Chapter VI

Analysis & Findings

6.0 Introduction

In the earlier chapter, we discussed the Research Methodology and the research process in detail. We also discussed about the choice of research methods, the reasons behind choosing Factor Analysis and Multiple Regression Analysis for this research study. We also discussed the theory behind these techniques, the thumb rules for interpreting and taking important decisions for further research processes. With this backdrop of understanding of the research processes, we would look at the actual data analysis done, the results and the interpretations behind those findings at different stages of analysis in this chapter. This chapter is divided into five key sections; Exploratory Factor Analysis Findings, Multiple Regression Modeling, Analysis of non - metric variables, Summary of the Findings and Conclusion of the chapter.

Section 6.1 discusses exploratory factor analysis and findings. Factors are identified to have a hidden thread that underlies and connects all the variables, grouped and they accordingly are named suitably. Section 6.2 talks about the analysis of Multiple Regression with the factors obtained from Factor Analysis and the unique variables against each of the 4 metric dependent variables chosen. The regression outputs are discussed and the formulation and testing of the hypothesis are explained. Section 6.3 converses about the results of observations from the non-metric variables that explain organizational capabilities of the sample organizations chosen. Section 6.4 talks about other additional findings from the analyses. Section 6.5 discusses the development of the conceptual model of Organizational Intelligence Measurement Scale from 8 different factors and 2 unique variables derived from Exploratory Factor Analysis. Section 6.6 discusses the conceptual model of OI-OP Linkage obtained from Multiple Regression Analysis. Section 6.7 concludes the chapter.

Part I

6.1 Exploratory Factor Analysis

6.1.1 Objectives and Variable Selection for Factor Analysis

Here the purpose of the Factor Analysis technique is to condense the information contained in a number of original variables into a smaller set of new, composite dimensions, i.e., into variants with a minimum loss of information. Factor Analysis technique defines the original constructs that underlie the original variables. SPSS version 16.0 was used for Factor Analysis.

Factor Analysis identifies the structure of a set of variables as well as provides a process for data reduction. Obtaining a factor solution through Factor Analysis (principal components analysis) is an iterative process that usually requires repeating the SPSS Factor Analysis procedure a number of times to reach a satisfactory solution.

Out the objective in the Factor Analysis is to understand whether these variables can be grouped. The formation of factors will reduce the 26 variables to a limit for Multiple Regression Analysis further.

Initially we had 40 variables collected represented by the questions on business (Appendix 4). Out of the there are 26 metric variables and 12 dummy variables. These 40 variables got grouped into 8 different factors. Factor 1 consisted of 6 variables. Factor 2 consisted of 2 variables. Factor 3 consisted of 2 variables. Factor 4 consisted of 3 variables. Factor 5 consisted of 3 variables. Factor 6 consisted of 2 variables. Factor 7 consisted of 3 variables. Factor 8 consisted of 3 variables. There were 2 unique variables and 14 nominal variables. 'Age' and 'total experience' are additional variables representing the maturity level of respondents, making the total number of variables 42. Perceptions of the respondents who were very young and less experienced in their family businesses will largely impact the data, as the questions were designed to target veteran business owners. Most of the respondents in this case were young and less experienced; however they had sufficient interaction with and were mentored by the business owners. These respondents were in the process of taking over their businesses. Keeping this fact in mind, we decided to include age and total work experience of the respondents as variables in the entire analysis, as these factors might affect the results someway or the other. Table 6.1 lists the names of variables and their abbreviations used in factor analysis. Each set of variables are suitably named to represent a single aspect of the organization for making Multiple Regression Analysis meaningful. The names are listed below each group in 6.1.

Table 6.1 - List of Factors representing OI

(Independent variables representing OI- Organizational Intelligence)

Names of Variables and Factors	***Abbreviations***
Ability to have awareness on stakeholder needs	*A_S_N*
Ability to encourage innovation	*E_Inn*
Capacity to utilize performance management systems effectively	*Pfr_M_S*
Having improvement on cycle time of operating systems	*ICTOS*
Having high business process efficiency	*Bus_P_Ef*
Having highly efficient quality management systems	*Eff_Q_M*
Organizational Value Orientation Index	***Factor I***
Age	*Age*
Total experience	*ttl_exp*
Maturity Index	***Factor II***
Capacity to operate on customer-oriented competition analysis reports	*CO_CA*

Capacity to utilize customer and market valuation analysis	*C_M_Val*
Organizational Competitiveness Index	***Factor III***
Ability to encourage organizational learning	*E_O_L*
Ability to Apply the learning	*A_L*
Capacity to share profit among all employees	*Pft_Sh*
Organizational Wisdom Index	***Factor IV***
Business continuity capacity	*Bus_Cnt*
Ability to know the trade-off between organizational goal and stakeholder Benefits	*t_og_s_b*
Having a stable information technology network	*S_I_T_N*
Information And Knowledge Deployment Index	***Factor V***
Ability to provide schemes on employee welfare	*Wlf_Emp*
Capacity to use information effectively	*Ef_U_Inf*
Infrastructural Standards Index	***Factor VI***
Ability to incorporate societal sensitiveness in the system	*Em_Intel*
Ability to focus on high level of stakeholder satisfaction	*Stk_Stis*
Capacity to have effective workflow systems	*W_F_Sys*
Systems Effectiveness Index	***Factor VII***
Ability to incorporate technology and innovation in planning	*T_I_Plg*
Ability to deploy new technology for business process planning	*N_T_B_P*
Ability to have periodic up-gradation of quality management processes	*PU_QPMS*
Process Efficiency Index	***Factor VIII***

Table 6.2 - List of Unique Variables

(Representing OI - Organizational Intelligence)

Unique Variables (not included as a part of any of the Factors)	***Abbreviations***
Ability of incorporating information in strategic planning	*Inf_S_Pg*
Proficiency of Planning Index	***Unique Var 1***
Ability of tracking the progress of action plans	*AT_Prg*
Proficiency of Execution Index	***Unique Var 2***

There are 5 dependent variables totally, and out of them 4 are metric and 1 is non-metric. The non-metric variables are denoted with a prefix of 'Dm_'. Other variables are metric, mostly derived from the ordinal scale. This table also indicates the grouping along with the names of the groups. Table 6.2 represents unique variables that are not part of any of these factors from table 6.1. Table 6.3 represents the list of dependent variables. Table 6.4 represents list of independent variables.

Table 6.3 - List of Dependent Variables

(Representing Financial Performance)

Potential Dependent Variables (*4 metric and 1 non-metric****)***	***Abbreviations***
Financial returns	*Fin_Rts*
Market share growth	*Mkt_Sh_g*
Business valuation	***Dm***_*Bus_Val*
Profit growth	*Pft_Grw*
Business expansion	*Bus_Exp*

Table 6.4 - List of Dummy Variables

(Independent Variables analyzed in Groups)

Dummy Variables Removed from Factor Analysis	***Abbreviations***
Strategic planning efficiency	***Dm***_*D_S_P_F*
Ability to build and manage knowledge assets	***Dm***_*B&M_K_A*
Capacity to manage customer expectations	***Dm***_*C_E_Mgt*
Ability to have decentralized decision making systems	***Dm***_*DC_MK*
Having effective career planning systems	***Dm***_*C_P_Sys*
Having strategic cost management in business processes	***Dm***_*S_C_M_BP*
Having variability reduction in business processes	***Dm***_*VR_BP*
Having high process performance	***Dm***_*Pr_Pfr*
Having standardized quality metrics for production / delivery processes	***Dm***_*S_Q_M_PP*
Presence of quality metrics along the value chain	***Dm***_*QM_VC*
Continuous monitoring of quality	***Dm***_*C_M_Q*

The variables listed in Tables 6.1, 6.2 and 6.4 represent OI (Organizational Intelligence). The variables represented by table 6.3 represent Financial Performance. We have chosen consciously the Financial Performance Terms to represent OP (Organizational Performance) for variable measurement conveniences. However, this choice is from the literature.

6.1.2 Factor Analysis Design

Understanding the structure and perceptions of the variables requires R-type factor analysis and a correlation matrix between variables. These variables that are getting grouped in the factor analysis are metric and constitute a homogeneous set of perceptions appropriate for factor analysis.

The number of valid cases for this set of variables is 115. The preferred minimum sample size requirement of 100 valid cases, which in our case, is satisfied. While principal component analysis can be conducted on a sample that has fewer than 100 cases, but more than 50 cases, we should be vigilant about its interpretation.

The ratio of cases to variables in a principal component analysis should be at 5 to 1. With 115 observations and 26 variables, the ratio of cases to variables is 4.12 to 1, which just falls short of the requirement for the ratio of cases to variables. So, it is important to be cautious while interpreting the results of the factor analysis.

6.1.3 Assuming the Appropriateness of Factor Analysis

The underlying statistical assumptions influence factor analysis to the extent that they affect the derived correlations. Departure from normality, homoscedasticity, and linearity can diminish correlations between variables.

A visual examination of the correlations is the first step to ensure that the assumptions are met. Because factor analysis will always derive factors, the objective is to ensure a base level of statistical correlation within the set of variables, such that the resulting factor structure has some objective basis.

