

ANALYSIS OF CORRELATION CO-EFFICIENT AND ANALYSIS OF VARIANCE (ANNOVA) OF HUMAN RESOURCE ACCOUNTING REPORTED BY INFOSYS TECHNOLOGIES LTD.

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The success or otherwise of an organization depends on how best the scarce physical resources are utilized by the Human Resource. What is important here is that the physical resource are being activated by the Human Resources as the physical resources cannot act on their own. Therefore, the efficient and effective utilization of inanimate resources depends largely on the quality, calibre, skills, perception and character of the people that is the Human Resource working in it. The term Human Resource at macro level indicates the sum of all the components such as skills, creative abilities, innovative thinking, intuition, imagination, knowledge and experience possessed by all the people. An organization possessed with abundant physical resources may sometimes miserably fail unless it has right people, Human Resources, to manage its affairs. Thus, the importance of Human Resources cannot be ignored. Unfortunately, till new generally accepted system of accounting this important asset, viz., the Human Resource has not been evolved.

Infosys Technologies Ltd. has used Lev and Schwartz model to compute the Value of Human Resource. This evaluation is based on the present value of the future earnings of the employees and on the following assumptions:

1. Employee compensation includes all direct and indirect benefits earned both in India and abroad.
2. The incremental earnings based on group/age have been considered.
3. The future earnings have been discounted at the rate which is the rate of cost of capital for the company. Beta has been assumed at different variation based on average beta for software stocks in the US or in India.

In this context the analysis of variance of Human Resource Accounting reported by Infosys Technologies Ltd. has been evaluated. For this the discounted rate i.e. the rate of cost of capital and beta co-efficient based on software stocks in the US or in India has been selected. Further for evaluation purpose following three basic information has been selected as:

1. Number of Employees
2. Human Resource Value
3. Total Revenue

Discounted Rate and Beta Co-Efficient

In this segment, the details of Human Resource Accounting of Infosys Technologies Ltd. have been taken for the period of 15 years from March 1998 to March 2012. During this period the discounted rate i.e. the rate of cost of capital applied by the company is presented in following Table 1.

Table 1: Discounted Rate (The Rate Of Cost Of Capital) Applied By Infosys Technologies Ltd. From March 1998 to March 2012

Year (March)	Discounted Rate (The Rate of Cost of Capital) Applied by the Co. (%)
1998	26.95
1999	25.32
2000	22.29
2001	21.08
2002	17.17
2003	16.99
2004	14.09
2005	13.63
2006	12.96
2007	14.97
2008	13.32
2009	12.18
2010	10.60
2011	11.21
2012	11.54

During this period of 15 years from March 1998 to March 2012 the Beta co-efficient applied by the company based on software stocks in the US or in India are presented in following Table 2.

Table 2. Beta Co-Efficient Applied By Infosys Technologies Ltd. From March 1998 to March 2012 and the Base of Software Stocks

Year (March)	Beta Co-efficient	Base of Software Stock in Country
1998	1.48	US
1999	1.48	US
2000	1.48	US
2001	1.54	US
2002	1.41	US
2003	1.57	US
2004	1.27	India
2005	0.98	India
2006	0.78	India
2007	0.99	India

Table 2. Beta Co-Efficient Applied By Infosys Technologies Ltd. From March 1998 to March 2012 and the Base of Software Stocks (Contd....)

Year (March)	Beta Co-efficient	Base of Software Stock in Country
2008	0.76	India
2009	0.74	India
2010	0.68	India
2011	0.71	India
2012	0.71	India

Analysis of Correlation Co-Efficient

In this segment, correlation co-efficient has been calculated among details of Human Resource Valuation reported by Infosys Technologies Ltd. For this analysis following three aspects are considered:

1. No. of Employees
2. Human Resource Value
3. Total Revenue

Following Table 3 provides details of No. of Employees, Human Resource Value and Total Revenue of Infosys Technologies Ltd. for the period of fifteen years from March 1998 to March 2012. On that basis correlation co-efficient has been work out.

Table 3. No. Of Employees, Human Resource Value And Total Revenue Of Infosys Technologies Ltd. From March 1998 To March 2012

Year (March)	No. of Employees	Human Resource Value (Rs. In lakhs)	Total Revenue (Rs. In lakhs)
1998	2605	50900.69	26036.57
1999	3766	94569.74	51273.84
2000	5389	223741.8	92146.48
2001	9831	512342	195994
2002	10738	953915	267000
2003	15356	1041703	372230
2004	25634	2113996	497633
2005	36750	2833425	725355
2006	52715	4663700	966000
2007	72241	5745200	1389300
2008	91187	9882100	1669200
2009	104850	10213300	2169300
2010	113796	11328700	2274200
2011	130820	13510500	2750100
2012	149994	12571700	3373400

Correlation co-efficient among (1) Number of Employees, (2) Human Resource Value, and (3) Total Revenue has been calculated with the help of computer and directly quoted in the following TABLE 4. Then after, final correlation co-efficient has been found out.

