fund managers in Ghana using the classic Treynor-Mazuy (1966) model and Henriksson- Merton (1981) model was examined by Musah et al. (2014), and reported that mutual fund managers were not able to select stocks, and predict both the magnitude and direction of future market returns. Hence, in this paper the shortcomings in the study of stock selection are addressed to make an attempt to fulfill it using MANOVA. The methodology to identify the significant factor in stock selection is presented in section 3.

III. MANOVA Methodology

Multivariate analysis has the possibility to provide an interpretable composite when the outcome variables are judiciously chosen for study. However, the methodology could be initiated if the data are checked for outliers and satisfying the following assumptions.

- The data from each group has common mean vector
- The data from all groups have common variance-covariance matrix
- The subjects are independently sampled
- The data are multivariate normally distributed

To assess these assumptions, soften the data, conduct MANOVA, the steps followed are

Step 1. Draw scatter diagram and profile plot to validate the assumptions of the MANOVA based on the following conditions

- If the residual values are not scattered above and below zero residual line and nearer to it, perform appropriate normalizing and variance stabilizing transformations of the variables and go to step 2, else go to step 2.

Step 2. Perform a one-way MANOVA to check the null hypothesis that there is no significance difference between group mean vectors. Wilks Lambda is calculated and F value is determined to test significance.

Wilks Lambda (λ) :

$$\lambda = \frac{|E|}{|H + E|} \quad (1)$$

Where

E – Error sum of squares and cross products matrix

H – Hypothesis sum of squares products matrix

- If this test is not significant, conclude that there is no statistically significant evidence against the null hypothesis that the group mean vectors are equal to one another, and stop.
- If the test is significant, conclude that at least one pair of group mean vectors differ on at least one element, the value of λ is nearer or equal to zero, and the null hypothesis is rejected. It means that there exist differences among the stock selection factors and step 3 is continued.

As statistical table for F value to Wilks Lambda is not available, the F value is calculated using the formula

$$F = \left(\frac{1 - \lambda^{1/b}}{\lambda^{1/b}} \right) \left(\frac{ab - c}{p(g - 1)} \right) \quad (2)$$

Where

N – Total number of data from all groups and observations

g – Total number of groups or number of companies

p – Total number of observations (factors) in each group

Based on these values, the approximation to F value is determined using the formulae 3, 4 and 5.

$$a = N - g - \frac{p - g + 2}{2} \quad (3)$$

$$b = \begin{cases} \sqrt{\frac{p^2(g-1)^2 - 4}{p^2 + (g-1)^2 - 5}}; & \text{if } p^2 + (g-1)^2 - 5 > 0 \\ 1 & ; \text{if } p^2 + (g-1)^2 - 5 < 0 \end{cases} \quad (4)$$

$$c = \frac{p(g-1) - 2}{2} \quad (5)$$

The $F_{\text{tabulated}}$ value (2.09) is determined from F table for degrees of freedom 8, 63 and significance($\alpha/p = 0.05$) and tested.

Step 3. Construct up to $g-1$ orthogonal contrasts based on specific scientific questions regarding the relationships among the groups, and calculate contrast coefficients, contrast values(ψ), Wilks lambda to test the significance of each contrast.

Step 4. If the contrasts are orthogonal, simultaneous or Bonferroni confidence interval for the elements of orthogonal contrasts is constructed and appropriate conclusions is drawn.

$$\text{Confidence interval} = \psi \pm \sqrt{\frac{p(N-g)}{N-g-p+1} F_{p, N-g-p+1} SE(\psi)} \quad (6)$$

Where

E_{ii} – Diagonal elements in error sum of squares and cross product matrix (E)

C_i – Contrast coefficient for specific questions

$$M = \sqrt{\frac{p(N-g)}{N-g-p+1} F_{p, N-g-p+1}} \quad (7)$$

$$SE(\psi) = \sqrt{\left(\sum_{i=1}^g \frac{c_i^2}{n_i} \right) \frac{e_{jj}}{N-g}} \quad (8)$$

The $F_{\text{tabulated}}$ value (3.49) is determined from F table for degrees of freedom 4, 60 and significance($\alpha/p = 0.0125$) and tested.