To assess the overall significance of the correlation matrix we take the help of the Bartlett's test and to assess the factorability of the overall set of variables we use the measures of sampling adequacy. In our case, both of the values are sufficiently high, ensuring the adherence to the assumptions required to be fulfilled. Table 6.5 represents the sampling adequacy and sphericity of this case.

Table 6.5 - Results of the Test for Sampling Adequacy

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.732
Bartlett's Test of Sphericity	***Approx. Chi-Square***	856.306
	Df (degrees of freedom)	325
	Sig. (significance)	.000

The set of variables included in the analysis satisfied the suitable criterion for principal component analysis, after removing two variables from the analysis, because of a low MSA Principal Component analysis requires that there be some correlations greater than 0.30 between the variables included in the analysis.

For the set of variables under our consideration, there are several correlations in the matrix greater than 0.30, satisfying this requirement. The MSA Principal Component Analysis (Table 6.6 given in the next page) reveals the correlations above 0.5 and those variables with correlations below 0.5 are removed.

Table 6.6 – Communalities

Communalities		
Variables	***Initial***	***Extraction***
Age	1.000	.857
Total experience	1.000	.864
E_O_L	1.000	.554
A_S_N	1.000	.596
A_L	1.000	.608
E_Inn	1.000	.556
Em_Intel	1.000	.647
Stk_Stis	1.000	.714
Wlf_Emp	1.000	.688
Bus_Cnt	1.000	.604
Pft_Sh	1.000	.577
CO_CA	1.000	.682
C_M_Val	1.000	.775
T_I_Plg	1.000	.534
t_og_s_b	1.000	.648
Ef_U_Inf	1.000	.612
S_I_T_N	1.000	.678
W_F_Sys	1.000	.600
Pfr_M_S	1.000	.548
ICTOS	1.000	.617
Bus_P_Ef	1.000	.673
N_T_B_P	1.000	.670
Eff_Q_M	1.000	.560
PU_QPMS	1.000	.638

As mentioned earlier, factor analysis procedures are based on the initial computation of a complete table of intercorrelations among the variables. The matrix is then transformed through estimation of a factor model to obtain a factor matrix containing factor loadings for each variable, as given in Table – 6.9. These factor loadings of each variable are then interpreted to identify the underlying structure of the variables, in this case perceptions of organizational intelligence.

After removing Inf_S_Pg and AT_Prg, which had Extraction Values of 0.450 and 0.474, the Communalities of the rest of the variables are given below. It is to be noted that there is no variable with an Extraction Value less than 0.50, as per the required conditions. Even the Measures of Sampling Adequacy (MSA) generates values greater than 0.50 for all the variables considered for the study.

In addition, the overall MSA (Table – 6.5) for the set of variables included in the analysis was 0.732, which exceeds the minimum requirement of 0.50 for overall MSA. The eleven variables in the analysis satisfy this criterion for appropriateness of factor analysis.

Principal component analysis requires that the probability associated with Bartlett's Test of Sphericity be less than the level of significance. The Bartlett's Test of Sphericity is a statistical test for overall significance of all correlations within a correlation matrix. The probability associated with the Bartlett test is $p<0.001$, which satisfies this requirement.

The variables now included in the analysis satisfy the screening criteria for the appropriateness of factor analysis. The next step is to determine the number of factors that should be included in the factor solution.

Once we remove the variables, which have a low individual MSA, the next adjustment that we make to the factor solution is to examine the communalities (Table – 6.6). The communalities represent the proportion of the variance for each of the variables included in the analysis that is explained or accounted for by the components in the factor solution. The derived components should explain at least half of each original variable's variance, so the communality value for each variable should be 0.50 or higher.

If one or more variables have a value for communality that is less than 0.50, the variable with the lowest communality should be excluded and the principal component analysis should be computed again.

While other variables in the analysis also had communalities lower than 0.50, Inf_S_Pg and AT_Prg were selected for removal because it had the lowest communality. In this case we followed the sequence of removal of the lowest followed by the next lowest.

Once we get all variables which have an Extraction Value greater than 0.50, we look at Total Variance Explained (Table – 6. 7). Latent root criterion (same as eigenvalues – represents the amount of variance accounted for by a factor) helps us understand the number of factors generated in the factor analysis.

Though eigenvalues of all possible factors are provided, we should consider only those factors where eigenvalues (as given in Table – 6. 7) are greater than 1.0. Thus only 8 factors got generated.

If the percentage of variance explained is less than 60%, we should attach a note of caution to our solution, since using the components as substitutes for the variables may not be all that useful. If the first component contains ordinal variables, or if the proportion of total variance explained is less than 60%, a caution is added to the true answer.

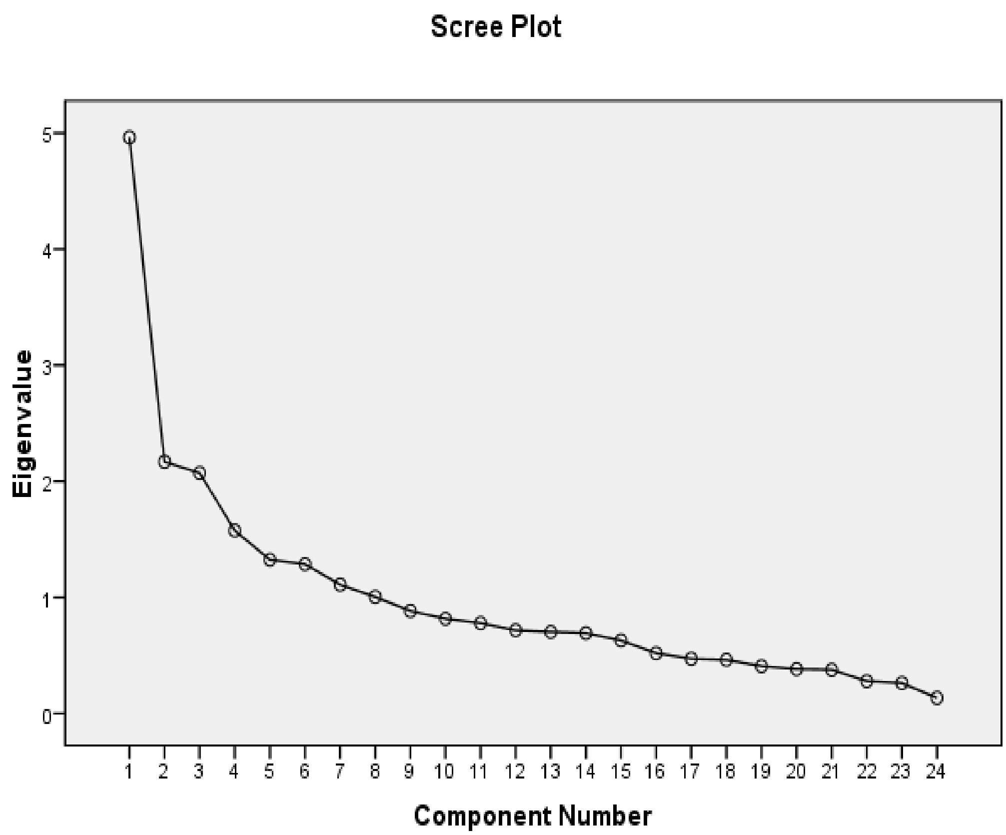
The cumulative proportion of variance criteria would require 8 components to satisfy the criterion of explaining 60% or more of the total variance in the original set of variables. In our case, we have 8-component solution, which explains 64.58% of the total variance.

Table 6.7 - Total Variance Explained

Com-Pone--nt	Initial Eigen values			Extraction Sums of Squa Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumu--lative %	Total	% of Variance	Cumu--lative %	Total	% of Variance	Cumu--lative %
1	4.963	20.679	20.679	4.963	20.679	20.679	3.017	12.572	12.572
2	2.168	9.034	29.713	2.168	9.034	29.713	2.172	9.052	21.624
3	2.071	8.629	38.342	2.071	8.629	38.342	2.145	8.937	30.561
4	1.574	6.560	44.902	1.574	6.560	44.902	2.141	8.919	39.480
5	1.324	5.517	50.418	1.324	5.517	50.418	1.611	6.714	46.194
6	1.286	5.360	55.778	1.286	5.360	55.778	1.581	6.589	52.782
7	1.109	4.620	60.398	1.109	4.620	60.398	1.419	5.914	58.697
8	1.004	4.183	64.581	1.004	4.183	64.581	1.412	5.884	64.581
9	.883	3.679	68.260						
10	.816	3.398	71.658						

The Figure 6.1 represents the Scree Plot. We know that only those factors are considered which have an eigenvalue greater than 1. Hence, in the Scree Plot we draw a line parallel to the horizontal axis through eigenvalue = 1. This intersects at 8, which gives us the number of factors generated. This is in accordance of the previous analysis as generated in Table – 6.7.