Table 4. Correlation Co-Efficient Among Selected Variables

Base of Correlation Co-efficient	Correlation Co-efficient
Number of Employees and Human Resource Value	0.989395
Number of Employees and Total Revenue	0.995411
Human Resource Value and Total Revenue	0.976948

Correlation co-efficient between 0.0 to +1.0 shows positive correlation. Here, under all above these three ways of correlation co-efficient are 0.989395, 0.995411 and 0.976948, which shows 98.93%, 99.54%, and 97.69% positive relationship among them. Even though, the simple average of correlation co-efficient is 0.9873. It means there is 98.73% positive relationship among three selected aspects such as (1) Number of Employees, (2) Human Resource Value, and (3) Total Revenue

Analysis of Variance (ANNOVA)

In this segment, one-way classification analysis of variance (ANNOVA) of has been used by considering following two aspects :

1. Human Resource Value per employee over No. of Employees, and
2. Total Revenue over No. of Employee.

Following Table 5 provides basis for calculation of analysis of variance. On that basis analysis of variance (ANNOVA) has been work out. The steps for calculation of analysis of variance have been presented in Annexure 1.

Table 5. Calculation of Analysis of Variance (ANNOVA)

Year (March)	Human Resource Value per Employee	Total Revenue per Employee	Total of Human Resource Value per Employee and Total Revenue per Employee	Square of Human Resource Value per Employee	Square of Total Revenue per Employee	Square of Total of Human Resource Value per Employee and Total Revenue per Employee
			(2 + 3)	(2) ²	(3) ²	(4) ²
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1998	19.53961	9.994845	29.53446	381.796448	99.8969172	872.2841
1999	25.11146	13.61493	38.72639	630.585178	185.366417	1499.733
2000	41.51824	17.09899	58.61724	1723.76432	292.375604	3435.98
2001	52.11494	19.93632	72.05127	2715.96723	397.45701	5191.385
2002	88.83544	24.86497	113.7004	7891.73615	618.266511	12927.78
2003	67.83687	24.24004	92.07691	4601.84115	587.579368	8478.157

Table 5. Calculation of Analysis of Variance (ANNOVA) (Contd....)

Year (March)	Human Resource Value per Employee	Total Revenue per Employee	Total of Human Resource Value per Employee and Total Revenue per Employee	Square of Human Resource Value per Employee	Square of Total Revenue per Employee	Square of Total of Human Resource Value per Employee and Total Revenue per Employee
			(2 + 3)	(2) ²	(3) ²	(4) ²
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2004	82.46844	19.41301	101.8814	6801.04365	376.864808	10379.83
2005	77.1	19.73755	96.83755	5944.41	389.57092	9377.511
2006	88.47007	18.32495	106.795	7826.95416	335.803974	11405.18
2007	79.52825	19.23146	98.75971	6324.74187	369.849106	9753.48
2008	108.3718	18.30524	126.677	11744.4486	335.081844	16047.07
2009	97.40868	20.68956	118.0982	9488.45076	428.057749	13947.19
2010	99.55271	19.98489	119.5376	9910.74174	399.395638	14289.24
2011	103.2755	21.02201	124.2975	10665.8275	441.925114	15449.87
2012	83.81469	22.49023	106.3049	7024.90158	505.810578	11300.74
Total	1114.947	288.949	1403.896	93677.2103	5763.30156	144355.4

Analysis of Variance (ANNOVA)

Null Hypothesis

There is no significant difference in the “Human Resource Value over No. of Employees” and “Total Revenue over No. of Employees”.

Variance Ratio (F)

$$\begin{aligned}
 \text{Calculated Value} &= M. S. C. / M. S. E. \\
 &= 22742.4066 / 785.761931 \\
 &= 28.9431261
 \end{aligned}$$

INTERPRETATION

From the above Analysis of Variance, it can be observed that the Critical Value (Tabulated Value) of F for $v_1 = 1$ and $v_2 = 14$ at 5% level of significance is 4.60 and the Calculated Value of F is 28.9431261. The calculation steps have been presented in Annexure 1. The Calculated Value of F (28.9431261) is much high than the Critical (Tabulated) Value (4.60) at 5% level with degree of freedom. This analysis do not supports the null hypothesis of no significant difference in sample means. Therefore the difference in the “Human Resource Value over No. of Employee” and “Total Revenue over No. of Employee” is significant. Furthermore, “Human Resource Value over No. of Employee” is higher [almost 6.291984 times (28.9431261 / 4.60)] as compared to “Total Revenue over No. of Employee”. Hence, Null Hypothesis will not be accepted and it can be concluded that there is no significant

difference between “Human Resource Value over No. of Employee” and “Total Revenue over No. of Employee”.