Figure 1 depicts the MANOVA methodology to select stocks based on its significant factors. The numerical evaluation of these steps is presented in section 4.

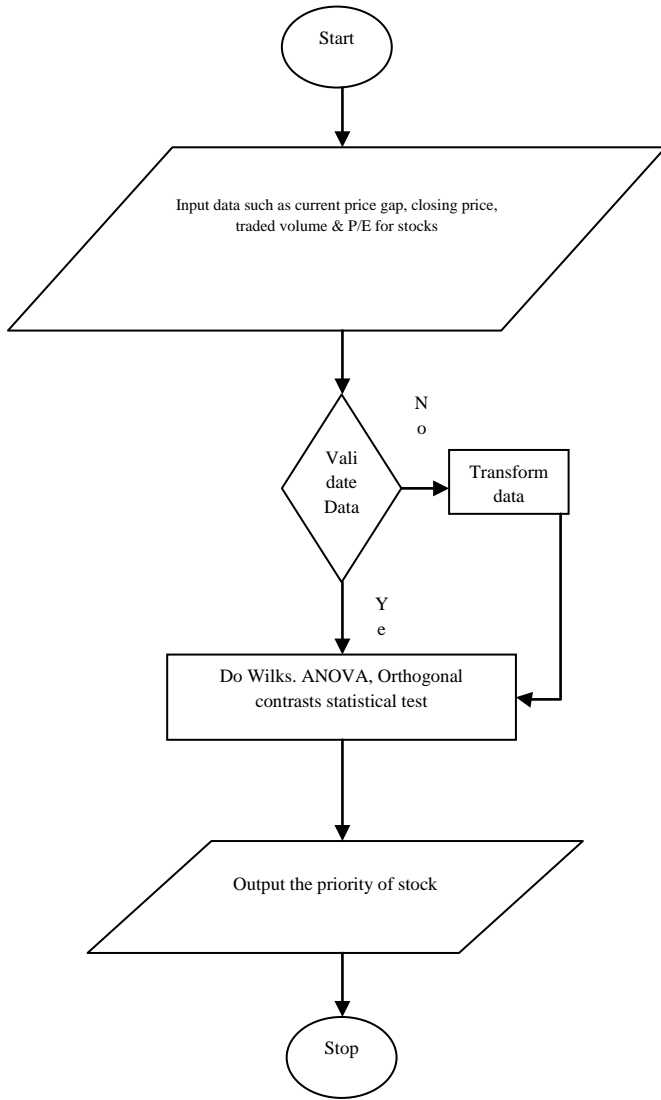


Figure 1. MANOVA methodology for stock selection

IV. Numerical illustration for MANOVA Methodology

The companies that closed high in post

market session of previous trade day, and opened high in premarket session is selected for MANOVA study. The companies and its corresponding sectors are presented in Table 1.

Table 1. Selected companies and its sector

Symbol	Company name	Sector
NSE:KE SORAM IND	Kesoram Industries Ltd.	CEMENT & CEMENT PRODUCTS
NSE:MANP ASAN D	Manpasand Beverages Ltd.	CONSUMER GOODS
NSE:JMFANCI L	JM Financial Ltd.	FINANCIAL SERVICES
NSE:DEEPA KFER T	Deepak Fertilisers & Petrochemicals Corp. Ltd.	CHEMICALS
NSE:ITDC	India Tourism Development Corporation Ltd.	SERVICES
NSE:WELCORP	Welspun Corp Ltd.	METALS
NSE:VAKRANGEE	Vakrangee Ltd.	IT

The data such as current gap, last traded price, current traded volume and profit by earnings ratio (P/E) is obtained from NSE website and are presented in Table 2.