Figure 6.1 - Scree Plot



Lastly, we have the Rotated Factor Loadings, based on VARIMAX method. The rotated factor loadings involving the variables are converted to relative loadings by dividing the factor loading of the variable (within a factor) with the sum of the factor loadings of all the variables within the factor considered. As a result, the factor loadings of all the variables considered in Factor 1, for example, will sum up to 1, and so on. This is given in Table – 6.8. These relative factor loadings are used to represent the factors, which in turn represent the variables they represent.

Table 6.8 - Rotated Component Matrix

(Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.**)**

	Rotated Component Ma							
	1	2	3	4	5	6	7	8
A_S_N	0.528							
E_Inn	0.597							
Pfr_M_S	0.582							
ICTOS	0.653							
Bus_P_Ef	0.649							
Eff_Q_M	0.672							
Age		0.920						
Total exp- -erience		0.913						
CO_CA			0.763					
C_M_Val			0.856					
E_O_L				0.614				
A_L				0.718				
Pft_Sh				0.533				
Bus_Cnt					0.544			
t_og_s_b					0.771			
S_I_T_N					-0.463			
Wlf_Emp						0.792		
Ef_U_Inf						0.617		
Em_Intel							0.768	
Stk_Stis							0.415	
W_F_Sys							0.547	
T_I_Plg								0.383
N_T_B_P								0.768
PU_QPMS								0.505

This leaves us with 8 factors and 2 independent variables, which were initially removed as they had MSA and Extraction values less than 0.50. The next part of the analysis is the Regression results.

With 8 factors to be analyzed, we now turn to the interpretation of the factors. In our case, as the unrotated factor matrix did not have a completely clean set of factor loadings (i.e., had substantial cross-loadings of each variable on one factor), a rotational technique is applied to hopefully improve the interpretation.

In our case, we used the VARIMAX rotation and its impact on the overall factor solution and the factor loading are described in Table – 6.9.

Table 6.9 - Rotated Factor Loadings

Variables	*Rotated Factor Loading*	*Relative Rotated Factor Loading*
A_S_N	0.528483	0.143498
E_Inn	0.597143	0.162141
Pfr_M_S	0.582499	0.158165
ICTOS	0.652821	0.177259
Bus_P_Ef	0.649491	0.176355
Eff_Q_M	0.672426	0.182582
FACTOR 1		
Age	0.919506	0.501795
Total_exp	0.912929	0.498205
FACTOR 2		
CO_CA	0.763328	0.471381
C_M_Val	0.856015	0.528619
FACTOR 3		
E_O_L	0.613556	0.329021
A_L	0.718339	0.385211
Pft_Sh	0.532898	0.285768
FACTOR 4		
Bus_Cnt	0.544414	0.638528
t_og_s_b	0.77096	0.904237
S_I_T_N	-0.462766	-0.54276
FACTOR 5		
Wlf_Emp	0.791611	0.561938
Ef_U_Inf	0.617105	0.438062
FACTOR 6		
Em_Intel	0.76836	0.444049

Stk_Stis	0.415258	0.239985
W_F_Sys	0.546733	0.315966
FACTOR 7		
T_I_Plg	0.383016	0.231245
N_T_B_P	0.767861	0.463595
PU_QPMS	0.505444	0.305161
FACTOR 8		

We find that the first factor accounts for 21% of the variance, as given in Table – 6.7. All the other factors account within the range of 4 and 9 percent totaling to 64.58%.

These 8 factors along with the 2 unique variables represent OI. OI can be considered to have 10 different components as a whole. Thus,

Factor I = A_S_N x 0.143498 + E_Inn x 0.162141 + Pfr_M_S x 0.158165 + ICTOS x 0.177259 + Bus_P_Ef x 0.176355 + Eff_Q_M x 0.182582

Factor II = Age x 0.501795 + Total_exp x 0.498205

Factor III = CO_CA x 0.471381 + C_M_Val x 0.528619

Factor IV = E_O_L x 0.329021 + A_L x 0.385211 + Pft_Sh x 0.285768

Factor V = Bus_Cnt x 0.638528 + t_og_s_b x 0.904237 + S_I_T_N x -0.54276

Factor VI = Wlf_Emp x 0.561938 + Ef_U_Inf x 0.438062

Factor VII = Em_Intel x 0.444049 + Stk_Stis x 0.239985 + W_F_Sys x 0.315966

Factor VIII = T_I_Plg x 0.231245 + N_T_B_P x 0.463595 + PU_QPMS x 0.305161

All these components contribute to OI along with the 2unique variables.

6.1.4 Naming the Factors

Factor – I includes variables *Ability to have awareness on stakeholder needs, Ability to encourage innovation, Capacity to utilize performance management systems effectively, Having improvement on cycle time of operating systems, Having high business process efficiency, and Having highly efficient quality management system.* These parameters drive awareness on stakeholder needs, leadership efficiency, and encouragement towards innovation, performance creating systems, and improvement in the efficiency of operating systems, business process and quality efficiency. All these variables essentially capture the basic interest of the organization, which is oriented towards creating and delivering value in all it's intensely thought and planned activities. Hence, this factor is named ***Organizational Value Orientation Index.***

Factor – II includes variables namely *Age and Work Experience*. The variables together indicate the level of maturity of respondents representing their organizations and their knowledge in their business to respond to intriguing questions. Hence, this factor is named ***Maturity Index.***

Factor – III comprises of variables *Capacity to operate on customer-oriented competition analysis reports and Capacity to utilize customer and market valuation analysis that* collectively denote the capacity of the organization to collect data on competitors, customers, markets and best practices and formulate and deploy competitive strategies accordingly. Competitiveness of the organization gets visible from these variables. This factor can be termed as ***Organizational Competitiveness Index.***

Factor – IV includes issues related to *capability and interest of organization to support and share profits with employees via services, benefits and policies*. It also discusses interest of leaders in *encouraging and being accountable and responsible for organizational learning and incorporates values in business processes*. It includes interest of leaders to incorporate the findings of the employee performance into practice. The three aspects of this factor indicate interest of *leaders in being accountable for putting employee performance results in learning and sharing profits* with employees, implying the three dimensions of leadership – employee benefits. It indicates the wisdom and spiritual responsiveness of the leaders towards employees. This factor can be termed as ***Organizational Wisdom Index.***

Factor – V includes variables, *Ability to provide schemes on employee welfare, and Capacity to use information effectively;* these variables measure capacity of organization to ensure business continuity for the benefit of employees and customers, ability of organization to strike a balance between the goals of organization and stakeholder benefits and competency of organization to ensure the knowledge and information infrastructure secured is stable and user friendly. The basic thread between these varied interests of the organization is to use information infrastructure effectively to benefit stakeholders and maintain business continuity, implying the criticality of information and knowledge infrastructure stability. These parameters indicate the interest of the organization *to Deploy Knowledge and Information Resources* for the benefit of stakeholders and manage crisis for business continuity at difficult and uncertain situations. This factor may be termed as ***Information and Knowledge Deployment Index.***

Factor – VI includes variables that measure *interest of organization to protect health, safety and security of its employees (such as, health schemes, checkups, safety measure trainings and good ergonomic arrangements) for productivity and competency of organization to ensure the quality, availability and accessibility of information for stakeholders*. There is an underlying thread between the two implications of these questions; they are, employee care, and availability of precise information to employees to increase productivity. As a whole, these variables indicate the interest of an organization to have stable and standardized internal and information infrastructural standards for increasing productivity of employees. This factor can be termed around the motivation of the organization to establish high standards for *ergonomic & safe Infrastructure along with stable information infrastructure – i.e.,* ***Infrastructural Standards Index.***

Factor – VII consists of variables such as, *Ability to incorporate societal sensitiveness in the system, Ability to focus on high level of stakeholder satisfaction, and Capacity to have effective workflow systems.* These variables reveal the hidden thread behind the interest of the leaders to stay proactive in sensing the opinions and concerns of employees and society about its products and services and dynamic in understanding the presence of processes and scales to measure and determine the satisfaction and dissatisfaction of customers and employees and the cordial relationship between them. It indicates the ability of the organization to realize and insist on sustainable and effective work flow systems. Thus, these three variables together imply the presence of efficient work-flow systems to measure apprehensions and satisfaction of employees and stakeholders and optimal maintenance of those systems. This factor can be termed as ***Systems Effectiveness Index.***

Factor – VIII includes variables *Ability to incorporate technology and innovation in planning, Ability to deploy new technology for business process planning, and Ability to have periodic up-gradation of quality management processes* - that measure capability of organization to incorporate new technology and innovations and periodic up-gradation of quality management programs. Incorporation of innovations, new technology and periodic up-gradation would tend to alter the efficiency of the business processes being followed in an organization largely. Organizations that have these three abilities have innate strength to correct their processes quickly and adapt the changes and innovations to maintain and to improvise the efficiency in spite of the changes faced. Thus this factor can be termed as ***Process Efficiency Index.***

The answers to why organizations would want to have the abilities (variables) that got churned out by factor analysis would give us insights to locate the hidden threads that connect the grouped variables. These hidden values behind these eight groups are now indicated by the names of these factors.