CONCLUSION

After considering the correlation co-efficient and analysis of variance (ANNOVA) of information regarding Human Resource Accounting reported by Infosys Technologies Ltd. during the period of fifteen years from March 1998 to March 2012 for “Human Resource Value over No. of Employees” and “Total Revenue over No. of Employees”, it can be concluded that there is no significant difference between “Human Resource Value over No. of Employee” and “Total Revenue over No. of Employee”. It means there is significant relationship between Human Resource Value per employee and Total Revenue per employee. It means there is direct relationship between them.

Annexure 1

Analysis of Variance (ANNOVA) of Human Resource Accounting Reported By Infosys Technologies Ltd

The computation steps of analysis of variance work out is made as under:

STEP 1: NULL HYPOTHESIS

There is no significant difference in the “Human Resource Value over No. of Employees” and “Total Revenue over No. of Employees”.

STEP 2: SUM OF VALUES

$$T = \sum x_1 + \sum x_2 \dots + \sum x_{15}$$

$$T = 1403.896$$

STEP 3: CORRECTION FACTOR / CO-EFFICIENT OF FACTOR

$$\begin{aligned} \text{Correction Factor / Co-efficient of Factor} &= (T)^2 / n \\ &= (1403.896)^2 / 30 \\ &= 65697.4382 \end{aligned}$$

(Here, n = total no. of variable in raw and column)

STEP 4: TOTAL SUM OF SQUARES

S. S. T. =	Total of Square of Human Resource Value over No. of Employee	+	Total of Square of Total Revenue over No. of Employee	-	Correction Factor
S. S. T. =	93677.21	+	5763.30156	-	65697.4382
S. S. T. =	33743.07				

STEP 5: SUM OF SQUARES BETWEEN SAMPLES

S. S. C. =	(	Square of Total of Human Resource Value over No. of Employees	+	Square of Total of Total Revenue over No. of Employees	)	÷	15 (years)	-	Correction factor
S. S. C. =	[	(1114.947) ²	+	(288.949002) ²	]	÷	15	-	65697.4382
S. S. C. =	[	2285.415	+	83385.27	]	÷	15	-	65697.4382
S. S. C. =		22742.41							

STEP 6: SUM OF SQUARES WITHIN SAMPLES

S. S. E. =	S. S. T.	-	S. S. C
S. S. E. =	33743.07	-	22742.41
S. S. E. =	11000.67		

STEP 7: ANALYSIS OF VARIANCE

Table A-1.1: Analysis of Variance (ANNOVA) (One-Way) of Infosys Technologies Ltd.

Source	Sum of Squares	Degree of Freedom	Mean of Squares	Variance Ratio (F) Calculated Value	Variance Ratio (F) Table Value (5% Level of Significance)
			(2 / 3)		
(1)	(2)	(3)	(4)	(5)	(6)
S. S. C.	22742.41	(2 - 1) = 1	22742.4066	28.9431261	F(1,14) 4.60
S. S. E.	11000.67	(15 - 1) = 14	785.761931		
S. S. T.	33743.07	1 + 14 = 15	-----		

STEP 8 : VARIANCE RATIO (F)

$$\begin{aligned} \text{Variance Ratio (F) (Calculated Value)} &= \text{M. S. C. / M. S. E.} \\ &= 22742.4066 / 785.761931 \\ &= 28.9431261 \end{aligned}$$

Annexure 2

Abstract of Human Resource Accounting Details of Infosys Technologies Ltd

The Human Resource Accounting reported by Infosys Technologies Ltd. For the period for the period of fifteen years from March 1998 to March 2012 have been presented as under:

Table A-2.1: Abstract of Human Resource Accounting Details of Infosys Technologies Ltd. (Part – 1)

(Rs. Lakhs)