Table 2. Input data for stock significant study and selection

Company / Index	Last trade time	Current gap	Last Traded Price or close	current Traded Volume (lacs)	P/E	Company / Index	Last trade time	Current gap	Last Traded Price or close	current Traded Volume (lacs)	P/E
NSE:DEPAKERT	11:28:28 AM	23.05	189.25	2958792	12.22	NSE:NIFTY	11:28:20 AM	2.9	10615.55	20389300	25.43
	2:33:55 PM	19.55	185.75	3957999	12.09		2:33:56 PM	-51.05	10561.6	20389300	25.43
	2:49:58 PM	18.6	184.8	4027127	11.99		2:50:00 PM	-65.8	10546.85	20389300	25.43
	3:03:57 PM	15.55	181.75	4250732	11.65		3:04:02 PM	-66.35	10546.3	20389300	25.43
	3:07:58 PM	14.75	180.95	4327152	11.68		3:07:57 PM	-77.05	10535.6	20389300	25.43
	3:19:59 PM	11.6	177.8	4583793	11.56		3:20:00 PM	-86.15	10526.5	20389300	25.43
	3:27:48 PM	12.45	178.65	4672408	11.64		3:27:47 PM	-84.65	10528	20389300	25.43
	3:30:00 PM	12.15	178.35	4702363	11.62		3:31:02 PM	-85.9	10526.75	20389300	25.43
NSE:ITDC	11:28:08 AM	11.1	320.15	33074	89.86	NSE:VAKRANGHEE	11:27:54 AM	1.1	25.35	7639175	11.79
	2:32:22 PM	9.45	318.5	45247	89.86		2:33:39 PM	1.1	25.35	7790434	11.79
	2:48:36 PM	6.7	315.75	46519	89.86		2:49:46 PM	1.1	25.35	7804857	11.79
	3:03:56 PM	2.95	312	50215	89.86		3:03:40 PM	1.1	25.35	7872004	11.79
	3:07:47 PM	2.6	311.65	50596	89.86		3:07:55 PM	1.1	25.35	7874499	11.79
	3:19:44 PM	-1.9	307.15	55814	89.86		3:19:38 PM	1.1	25.35	7898816	11.79
	3:27:32 PM	-2.4	306.65	57085	89.86		3:27:49 PM	1.1	25.35	7922439	11.79
	3:30:00 PM	-2.5	306.55	57983	89.86		3:30:00 PM	1.1	25.35	7931145	11.79
NSE:IMFINANCIL	11:28:24 AM	2	88	815309	10.9	NSE:WELCORP	11:28:18 AM	2.85	159.85	260895	25.35
	2:34:00 PM	2.4	88.4	1295727	10.96		2:33:49 PM	2.4	159.4	471869	25.3
	2:49:55 PM	2.15	88.15	1360671	10.93		2:49:58 PM	2.5	159.5	492429	25.29
	3:04:04 PM	2.15	88.15	1438537	10.98		3:03:49 PM	2.7	159.7	507545	25.4
	3:07:56 PM	2.2	88.2	1458527	10.99		3:07:52 PM	2.5	159.5	520274	25.36
	3:20:00 PM	2.85	88.85	1580608	10.99		3:20:02 PM	2.45	159.45	565330	25.29
	3:27:39 PM	2.7	88.7	1654567	10.99		3:27:37 PM	2.4	159.4	577438	25.31
	3:30:00 PM	2.35	88.35	1679407	10.95		3:30:00 PM	1.7	158.7	581901	25.19
KES ORA MIN	11:28:22 AM	3.35	80.75	2998600	0	SEN SEX	11:28:26 AM	-10.56	35271.77	11233095	23.64

	2:33:58 PM	3.5	80.9	3678294	0	2:33:59 PM	-194.35	35087.98	11233095	23.64
	2:49:55 PM	4.35	81.75	3778589	0	2:50:05 PM	-265.66	35016.67	11233095	23.64
	3:03:54 PM	4.05	81.45	3944076	0	3:04:02 PM	-241.61	35040.72	11233095	23.64
	3:08:03 PM	4.35	81.75	3973480	0	3:07:59 PM	-284.61	34997.72	11233095	23.64
	3:20:01 PM	3.75	81.15	4126523	0	3:20:00 PM	-297.7	34984.63	11233095	23.64
	3:27:44 PM	2.75	80.15	4211461	0	3:27:51 PM	-287.67	34994.66	11233095	23.64
	3:30:00 PM	2.9	80.3	4243761	0	3:37:45 PM	-301.31	34981.02	11233095	23.64
NSE:MANPASAND	11:28:25 AM	3.3	98.65	468203	11.34					
	2:33:58 PM	3.5	98.85	571596	11.36					
	2:49:26 PM	3.15	98.5	582212	11.24					
	3:03:48 PM	2.2	97.55	596122	11.18					
	3:07:53 PM	2.15	97.5	601515	11.18					
	3:19:43 PM	2.6	97.95	614847	11.21					
	3:27:45 PM	3.4	98.75	663913	11.34					
	3:30:00 PM	3.15	98.5	668417	11.32					