It is important now to build a model to measure OI with the above mentioned 8 factors and the 2 unique variables. We would leave those variables that got removed from the factor analysis as they had low Communality and MSA Values for the design of OI Instrument. Hence, our complete list of independent variables for Multiple Regression Analysis is as follows:

(i) *Factor – I:* *Organizational Value Orientation Index*
(ii) *Factor – II:* *Maturity Index*
(iii) *Factor – III:* *Organizational Competitiveness Index*
(iv) *Factor – IV:* *Organizational Wisdom Index*
(v) *Factor – V:* *Information and Knowledge Deployment Index*
(vi) *Factor – VI:* *Infrastructural Standards Index*

(vii) Factor – VII: Systems Effectiveness Index

(viii) Factor – VIII: Process Efficiency Index

(ix) Unique Variable1: Inf_S_Pg - Ability of incorporating information in strategic planning - the hidden value in this variable is proficiency in planning and it can be denoted now on as Proficiency in Planning Index

(x) Unique Variable2: AT_Prg - Ability of tracking the progress – this represents proficiency in execution of the plans and it can be denoted as Proficiency in execution Index

Each of the above discussed factors can be measured with 8 factors constructed with the variables as listed below with the coefficients represented by the rotated factor loadings (Table 6.9). These 8 factors along with the 2 unique variables represent OI. Hence, OI can be considered to be constructed by 10 different components as a whole. The Equations of those 10 components are;

i) **Organizational Value Orientation Index** = A_S_N x 0.143498 + E_Inn x 0.162141 + Pfr_M_S x 0.158165 + ICTOS x 0.177259 + Bus_P_Ef x 0.176355 + Eff_Q_M x 0.182582

ii) **Maturity Index** = Age x 0.501795 + Total_exp x 0.498205

iii) **Organizational competitiveness Index** = CO_CA x 0.471381 + C_M_Val x 0.528619

iv) **Organizational Wisdom Index** = E_O_L x 0.329021 + A_L x 0.385211 + Pft_Sh x 0.285768

v) **Information and Knowledge Deployment Index** = Bus_Cnt x 0.638528 + t_og_s_b x 0.904237 + S_I_T_N x (-0.54276)

vi) **Infrastructural Standards Index** = Wlf_Emp x 0.561938 + Ef_U_Inf x 0.438062

vii) **Systems Effectiveness Index** = Em_Intel x 0.444049 + Stk_Stis x 0.239985 + W_F_Sys x 0.315966

viii) **Process Efficiency Index** = T_I_Plg x 0.231245 + N_T_B_P x 0.463595 + PU_QPMS x 0.305161

ix) **Proficiency in Planning Index** = Inf_S_Pg x 1.0

x) **Proficiency in Execution Index** = AT_Prg x 1.0

OI can be measured by measuring these 10 independent variables and substituting the variables in a Multiple Regression Model that determines the Relationship between all or some of these 10 components with the 5 dependent variables that represent OP.

Part II

6.2 Multiple Regression Analysis

As given in Table – 6.3, we have 5 variables to measure organizational performance. Exploratory Factor Analysis created 8 factors and 2 unique independent variables, which implies 10 independent variables (Table 6.1 and Table 6.2). There are two ways to analyze further the relationship between these 10 variables with the dependent ones; they are, Multivariate Analysis of Variance (MANOVA) or Multiple Regression taking one dependent variable at a time. Multiple Regressions are run with the software for all the 4 dependent variables except Business valuation as it is a non metric variable. We choose Multiple Regression over MANOVA or Multiple Discriminant Analysis as we have 4 metric dependent variables and the linear equations are compared for best predictability. Discriminant analysis is appropriate for research problems that have categorical non metric dependent variables for study. MANOVA uses single dependent metric variables and non metric independent variables for analysis. From Exploratory Factor Analysis we collected 10 independent variables grouped from metric independent variables. Therefore we choose Multiple Regression Analysis as the suitable analytical technique for this research problem.

6.2.1 Regression Analysis of Dependent Variables

Before we come to the interpretation of the regression results, it is important to explain the terms given in the regression outputs. We have used E-Views 5 for generating regression output. Using matrix notation, the standard regression may be written as: $Y = X\beta + \xi$; where Y is a T-dimensional vector containing observations on the dependent variable, X is a $T \times k$ matrix of independent variables, β is a k-vector of coefficients, and ξ is a T-vector of disturbances. T is the number of observations and k is the number of right-hand side regressors.

A typical regression output in E-Views looks as given below; Table 6.10 lists the date and time at which the regression is done; number of samples; assumptions such as White heteroscedasticity and consistent standard errors and covariance.

Table 6.10 - Regression Output – (sample to explain the terms in the table)

Dependent Variable: FIN_RTS (represents Y in the model Equation)				
***Method**: Least Squares (Ordinary Least squares Method is used for Analysis)*				
***Date:** 03/16/09* ***Time:** 15:13*				
***Sample**: 1 (First set) 115 (Total Number of samples Taken for Analysis)*				
***Included observations**: 115 (All observations are Included)*				
White Heteroscedasticity-Consistent Standard Errors & Covariance (Assumptions taken into consideration)				
Variable	***Coefficient***	***Std. Error***	***t-Statistic***	***Prob.***
X_1	0.431833	0.106640	4.049451	0.0001
X_2	0.000765	0.001086	0.704572	0.4827
X_3	-0.077211	0.069013	-1.118783	0.2658
X_4	0.048216	0.087716	0.549686	0.5837
X_5	-0.188878	0.044135	-4.279575	0.0000
X_6	0.270535	0.081410	3.323119	0.0012
X_7	0.180137	0.070412	2.558313	0.0120
X_8	-0.014688	0.068594	-0.214128	0.8309
X_9	0.007582	0.072472	0.104614	0.9169
X_{10}	0.078347	0.053951	1.452182	0.1495
C	0.563344	0.435046	1.294907	0.1982
R-squared	0.488204	***Mean dependent var***		2.643478
Adjusted R-squared	0.438993	***S.D. dependent var***		0.938376
S.E. of regression	0.702848	***Akaike info criterion***		2.223410
Sum squared resid	51.37544	***Schwarz criterion***		2.485968
Log likelihood	-116.8461	***F-statistic***		9.920586
Durbin-Watson sta	2.006621	***Prob(F-statistic)***		0.000000

The Model Equation is, $Y = \alpha + \beta_1 \times X_1 + \beta_2 \times X_2 + \beta_3 \times X_3 + \beta_4 \times X_4 + \beta_5 \times X_5 + \beta_6 \times X_6 + \beta_7 \times X_7 + \beta_8 \times X_8 + \beta_9 \times X_9 + \beta_{10} \times X_{10} + \xi;$

This Model is depicted by the Regression Output as shown in the Table 6.10. The terms in this table are explained below. However for our case, the overall Model fit is measured with 'The R-squared (R^2)'. The accuracy of the Model is determined by Standard error of the estimate. The resulted values of the Coefficients are explained by *regression coefficients*.

***Regression Coefficients**:* The column labeled "Coefficient" depicts the estimated coefficients. The least squares regression coefficients *b* are computed by the standard OLS (Ordinary Least Square) formula:

$$b = \left(X'X\right)^{-1} X'Y$$

If the equation is specified by list, the coefficients will be labeled in the "Variable" column with the name of the corresponding regressor. If the equation is specified by formula, EViews lists the actual coefficients, C(1), C(2), etc.

For the simple linear models considered here, the coefficient measures the marginal contribution of the independent variable to the dependent variable, holding all other variables fixed. If present, the coefficient of the C is the constant or intercept in the regression. It is the base level of the prediction when all of the other independent variables are zero. The other coefficients are interpreted as the slope of the relation between the corresponding independent variable and the dependent variable, assuming all other variables do not change.

***Standard Errors**:* The "Std. Error" column reports the estimated standard errors of the coefficient estimates. The standard errors measure the statistical reliability of the coefficient estimates – the larger the standard errors, the more statistical noise in the estimates. If the errors are normally distributed, there are about 2 chances in 3 that the true regression coefficient lies within one standard error of the reported coefficient, and 95 chances out of 100 that it lies within two standard errors.

The covariance matrix of the estimated coefficients is computed as:

$$\text{var}(b) = s^2 (X'X)^{-1}; \quad s^2 = \hat{\xi}'\hat{\xi} \big/ (T - k) \quad \hat{\xi} = Y - Xb$$

Where $\hat{\xi}$ is the residual. The standard errors of the estimated coefficients are the square roots of the diagonal elements of the coefficient covariance matrix.

t-Statistics: The t-statistic, which is computed as the ratio of an estimated coefficient to its standard error, is used to test the hypothesis that a coefficient is equal to zero. To interpret the t-statistic, you should examine the probability of observing the t-statistic given that the coefficient is equal to zero. This probability computation is described below. In cases where normality can only hold asymptotically, EViews will report a z-statistic instead of a t-statistic.

Probability: The last column of the output shows the probability of drawing a t-statistic (or a z-statistic) as extreme as the one actually observed, under the assumption that the errors are normally distributed, or that the estimated coefficients are asymptotically normally distributed.