Particulars	Mar 1998	Mar 1999	Mar 2000	Mar 2001	Mar 2002	Mar 2003	Mar 2004	Mar 2005
Cost of Capital (%)	26.95	25.32	22.29	21.08	17.17	16.99	14.09	13.63
Beta Co-efficient	1.48	1.48	1.48	1.54	1.41	1.57	1.27	0.98
No. of Employees :								
Production	1755	2854	4292	7641	9405	14001	23855	34747
support-(all)	850	912	1097	2190	1333	1355	1779	2003
Total No. of Employees	2605	3766	5389	9831	10738	15356	25634	36750
Value of Human Resources of Employees :								
Production	39731.09	76984.25	196513.84	440653	866299	971798	1960778	2655012
Support-(all)	11169.6	17585.49	27227.93	71689	87616	69905	153218	178413
Total Value of Human Resources	50900.69	94569.74	223741.77	512342	953915	1041703	2113996	2833425
Total Revenue	26036.57	51273.84	92146.48	195994	267000	372230	497633	725355
Software Revenue	25765.73	50889.12	88232.37	190057	260359	362269	485295	712965
Employee Cost	9372.65	16605.64	33455.91	71778	111787	167712	245096	353911
Value-Added	18579.12	37411.49	72330.7	156317	223907	304325	418496	605285
Not Profits Excluding Extraordinary Income	6036.33	13291.54	28594.86	62332	80796	95793	124363	184648
Ratios :								
Ratio of Total Revenue/Human Resources Value	0.511517034	0.542180194	0.411842992	0.382545253	0.279899152	0.357328336	0.23539922	0.25599936
Ratio of Total Software Revenue/Human Resources Value	0.506196085	0.538112085	0.39434912	0.37095729	0.272937316	0.34776611	0.22956288	0.25162657
Ratio of Value Added/Human Resources Value	0.365007233	0.395596837	0.323277589	0.305102841	0.234724268	0.29214181	0.19796442	0.21362309
Value of Human Resource per employee	19.53961228	25.11145512	41.51823529	52.11494253	88.83544422	67.83687158	82.4684404	77.1
Percentage of Employee Cost / Human Resources Value (%)	18.41360107	17.55914736	14.95291201	14.00978253	11.71875901	16.09979044	11.5939671	12.4905724
Percentage of Return on Human Resources Value (%)	11.85903374	14.05474944	12.78029578	12.16609218	8.469937049	9.19580725	5.88283989	6.5167774

Table A-2.2: Abstract of Human Resource Accounting Details of Infosys Technologies Ltd. (Part – 2)

(Rs. Lakhs)

Particulars	Mar 2006	Mar 2007	Mar 2008	Mar 2009	Mar 2010	Mar 2011	Mar 2012
Cost of Capital (%)	12.96	14.97	13.32	12.18	10.6	11.21	11.54
Beta Co-efficient	0.78	0.99	0.76	0.74	0.68	0.71	0.71
No. of Employees :							
Production	49495	68156	85013	97349	106864	123811	141788
support- (all)	3220	4085	6174	7501	6932	7009	8206
Total No. of Employees	52715	72241	91187	104850	113796	130820	149994
Value of Human Resources of Employees :							
Production	4333600	5359200	9233100	9560000	10617300	12253900	11590000
Support- (all)	330100	386000	649000	653300	711400	1256600	981700
Total Value of Human Resources	4663700	5745200	9882100	10213300	11328700	13510500	12571700
Total Revenue	966000	1389300	1669200	2169300	2274200	2750100	3373400
Software Revenue	902800	1314900	1564800	2026400	2114000	2538500	3125400
Employee Cost	480100	711200	887800	1140500	1209300	1485600	1834000
Value-Added	802700	1189700	1482000	1907300	2093500	2503100	3096000
Not Profits Excluding Extraordinary Income	247900	386100	465900	598800	621900	682300	831600
Ratios :							
Ratio of Total Revenue/Human Resources Value	0.20713168	0.2418193	0.16891147	0.212399518	0.20074678	0.20355279	0.26833284
Ratio of Total Software Revenue/Human Resources Value	0.1935802	0.2288693	0.15834691	0.198407958	0.1866057	0.1878909	0.248606
Ratio of Value Added/Human Resources Value	0.17211656	0.2070772	0.14996812	0.186746693	0.18479614	0.18527072	0.24626741
Value of Human Resource per employee	88.4700749	79.528246	108.371807	97.40867907	99.5527084	103.275493	83.8146859
Percentage of Employee Cost / Human Resources Value (%)	10.2944014	12.379029	8.98392042	11.1668119	10.6746582	10.9958921	14.5883214
Percentage of Return on Human Resources Value (%)	5.31552201	6.7203927	4.71458496	5.862943417	5.48959722	5.05014618	6.61485718

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