Step1: The assumptions are checked using scatter diagram drawn between residuals of Y axis and each selection factors on X axis. The data were found to be scattered away from the mean value and its variance are one sided and non elliptical. Hence the data are transformed

logarithmically and the model assumptions are rechecked before MANOVA analysis. The profile plot and scatter plot before and after transformation of data are presented in Figure 1 and Figure 2.

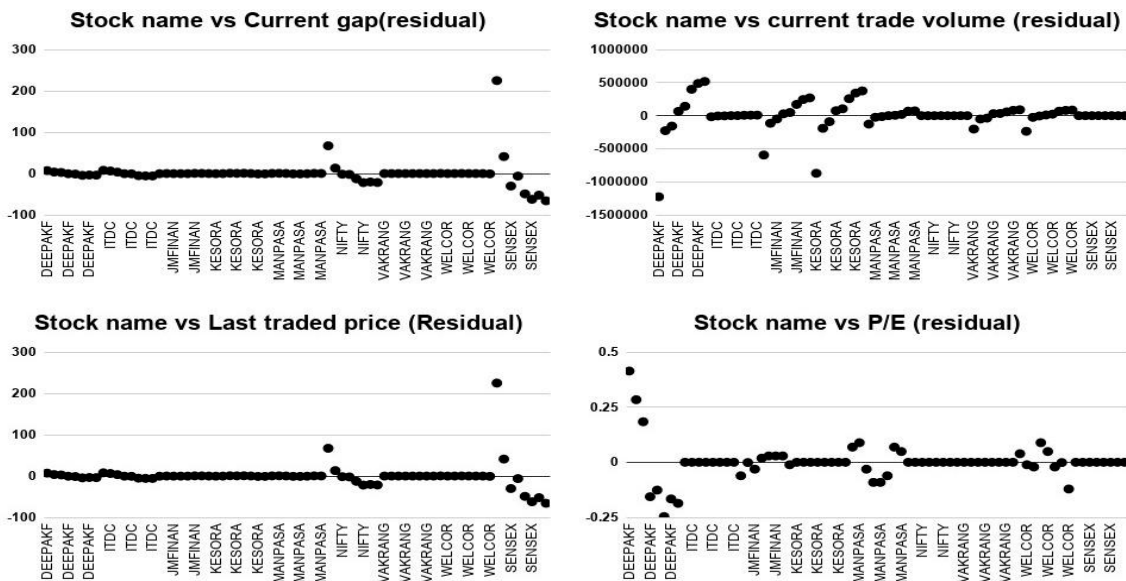


Figure 1. Scatter plot before data transformations

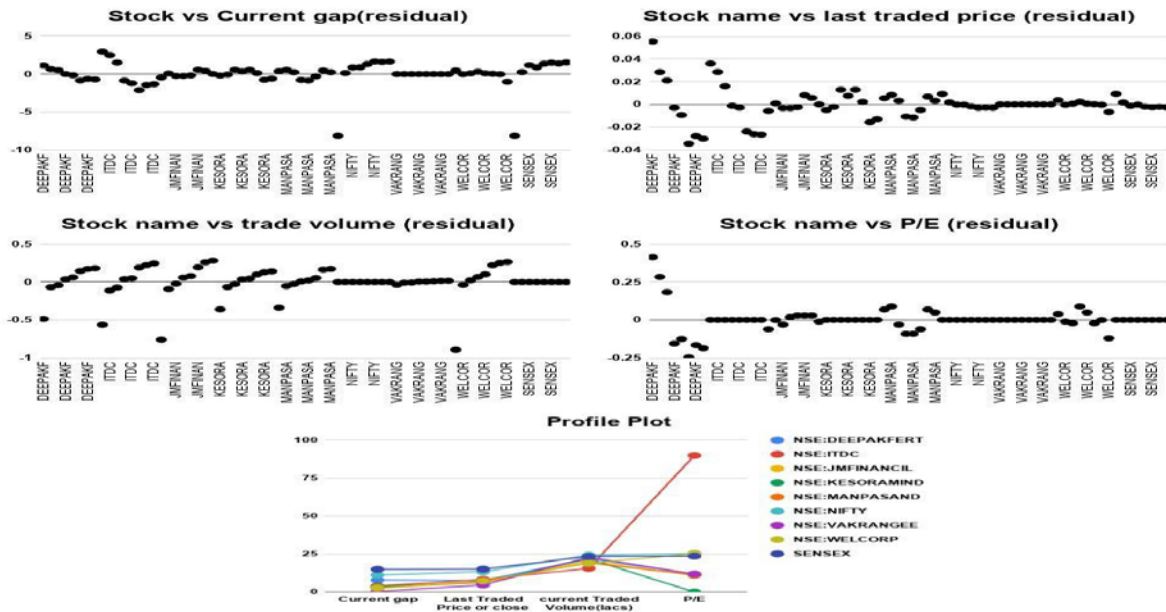


Figure 2. Scatter and profile plot after logarithmic data transformation

Step 2. The sample and grand mean values are determined and are presented in Table 3. The total sum of squares, error sum of squares and the hypothesis sum of squares are determined and are presented in Table 4 to verify the null hypothesis.

Table 3. Calculated sample mean and grand mean

Symbol	Current gap	Last Traded Price	Current Traded Volume(lacs)	P/E
NSE:DEEPAKFE RT	7.91	7.51	21.98	11.81
NSE:ITDC	3.98	8.29	15.58	89.86
NSE:JMFANCI L	2.45	6.47	20.40	10.96
NSE:KESORAMI ND	3.68	6.34	21.88	0.00
NSE:MANPASA ND	3.06	6.62	19.18	11.27
NSE:NIFTY	11.21	13.36	24.28	25.43
NSE:VAKRANG EE	0.28	4.66	22.90	11.79
NSE:WELCORP	2.54	7.32	18.89	25.31
SENSEX	14.94	15.10	23.42	23.64
Grand mean	5.56	8.41	20.94	23.34

Null hypothesis: There is no significance difference between group mean vectors means that the mean values are equal. Wilks Lambda (λ) is calculated; F value is