This probability is also known as the *p-value* or the *marginal significance level*. Given a *p-value*, one can tell at a glance whether to reject or accept the hypothesis that the true coefficient is zero against a two-sided alternative that it differs from zero. For example, if one is performing the test at the 5% significance level, a *p-value* lower than 0.05 is taken as evidence to reject the null hypothesis of a zero coefficient. If one wants to conduct a one-sided test, the appropriate probability is one-half that reported by EViews.

For the above example output, the hypothesis that the coefficient on FACTOR_7 is zero is rejected at the 5% significance level but not at the 1% level. However, if theory suggests that the coefficient on TB3 cannot be positive, then a one-sided test will reject the zero null hypothesis at the 1% level.

The ***p-values*** are computed from a t-distribution with degrees of freedom.
Summary Statistics:

(i) ***R-squared:*** The R-squared (R^2) statistic measures the success of the regression in predicting the values of the dependent variable within the sample. In standard settings, R^2 may be interpreted as the fraction of the variance of the dependent variable explained by the independent variables. The statistic will equal one if the regression fits perfectly, and zero if it fits no better than the simple mean of the dependent variable. It can be negative for a number of reasons. For example,

if the regression does not have an intercept or constant, if the regression contains coefficient restrictions, or if the estimation method is two-stage least squares or ARCH.

EViews computes the (centered) R2 as:

$$R^2 = 1 - \frac{\hat{\xi}'\hat{\xi}}{\left(Y - \overline{Y}\right)'\left(Y - \overline{Y}\right)}; \qquad \overline{y} = \sum_{t=1}^{T} Y_t \big/ T$$

Where $\overline{Y}$ is the mean of the dependent (left-hand) variable.

(ii) ***Adjusted R-squared:*** One problem with using R^2 as a measure of goodness of fit is that the R^2 will never decrease when more regressors are added. In the extreme case, one can always obtain an R^2 of one if one includes as many independent regressors as there are sample observations.

The adjusted R^2, commonly denoted as $\overline{R}^2$, penalizes the R^2 for the addition of regressors which do not contribute to the explanatory power of the model. The adjusted R^2 is computed as:

$$\overline{R}^2 = 1 - (1 - R^2)\frac{T-1}{T-k}$$

The $\overline{R}^2$ is never larger than the R^2, can decrease as you add regressors, and for poorly fitting models, may be negative.

Standard Error of Regression (S.E. of regression): The standard error of regression is a summary measure based on the estimated variance of the residuals. The standard error of the regression is computed as:

$$s = \sqrt{\frac{\hat{\xi}'\hat{\xi}}{T-k}}$$

This is a measure of accuracy of the model predictions. It is the square root of the sum of the squared errors divided by the degrees of freedom. It represents an estimate of the standard deviation of the actual dependent values around the regression line; (i.e.), it is a measure of variation around the regression line. The standard error of the regression can be viewed as the standard deviation of the prediction errors and thus becomes a measure to assess the absolute size of the prediction error (Neter et al, 1996)[354].

***Sum-of-Squared Residuals**:* The sum-of-squared residuals can be used in a variety of statistical calculations, and is presented separately:

$$\hat{\xi}'\hat{\xi} = \sum_{t=1}^{T}\left(Y_i - X_i^{'}b\right)^2$$

Log Likelihood: EViews reports the value of the log likelihood function (assuming normally distributed errors) evaluated at the estimated values of the coefficients. Likelihood ratio tests may be conducted by looking at the difference between the log likelihood values of the restricted and unrestricted versions of an equation.

The log likelihood is computed as:

$$l = -\frac{T}{2}\left(1 + \log(2\pi) + \log\left(\hat{\xi}'\hat{\xi}/T\right)\right)$$

When comparing EViews output to that reported from other sources, note that EViews does not ignore constant terms.

***Durbin-Watson Statistic**:* The Durbin-Watson statistic measures the serial correlation in the residuals. The statistic is computed as:

$$DW = \sum_{t=2}^{T}\left(\hat{\xi}_t - \hat{\xi}_{t-1}\right)^2 \Big/ \sum_{t=1}^{T}\hat{\xi}_t^2$$

Johnston and DiNardo (1997, Table D.5) can be referred to for a table of the significance points of the distribution of the Durbin-Watson statistic.

As a rule of thumb, if the DW is less than 2, there is evidence of positive serial correlation. The DW statistic in our output is very close to one, indicating the presence of serial correlation in the residuals. Serial Correlation Theory can be referred to for a more extensive discussion of the Durbin-Watson statistic and the consequences of serially correlated residuals.

[354] Neter et al., Applied Linear regression models, 3ed Ed, Homewood, IL:Irwin, 1996

There are better tests for serial correlation. In Testing for Serial Correlation, we discuss the Q-statistic, and the Breusch-Godfrey LM test, both of which provide a more general testing framework than the Durbin-Watson test. The Durbin-Watson test is not applicable in our case as our data is a cross section data, which is usually free from serial correlation, as there is no time dimension.

***Mean and Standard Deviation (S.D.) of the Dependent Variable*:** The mean and standard deviation of are computed using the standard formulae:

$$\bar{Y} = \sum_{t=1}^{T} Y_t \Big/ T; \qquad s_Y = \sqrt{\sum_{t=1}^{T} \left(Y_t - \bar{Y}\right)^2 / (T-1)}$$

Akaike Information Criterion*:* The Akaike Information Criterion (AIC) is computed as:

$$AIC = -2l / T + 2k / T$$

The AIC is often used in model selection for non-nested alternatives-smaller values of the AIC are preferred. For example, you can choose the length of a log distribution by choosing the specification with the lowest value of the AIC.

Schwarz Criterion*:* The Schwarz Criterion (SC) is an alternative to the AIC that imposes a larger penalty for additional coefficients:

$$SC = -2l / T + (k \log T) / T$$

F-Statistic*:* The F-statistic reported in the regression output is from a test of the hypothesis that all of the slope coefficients (excluding the constant, or intercept) in a regression are zero. For ordinary least squares models, the F-statistic is computed as:

$$F = \frac{R^2 / (k-1)}{(1 - R^2) / (T - k)}$$

Under the null hypothesis with normally distributed errors, this statistic has an F-distribution with k – 1 numerator degrees of freedom and T – k denominator degrees of freedom.

The p-value given just below the F-statistic of the output, denoted as Prob(F-statistic), is the marginal significance level of the F-test. If the p-value is less than the significance level you are testing, say 0.05, you reject the null hypothesis that all slope coefficients are equal to zero. For the example above, the p-value is essentially zero, so we reject the null hypothesis that all of the regression coefficients are zero. Note that the F-test is a joint test such that even if all the t-statistics are insignificant, the F-statistic can be highly significant.

Heteroscedasticity and Autocorrelation Consistent Covariances (HAC): When the form of heteroscedasticity is not known, it may not be possible to obtain efficient estimates of the parameters using weighted least squares. OLS provides consistent parameter estimates in the presence of heteroscedasticity, but the usual OLS standard errors will be incorrect and should not be used for inference. Before we describe the techniques for HAC covariance estimation, we must note that, Using the White heteroscedasticity consistent or the Newey-West consistent covariance estimates does not change the point estimates of the parameters, but only the estimated standard errors. There is nothing to keep one from combining various methods of accounting for heteroscedasticity and serial correlation. For example, weighted least squares estimation might be accompanied by White or Newey-West covariance matrix estimates.

Heteroscedasticity Consistent Covariances (White): White's heteroscedasticity consistent covariance matrix estimator which provides correct estimates of the coefficient Covariances in the presence of heteroscedasticity of unknown form. The White covariance matrix is given by:

$$\hat{\Sigma}_W = \frac{T}{T-k}(X'X)^{-1}\left(\sum_{t=1}^{T} U_t^2 x_t x_t'\right)(X'X)^{-1}$$

Where, T is the number of observations, k is the number of regressors, and U_t is the least squares residual.

EViews estimates equation and computes the variances using White's covariance estimator. One can always tell when EViews is using White Covariances, since the output display will include a line. So, in this way, our multiple regression takes care of Multicollinearity problem by using factor analysis on the independent variables, and heteroscedasticity by using White's Test.

6.2.2 Analysis and Hypotheses

Based on the above analysis we can now present the hypotheses used in the multiple regression in detail. Let is assume that the regression model is as follows.

$Y = \alpha + \beta_1\times$ AT_PRG + $\beta_2\times$ INF_S_PG + $\beta_3\times$FACTOR_1 + $\beta_4\times$FACTOR_2 + $\beta_5\times$FACTOR_3 + $\beta_6\times$FACTOR_4 + $\beta_7\times$FACTOR_5 + $\beta_8\times$FACTOR_6 + $\beta_9\times$FACTOR_7 + $\beta_{10}\times$FACTOR_8 $+\xi$; where, 'ξ' – Error Term & 'α' – Constant term ---------- Equation 6.1

Let us now consider the Regression output 1 given in Table 6.11.

Table 6.11 - Regression Output 1

Dependent Variable: FIN_RTS (Y)				
Method: Least Squares				
Date: 03/16/09 Time: 15:13				
Sample: 1 115				
Included observations: 115				
White Heteroscedasticity-Consistent Standard Errors & Covariance				
Variable	***Coefficient***	***Std. Error***	***t-Statistic***	***Prob.***
FACTOR_1	0.431833	0.106640	4.049451	0.0001
FACTOR_2	0.000765	0.001086	0.704572	0.4827
FACTOR_3	-0.077211	0.069013	-1.118783	0.2658
FACTOR_4	0.048216	0.087716	0.549686	0.5837
FACTOR_5	-0.188878	0.044135	-4.279575	0.0000
FACTOR_6	0.270535	0.081410	3.323119	0.0012
FACTOR_7	0.180137	0.070412	2.558313	0.0120
FACTOR_8	-0.014688	0.068594	-0.214128	0.8309
AT_PRG	0.007582	0.072472	0.104614	0.9169
INF_S_PG	0.078347	0.053951	1.452182	0.1495
C	0.563344	0.435046	1.294907	0.1982
R-squared	0.488204	*Mean dependent var*		2.643478
Adjusted R-squ	0.438993	*S.D. dependent var*		0.938376
S.E. of regressio	0.702848	*Akaike info criterion*		2.223410
Sum squared re	51.37544	*Schwarz criterion*		2.485968
Log likelihood	-116.8461	*F-statistic*		9.920586
Durbin-Watson	2.006621	*Prob(F-statistic)*		0.000000

In the output above, Y is FIN_RTS, X consists of 11 variables C, FACTOR_1, FACTOR_2,…, FACTOR_8, AT_PRG and INF_S_PG, where T = 115 and k = 11. The equation 6.1 can be written as below for better clarity while defining Hypotheses.

$Y = \alpha + \beta_1 \times$ *Ability to Track Progress of action Plans* $+ \beta_2 \times$ *Ability of Incorporating Information in Strategic Planning* $+ \beta_3 \times$ *Organizational Value Orientation* $+ \beta_4 \times$ *Maturity* $+ \beta_5 \times$ *Organizational Competitiveness* $+ \beta_6 \times$ *Organizational Wisdom* $+ \beta_7 \times$ *Information and Knowledge management* $+ \beta_8 \times$ *Infrastructural Standards* $+ \beta_9 \times$ *Systems Effectiveness* $+ \beta_{10} \times$ *Process efficiency* $+ \xi$; where, 'ξ' – Error Term & 'α' – Constant term -------------------- *Equation 6.2*

***Hypothesis 1*:** The Null Hypothesis can be stated as AT_PRG (unique variable 2 - Proficiency in Execution Index) , i.e., *Ability of Tracking the Progress* has no influence on Financial Returns vis-à-vis *Ability of Tracking the Progress* influences Financial Returns. It can be mathematically represented as follows:

$$H_{01} : \beta_1 = 0$$
$$H_{11} : \beta_1 \neq 0$$

From the regression output given in Table 6.11, it is evident (p-value > 0.05) that the null hypothesis is accepted. This indicates β value becoming zero in the Model equation 6.2. This proves that the variable '*Ability of Tracking the Progress of Action plans*' does not affect financial returns.

Hypothesis 2*:* The Null Hypothesis can be stated as INF_S_PG (unique variable 1 – Proficiency in Planning Index) , i.e., *Ability of Incorporating Information in Strategic Planning* has no influence on Financial Returns vis-à-vis A*bility of Incorporating Information in Strategic Planning* influences Financial Returns. It can be mathematically represented as follows:

$$H_{02} : \beta_2 = 0$$
$$H_{12} : \beta_2 \neq 0$$

From regression output given in Table 6.11, it is evident (p-value > 0.05) that the null hypothesis 2 is accepted. This indicates β value becoming zero in the Model equation 6.2. This proves that the variable '*Ability of Incorporating Information in Strategic Planning*' does not influence financial returns.

***Hypothesis* 3:** The Null Hypothesis can be stated as FACTOR_1, i.e., *Organizational Value Orientation* Index has no influence on Financial Returns vis-à-vis *Organizational Value Orientation* Influences influences Financial Returns. It can be mathematically represented as follows:

$H_{03} : \beta_3 = 0$

$H_{13} : \beta_3 \neq 0$

From regression output given in Table 6.11, it is evident (p-value < 0.05) that the null hypothesis is rejected. This indicates β value not becoming zero in the Model equation 6.2. This proves that the variable '*Organizational Value Orientation index*'influences financial returns.

***Hypothesis* 4:** The Null Hypothesis can be stated as FACTOR_2, i.e., *Maturity Index* has no influence on Financial Returns vis-à-vis *Maturity Index* influences Financial Returns. It can be mathematically represented as follows:

$H_{04} : \beta_4 = 0$

$H_{14} : \beta_4 \neq 0$

From regression output given in Table 6.11, it is evident (p-value > 0.05) that the null hypothesis is accepted. This indicates β value becoming zero in the Model equation 6.2. This proves that the variable '*Maturity Index*' does not influence financial returns.

***Hypothesis* 5:** The Null Hypothesis can be stated as FACTOR_3, i.e., *Organizational Competitiveness Index has no influence on Financial Returns vis-à-vis Organizational Competitiveness Index* influences Financial Returns. It can be mathematically represented as follows:

$H_{05} : \beta_5 = 0$

$H_{15} : \beta_5 \neq 0$

From regression output given in Table 6.11, it is evident (p-value > 0.05) that the null hypothesis is accepted. This indicates β value becoming zero in the Model equation 6.2. This proves that the variable '*Organizational Competitiveness Index*' does not influence financial returns.

***Hypothesis 6*:** The Null Hypothesis can be stated as FACTOR_4, i.e., *Organizational Wisdom Index* has no influence on Financial Returns vis-à-vis *Organizational Wisdom Index* influences Financial Returns. It can be mathematically represented as follows:

$H_{06} : \beta_6 = 0$

$H_{16} : \beta_6 \neq 0$

From regression output given in Table 6.11, it is evident (p-value > 0.05) that the null hypothesis is accepted. This indicates β value becoming zero in the Model equation 6.2. This proves that the variable *'Organizational Wisdom Index '* does not influence financial returns.

***Hypothesis 7*:** The Null Hypothesis can be stated as FACTOR_5, i.e., *Information and Knowledge Deployment Index* has no influence on Financial Returns vis-à-vis *Information and Knowledge Deployment Index* influences Financial Returns. It can be mathematically represented as follows:

$H_{07} : \beta_7 = 0$

$H_{17} : \beta_7 \neq 0$

From regression output given in Table 6.11, it is evident (p-value < 0.05) that the null hypothesis is rejected. This indicates β value not becoming zero in the Model equation 6.2. This proves that the variable *'Information and Knowledge Deploymen Index t'* ability influences financial returns.

***Hypothesis** 8:* The Null Hypothesis can be stated as FACTOR_6, i.e., *Infrastructural Standards Index* has no influence on Financial Returns vis-à-vis *Infrastructural Standards Index* influences Financial Returns. It can be mathematically represented as follows:

$H_{08} : \beta_8 = 0$

$H_{18} : \beta_8 \neq 0$

From regression output given in Table 6.11, it is evident (p-value < 0.05) that the null hypothesis is rejected. This indicates β value not becoming zero in the Model equation 6.2. This proves that the variable *'Infrastructural Standards Index* 'influences financial returns.

Hypothesis 9: The Null Hypothesis can be stated as FACTOR_7, i.e., *Systems Effectiveness Index* has no influence on Financial Returns vis-à-vis *Systems Effectiveness Index* influences Financial Returns. It can be mathematically represented as follows:

$$H_{09} : \beta_9 = 0$$
$$H_{19} : \beta_9 \neq 0$$

From regression output given in Table 6.11, it is evident (p-value < 0.05) that the null hypothesis is rejected. This indicates β value not becoming zero in the Model equation 6.2. This proves that the variable *'Systems Effectiveness Index s'* influences financial returns.

Hypothesis 10: The Null Hypothesis can be stated as FACTOR_8, i.e., *Process Efficiency Index* has no influence on Financial Returns vis-à-vis *Process Efficiency Index* influences Financial Returns. It can be mathematically represented as follows:

$$H_{010} : \beta_{10} = 0$$
$$H_{110} : \beta_{10} \neq 0$$

From regression output given in Table 6.11, it is evident (p-value > 0.05) that the null hypothesis is accepted. This indicates β value becoming zero in the Model equation 6.2. This proves that the variable *'Process Efficiency Index'* does not influence financial returns.

Summing up all of the above hypotheses, the Model Equation reduces to,

$Y = \alpha + \beta_3 \times$FACTOR_1 + $\beta_7 \times$FACTOR_5 + $\beta_8 \times$FACTOR_6 + $\beta_9 \times$FACTOR_7 + ξ;
where, 'ξ' – Error Term & 'α' – Constant term. --------- Equation 6.3

The same equation can be written as below for better clarity while defining Hypotheses.