determined and presented in Table 4. It is seen that the value of λ is nearer and equal to zero, and the $F_{cal} > F_{tabulated}$. Hence the null hypothesis is rejected.

Table 4. Verification of null hypothesis

E				H				T = E+H			λ	F_{cal}	F_{table}	
192.24	0.40	-4.48	1.73	1475.08	1010.27	425.94	399.41	1667.32	1010.68	421.46	401.13	0	6.85	2.09
0.40	0.01	-0.09	0.06	1010.27	772.76	240.30	1197.28	1010.68	772.78	240.21	1197.34			
-4.48	-0.09	2.97	-0.35	425.94	240.30	476.11	3052.78	421.46	240.21	479.08	3053.13			
1.73	0.06	-0.35	0.53	399.41	1197.28	-3052.78	44346.62	401.13	1197.34	-3053.13	44347.15			

Step 3. The differences among treatments are explored through pre-planned orthogonal contrasts. Contrasts involve linear combinations of group mean vectors instead of linear combinations of the variables. The specific questions to be answered after analyzing it in combined manner are presented in Table 5. The relationships between stocks are determined by studying its contrasts. Before analyzing the specific questions, the orthogonality of contrasts are calculated using the contrast coefficients

presented in Table 6. The contrast coefficients are the weightage that is shared by each factor between the contrast such that the summation of positive and negative weights on each side of contrasts is equal to zero. The relationship between contrasts in the form of hierarchy diagram is presented in Figure 3.

Table 5. Specific question to analyze the stock for selection

Question	How do the stocks differ?
1	Is the mean of performance factors from SENSEX and NIFTY equal to stocks such as DEEPAKFERT, ITDC, JMFINANCIAL, KESORAMINF, MANPASAND, VAKRANGEE and WELCORP?
2	Is the mean of performance factors from KESORAMID, MANPASAND, DEEPAKFERT and WELCORP equal to that of JMFINANCIL, ITDC and VAKRANGEE?
3	Is the mean of performance factors from NIFTY equal to that of SENSEX?
4	Is the mean of performance factors from MANPASAND, WELCORP equal to that of KESORAMIND, DEEPAKFERT?
5	Is the mean of performance factors from ITCD, JMFINANCIL equal to that of VAKRANGEE?
6	Is the mean of performance factors from KESORAMIND equal to that of MANPASAND?
7	Is the mean of performance factors from DEEPAKFERT equal to that of WELCORP?
8	Is the mean of performance factors from JMFINANCIL equal to that of ITCD?

Table 6. Contrast coefficients for specific questions

Contrast	1	2	3	4	5	6	7	8	Ni	Sum of (C ² / Ni)
NSE: DEEPAKFERT	0.14286	0.25	0	-0.5	0	0	1	0	8	0.1666
NSE: ITDC	0.14286	-0.33	0	0	0.5	0	0	-1	8	0.1724
NSE: JMFINANCIL	0.14286	-0.33	0	0	0.5	0	0	1	8	0.1724
NSE: KESORAMIND	0.14286	0.25	0	0.5	0	1	0	0	8	0.1666
NSE: MANPASAND	0.14286	0.25	0	0.5	0	-1	0	0	8	0.1666
NSE: NIFTY	-0.50000	0	1	0	0	0	0	0	8	0.1563
NSE: VAKRANGEE	0.14286	-0.33	0	0	-1	0	0	0	8	0.1412
NSE: WELCORP	0.14286	0.25	0	-0.5	0	0	-1	0	8	0.1666
SENSEX	-0.5	0	-1	0	0	0	0	0	8	0.1563
Sum	0	0.01	0	0	0	0	0	0	72	1.4649

The orthogonality constants are determined by summing the product of contrast coefficients of the corresponding questions to the number of observations for each stock.

The value of orthogonality is presented in Table 7, and it proves that the contrasts are orthogonal as its constants are equal to zero.

Table 6. Determination of contrast constants to check orthogonality

Contrast	1 and 2	2 and 3	3 and 4	4 and 5	5 and 6	6 and 7	7 and 8	1 and 3
Orthogonal Constants	0.00018	0	0	0	0	0	0	0
Inference	Orthogonal							

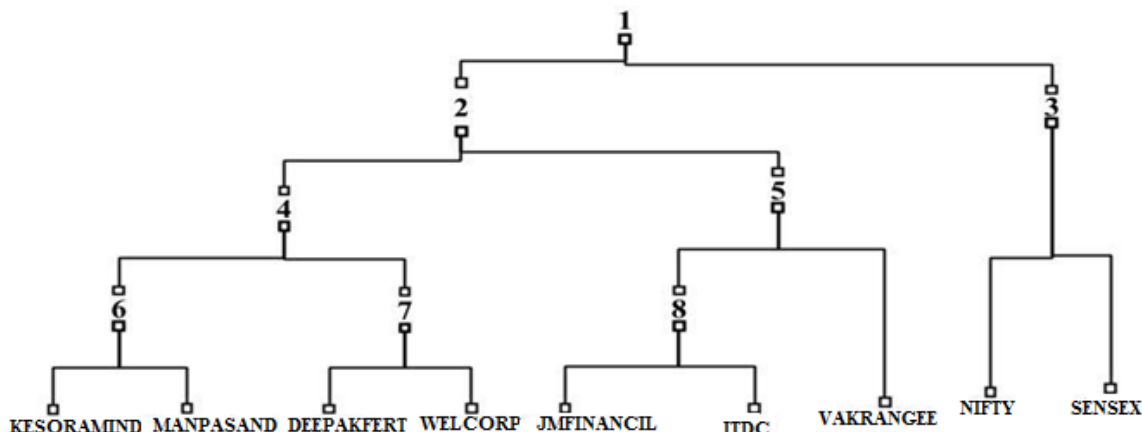


Figure 3. Relationship among stocks for orthogonal contrasts

Step 4. The relationship among stock is explained as follows. Contrast 1 verify the relationship between Indices and stocks, contrast 2 among goods and services stocks, contrast 3 among indices, contrast 4 among metals and chemicals, contrast 5 among information technology and other services, contrast 6 among cement and consumer

goods, contrast 7 among chemicals and metals, contrast 8 among tourism and financial services. The contrasts are validated using formulae 1 to 8 to determine λ , F and p-value for contrasts and are presented in Table 7. The next section presents the results with discussions.