$Y = \alpha + \beta_3 \times$ *Organizational Value Orientation Index* + $\beta_7 \times$ *Information and Knowledge Deployment Index* + $\beta_8 \times$ *Infrastructural Standards Index* + $\beta_9 \times$ *Systems Effectiveness Index* + ξ; where, 'ξ' – Error Term & 'α' – Constant term. ----------Equation 6.4

Substituting β_3, β_7, β_8 and β_9 from the regression output given in Table 6.10 in equation 6.4, *Y = (0.563344) + (0.4318833) × Organizational Value Orientation Index + (-0.188878) × Information and Knowledge Deployment Index + (0.270535) × Infrastructural Standards Index + (0.180137) × Systems Effectiveness Index +ξ;* where, 'ξ' – Error Term & 'α' – Constant term --------- *Equation 6.5*.

From Equation 6.5, we can understand that Information Knowledge Deployment Index affect Financial Returns negatively, where in, Organizational Value Orientation, Infrastructural Standards and Systems Effectiveness affect financial returns positively.

Next, let us consider *Market Share Growth* (MKT_SH_G) as the dependent variable and the 10 variables (8 factors and 2 variables) as mentioned above as independent. The output is as given in table 6.12.

Table 6.12 - Regression Output 2

Dependent Variable: MKT_SH_G (Y)				
Method: Least Squares				
Date: 03/16/09 Time: 18:06				
Sample: 1 115				
Included observations: 115				
White Heteroscedasticity-Consistent Standard Errors & Covariance				
Variable	***Coefficient***	***Std. Error***	***t-Statistic***	***Prob.***
AT_PRG	-0.030584	0.110424	-0.276967	0.7824
INF_S_PG	0.031450	0.080519	0.390588	0.6969
FACTOR_1	0.400534	0.183950	2.177412	0.0317
FACTOR_2	0.007390	0.001917	3.854257	0.0002
FACTOR_3	-0.061262	0.083162	-0.736660	0.4630
FACTOR_4	0.038966	0.145579	0.267664	0.7895
FACTOR_5	0.008046	0.074775	0.107609	0.9145
FACTOR_6	0.029256	0.109091	0.268180	0.7891
FACTOR_7	0.056575	0.102220	0.553464	0.5811
FACTOR_8	0.090447	0.103191	0.876497	0.3828
C	1.999860	0.871131	2.295707	0.0237
R-squared	0.202605	*Mean dependent var*		4.243478
Adjusted R-squ	0.125932	*S.D. dependent var*		1.151592
S.E. of regressio	1.076641	*Akaike info criterion*		3.076333
Sum squared re	120.5523	*Schwarz criterion*		3.338891
Log likelihood	-165.8891	*F-statistic*		2.642470
Durbin-Watson	1.796441	*Prob(F-statistic)*		0.006546

It is to be noted that the R^2 is very low (0.2026). Only two variables namely FACTOR_1 and FACTOR_2 have a significant impact. This is because both these two factors have a p-value less than 0.05. However, all the other variables/factors appear to be insignificant.

Let us assume that the regression model is as follows:

$Y = \alpha + \beta_3 \times$FACTOR_1 + $\beta_4 \times$FACTOR_2 + ξ; where, 'ξ' – Error Term & 'α' – Constant term. ----------- Equation 6.6

The same equation can be written as below for better clarity while defining Hypotheses.

$Y = \alpha + \beta_3 \times$ *Organizational Value Orientation Index* + $\beta_4 \times$ *Maturity Index* + ξ; *where* 'ξ' – Error Term and 'α' – Constant term ------------- Equation 6.7

Let us consider null Hypotheses that get rejected and not those that get accepted. There are 2 factors that affect market share growth. They are organizational value Orientation and Maturity of the Respondents.

Thus the Hypotheses are,

Hypothesis 11**:** The Null Hypothesis can be stated as FACTOR_1, i.e., *Organizational Value Orientation Index* has no influence on Market Share Growth vis-à-vis *Organizational Value Orientation Index* influences Market Share Growth. It can be mathematically represented as follows:

$$H_{03} : \beta_3 = 0$$
$$H_{13} : \beta_3 \neq 0$$

From regression output given in Table 6.12, it is evident (p-value < 0.05) that the null hypothesis is rejected. This indicates β value not becoming zero in the Model equation 6.2. This proves that the variable '*Organizational Value Orientation Index*' influences Market Share Growth.

Hypothesis 12**:** The Null Hypothesis can be stated as FACTOR_2, i.e., *Maturity Index* has no influence on Market Share Growth vis-à-vis *Maturity Index* influences Market Share Growth. It can be mathematically represented as follows:

$H_{04} : \beta_4 = 0$
$H_{14} : \beta_4 \neq 0$

From regression output given in Table 6.12, it is evident (p-value < 0.05) that the null hypothesis is rejected. This indicates β value not becoming zero in the Model equation 6.2. This proves that the variable *'Maturity Index'* influences Market Share Growth. Summing up hypotheses 11 and 12, the Model Equation reduces to,

$Y = \alpha + \beta_3 \times$FACTOR_1 + $\beta_4 \times$FACTOR_2 + ξ; where, 'ξ' – Error Term & 'α' – Constant term. --------- Equation 6. 8

The same equation can be written as below for better clarity while defining Hypotheses.

$Y = \alpha + \beta_3 \times$ *Organizational Value Orientation Index* + $\beta_4 \times$ *Maturity Index* + ξ; where, 'ξ' – Error Term & 'α' – Constant term. ---------Equation 6.9

Substituting β_3 and β_4 from the regression output given in Table 6.11 in equation 6.9,

Y = *(1.999860) + (0.400534)* $\times$ *Organizational Value Orientation Index + (0.007390)* $\times$ *Maturity Index* + ξ; where, 'ξ' – Error Term & 'α' – Constant term.
--------- *Equation 6.10*

From Equation 6.10, we can understand that Organizational value Orientation and Maturity of Respondents affect Market Share Growth positively. Maturity Index indicates only the age and total experience of respondents and not any capability of the organization. It can be excluded from the Equation.

Y = *(1.999860) + (0.400534)* $\times$ *Organizational Value Orientation Index* + ξ; Where, 'ξ' – Error Term & 'α' – Constant term --------- *Equation 6.11*

Next we consider *Profit Growth* (PFT_GRW) as the dependent variables and the same variables as independent as before.

The output is as given in table 6.13.

Table 6.13 - Regression Output 3

Dependent Variable: PFT_GRW (Y)				
Method: Least Squares				
Date: 03/16/09 Time: 18:18				
Sample: 1 115				
Included observations: 115				
White Heteroscedasticity-Consistent Standard Errors & Covariance				
Variable	***Coefficient***	***Std. Error***	***t-Statistic***	***Prob.***
AT_PRG	-0.046504	0.138611	-0.335503	0.7379
INF_S_PG	0.068649	0.092899	0.738965	0.4616
FACTOR_1	0.397745	0.179195	2.219617	0.0286
FACTOR_2	0.000402	0.001759	0.228828	0.8195
FACTOR_3	-0.160450	0.087002	-1.844215	0.0680
FACTOR_4	-0.013879	0.150539	-0.092198	0.9267
FACTOR_5	-0.099440	0.077926	-1.276079	0.2048
FACTOR_6	-0.091664	0.110544	-0.829215	0.4089
FACTOR_7	0.299019	0.110579	2.704119	0.0080
FACTOR_8	-0.005375	0.103766	-0.051797	0.9588
C	2.570295	0.836169	3.073894	0.0027
R-squared	0.159652	*Mean dependent var*		3.686957
Adjusted R-squared	0.078849	*S.D. dependent var*		1.165026
S.E. of regression	1.118152	*Akaike info criterion*		3.151995
Sum squared resid	130.0274	*Schwarz criterion*		3.414553
Log likelihood	-170.2397	*F-statistic*		1.975823
Durbin-Watson stat	1.697352	*Prob(F-statistic)*		0.043298

In this regression, it is to be noted that there are 2 variables which has a p-value less then 0.05 and they are, FACTOR_1 and FACTOR_7. FACTOR_2, which was significant in the previous regression, is no longer significant in this regression. Moreover, the R^2, fell from 0.202 to 0.159 in this regression, depicting that Profit Growth is a weaker dependent variable as compared to Market Share Growth.

In the next regression we consider business expectation (BUS_EXP) as the dependent variable and continue with the same set of independent variables. The output is as given in table 6.14.