Table 7. Validation of orthogonal contrasts

Factor	Current gap	Last Traded Price	Current Traded Volume(lacs)	P/E	λ	F cal	p value
Contrast 1	-9.65893	-	-3.73691	-1.535	1.19E-13	1.26E+14	0
SE	0.4951818	0.0041286	0.061499	0.025879			
M*SE	1.6126441	0.0134454	0.200281	0.084278			
Low Confidence level	-	-	-3.93719	-1.61928			
High Confidence level	-	-	-3.53663	-1.45072			
Contrast 2	2.0873258	0.5390037	1.051145	-25.0645	8.02E-14	1.87E+14	0

SE	0.46901 04	0.003910 4	0.058248	0.024511			
M*SE	1.52741 23	0.012734 8	0.189695	0.079824			
Low Confidence level	0.55991 35	0.526268 9	0.861449	-25.1443			
High Confidence level	3.61473 8	0.551738 5	1.24084	-24.9847			
Contrast 3	- 3.73012 5	- 1.732264	0.860057	1.79			
SE	0.87341 87	0.007282 1	0.108473	0.045646			
M*SE	2.84443 68	0.023715 4	0.353262	0.148653	5.98E- 12	2.51E+ 12	0
Low Confidence level	- 6.57456 2	- 1.755979	0.506795	1.641347			
High Confidence level	- 0.88568 8	- 1.708548	1.213319	1.938653			
Contrast 4	- 1.86042 8	- 0.933262	0.091678	-12.9231			
SE	0.61760 03	0.005149 2	0.076702	0.032276			
M*SE	2.01132 06	0.016769 4	0.249794	0.105114	5.69E- 13	2.64E+ 13	0
Low Confidence level	- 3.87174 9	- 0.950032	-0.15812	-13.0282			
High Confidence level	0.15089 22	- 0.916493	0.341472	-12.818			
Contrast 5	2.93661 11	2.711962 1	-4.91516	38.62063			
SE	0.75640 27	0.006306 5	0.093941	0.03953			
M*SE	2.46335 46	0.020538 2	0.305934	0.128737	2.29E- 12	6.56E+ 12	0
Low Confidence level	0.47325 65	2.691424	-5.22109	38.49189			
High Confidence level	5.39996 56	2.732500 3	-4.60923	38.74936			
Contrast 6	2.93661 11	2.711962 1	-4.91516	38.62063			
SE	0.87341 87	0.007282 1	0.108473	0.045646			
M*SE	2.84443 68	0.023715 4	0.353262	0.148653	2.29E- 12	6.56E+ 12	0
Low Confidence level	0.09217 42	2.688246 7	-5.26842	38.47197			
High Confidence level	5.78104 79	2.735677 6	-4.5619	38.76928			

Contrast 7	5.36983 91	0.191920 5	3.097008	-13.505	5.98E- 12	2.51E+ 12	0
SE	0.87341 87	0.007282 1	0.108473	0.045646			
M*SE	2.84443 68	0.023715 4	0.353262	0.148653			
Low Confidence level	2.52540 22	0.168205	2.743746	-13.6537			
High Confidence level	8.21427 59	0.215635 9	3.45027	-13.3563			
Contrast 8	-1.53034	- 1.821449	4.820062	-78.8988	5.98E- 12	2.51E+ 12	0
SE	0.87341 87	0.007282 1	0.108473	0.045646			
M*SE	2.84443 68	0.023715 4	0.353262	0.148653			
Low Confidence level	- 4.37477 6	- 1.845165	4.4668	-79.0474			
High Confidence level	1.31409 73	- 1.797734	5.173324	-78.7501			

V. Results and discussion

The results obtained from one way MANOVA analysis presents that there is significant difference between stocks and the mean values are not equal. The profile plot also projects that the stocks vary for all selection factors, and predominantly for P/E ratios. The stock KESORAMIND have low P/E and ITDC have the highest P/E. The validation of contrast based on Lambda (λ) value showed that the questions presented in Table 5 taken as null hypothesis must be rejected as all the contrasts are significant. In addition, the calculated F value is greater than the tabulated F, hence there is difference among the stocks. The confidence levels also discloses the following information based on the following conditions

- If all the confidence intervals cover zero, then no significant difference among stocks will be identified as the variation is due to the combined contribution by variables
- If confidence intervals did not cross zero, and have either fully positive or negative values, then there are significant

differences among elements of the contrasts based on its skewness towards its sign

- If confidence level for few variables crosses zero, then significant difference will be obtained using factors that did not cross zero.
- If all the contrast values are positive or negative, then no significant difference among stocks will be identified as the variation is due to the combined contribution by variables.
- If both negative and positive contrast values are present, the minimum and maximum contributing factors for stock selection could be identified

Based on the above conditions, the contrasts are studied and the inferences are presented in Table 8. It presents that the stocks and indices are not connected, and each contrast are decided by different combination of selection factors. Hence the stocks should be identified and selected based on the higher values of these deciding factors for stocks considered by traders.

Table 8. Consolidation of inferences for contrasts

Question	How do the stocks differ?	As λ nearer to Zero, Answer is	Confidence level		Contrast value			Inferences
			All zero	Cross zero	Only few positive	All negative	Both	
1	Is the mean of performance factors from SENSEX and NIFTY equal to stocks such as DEEPAKFERT, ITDC, JMFINANCIAL, KESORAMINF, MANPASAND, VAKRANGEE and WELCORP?	Not equal	No	No	No	Yes	No	Current gap and Last trade price play vital in variation between indices and stock
	Is the mean of performance factors from KESORAMID, MANPASAND, DEEPAKFERT and WELCORP equal to that of JMFINANCIL, ITDC and VAKRANGEE?	Not equal	No	No	No	No	Yes	Current gap, traded volume and price dominants for goods, chemical and cement industries
3	Is the mean of performance factors from NIFTY equal to that of SENSEX?	Not equal	No	No	No	No	Yes	P/E and traded volume dominantes for NIFTY
4	Is the mean of performance factors from MANPASAND, WELCORP equal to that of KESORAMIND, DEEPAKFERT?	Not equal	No	Yes	No	No	Yes	Traded volume determine the difference among goods and chemicals
5	Is the mean of performance factors from ITCD, JMFINANCIL equal to that of VAKRANGEE?	Not equal	No	Yes	No	No	Yes	P/E determines the difference between services and IT
6	Is the mean of performance factors from KESORAMIND equal to that of MANPASAND?	Not equal	No	No	No	No	Yes	P/E determine the difference between cement and consumer goods
7	Is the mean of performance factors from DEEPAKFERT equal to that of WELCORP?	Not equal	No	No	No	No	Yes	Current gap play vital role in differentiating chemicals with commodity(metal)
8	Is the mean of performance factors from JMFINANCIL equal to that of ITCD?	Not equal	No	Yes	No	No	Yes	Traded volume decides the difference among finance and tourism sectors stock

VI. Conclusion with future research directions

In this paper, the MANOVA analysis is performed to select stocks for intraday trading. The analysis presented the deciding

factors for each sectors, stocks and indices. The analysis considered current gap in stock price, Last traded volume and price, and P/E ratio as the selection factors to obtain the deciding factor for selection. The data

obtained from NSE website is used to perform combined consideration of selection factors using MANOVA analysis. The results are obtained and the inferences are made for each specific question raised by traders before selecting the stocks. The inferences are used as a guideline to for selection to earn profit. However, the study lacks in considering all the factors due to non availability or transparency of direct data in website. Hence the easily available data at near real time is used in this study. Even though the study is performed in microsoft excel using matrix operations, the study did not produce any computational lag, hence the study could be extended for more selection factors and stocks. Further the study need to include the projection of these inferences during the trading period to help traders monitor their trade, and frame a entry and exit trading strategy.

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