Table 6.14 - Regression Output 4

Dependent Variable: BUS_EXP (Y)				
Method: Least Squares				
Date: 03/16/09 Time: 18:24				
Sample: 1 115				
Included observations: 115				
White Heteroscedasticity-Consistent Standard Errors & Covariance				
Variable	***Coefficient***	***Std. Error***	***t-Statistic***	***Prob.***
AT_PRG	0.055054	0.131860	0.417523	0.6772
INF_S_PG	-0.090876	0.117229	-0.775201	0.4400
FACTOR_1	0.167063	0.219971	0.759479	0.4493
FACTOR_2	0.000544	0.004405	0.123406	0.9020
FACTOR_3	-0.161675	0.103278	-1.565442	0.1205
FACTOR_4	-0.299546	0.161125	-1.859094	0.0658
FACTOR_5	-0.028875	0.116984	-0.246826	0.8055
FACTOR_6	-0.247715	0.187609	-1.320377	0.1896
FACTOR_7	0.027205	0.118607	0.229366	0.8190
FACTOR_8	-0.057090	0.108219	-0.527539	0.5989
C	3.823557	0.986937	3.874165	0.0002
R-squared	0.108886	*Mean dependent var*		1.930435
Adjusted R-squared	0.023202	*S.D. dependent var*		1.329304
S.E. of regression	1.313792	*Akaike info criterion*		3.474475
Sum squared resid	179.5091	*Schwarz criterion*		3.737034
Log likelihood	-188.7823	*F-statistic*		1.270784
Durbin-Watson stat	1.769050	*Prob(F-statistic)*		0.256573

This regression output is completely different from the previous two and has little or no similarity. A new independent variable has emerged to be significant at 10 percent level of significant – it is FACTOR_4. However, as none of the variables are significant as 5 percent level of significance, we note that the R^2 is as low as 0.10. Hence, it proves that Business Expectation is the weakest of the 4 dependent variables considered so far. The overall Prob (F-Statistic) is also very high, much higher than the 0.10, which is the threshold level of acceptance for any regression.

Thus we decided to drop the models created for dependent variables Market share growth, Profit growth and Business expansion; however, we decided to chose the financial performance to be represented by the variable Financial

Returns as the regression model generated by this variable is strongest of all dependent variables.

Now, let us consider the first regression output where with FIN_RTS as the dependent variable. R^2 is 0.4882. This implies the best fitness of the model, and indicates the variable FIN_RTS as the most powerful representative of Financial Performance. In this regression, 4 factors emerge as highly significant at 5% level of significance.

These variables are FACTOR_1, FACTOR_5, FACTOR_6 and FACTOR_7. While FACTOR_1, FACTOR_6 and FACTOR_7 have positive coefficients, FACTOR_5 has a negative coefficient. This implies that, other than FACTOR_5, FIN_RTS changes positively with the other 3 factors. So we decided to run a regression of the model depicted by Equation 6.4.

The regression Outputs are as shown in Table 6. 15

Table 6.15 - Regression Output 5

Dependent Variable: FIN_RTS (Y)				
Method: Least Squares				
Date: 03/25/09 Time: 14:51				
Sample: 1 115				
Included observations: 115				
Variable	***Coefficient***	***Std. Error***	***t-Statistic***	***Prob.***
FACTOR_1	0.444	0.104	4.284	0.000
FACTOR_7	0.188	0.068	2.743	0.007
FACTOR_6	0.259	0.078	3.332	0.001
FACTOR_5	-0.171	0.048	-3.571	0.001
C	0.644	0.443	1.455	0.149
R-squared	0.468	*Mean dependent var*		2.643
Adjusted R-squared	0.449	*S.D. dependent var*		0.938
S.E. of regression	0.697	*Akaike info criterion*		2.157
Sum squared resid	53.382	*Schwarz criterion*		2.277
Log likelihood	-119.049	*F-statistic*		24.212
Durbin-Watson stat	2.096	*Prob(F-statistic)*		0.000

This Regression reveals that the variable 'Financial Returns' as the best proxy for Financial Performance and in turn Organizational Performance OP.

Therefore, the equation can be re-written as, $Y = 0.644 + 0.444 \times Organizational\ Value\ Orientation - 0.171 \times Information\ and\ Knowledge\ Deployment + 0.259 \times Infrastructural\ Standards + 0.188 \times Systems\ Effectiveness + \xi$; --- *Equation 6*. 12

Where, Y is the predicted value of Organizational performance and ξ indicates the error in prediction. This is an optimal model for measuring organizational performance in terms of some independent factors which depict organizational intelligence.

The final Equation - 6.12 qualifies to be the best model for discussing the relationship between OI and OP from the R-Square value being 0.468 and Standard Error of the regression being 0.697. These values indicate the best fit and the model being validated respectively. Inferences from these findings will be discussed in next chapter.

6.2.3 Validation of the Models

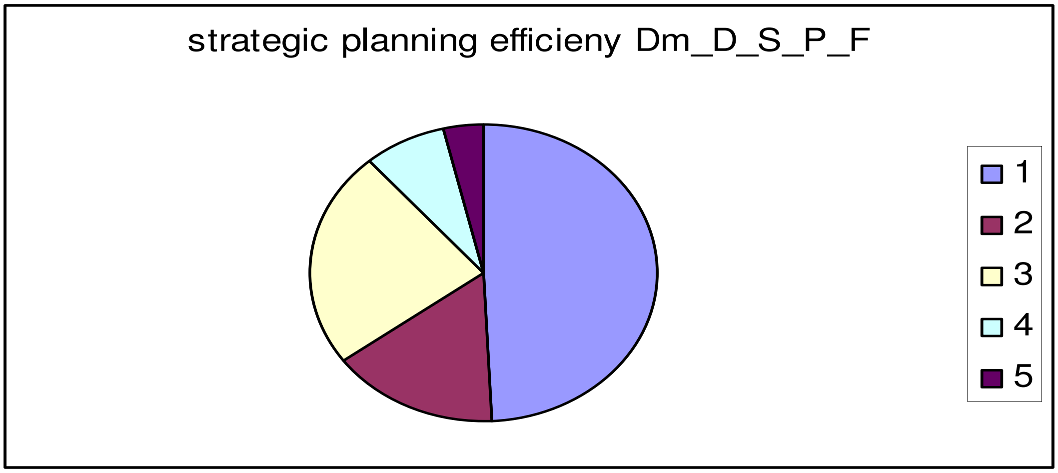
Validation of the model is done to establish the reliability of the research process so that the results are generalizable. The direct approach is in view of obtaining a fresh set of variables from a new set of sample to do Regression Analysis. Repetition of the same R-Square will validate the model. In our case, the data collection from small and medium businesses had been tedious and collecting another set of data would consume more than 2 years. Thus validation of the model could not be done.

6.3 Findings from the Non Metric Independent Variables

There are dummy variables which could not be considered for the multivariate analysis techniques as they are non-metric. However, they can be analyzed with the help of simple histograms.

6.3.1 Strategic Planning Efficiency Variable

Figure 6.2 – Strategic planning efficiency of Organizations (Dm_D_S_P_F)

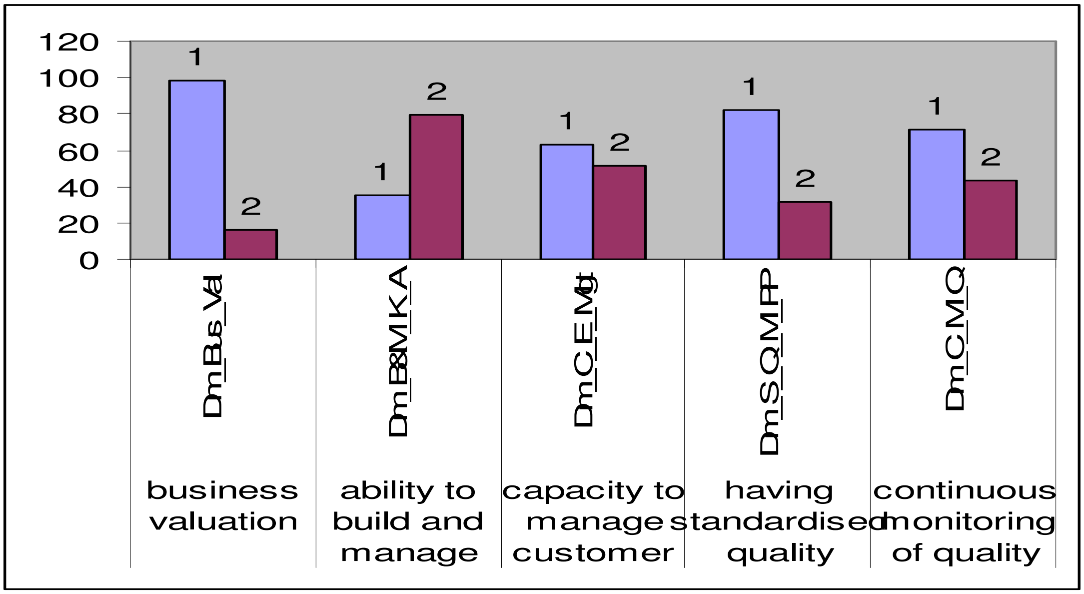


The figure reveals a fact that almost 50% of the sample organizations have at least one specific way of planning their strategic processes of the following;
Roles and responsibilities, Resource allocation, Action plan execution duration,
Crisis anticipation, Disaster management

6.3.2 Group A variables

Business Valuation - Dm_Bus_VaL, Ability to Build and Manage Knowledge Assets - Dm_B&M_K_A, Capacity to Manage Customer Expectations - Dm_C_E_Mgt, Having Standardized Quality Metrics for Production / Delivery Processes - Dm_S_Q_M_PP, Continuous Monitoring of Quality - Dm_C_M_Q are the variables that fetch answers in binary (yes or no) from the respondents. The comparison of these variables is shown as in Figure 6.3.

Figure 6.3 - Comparison between the Independent Non-Metric Variables (Group A)



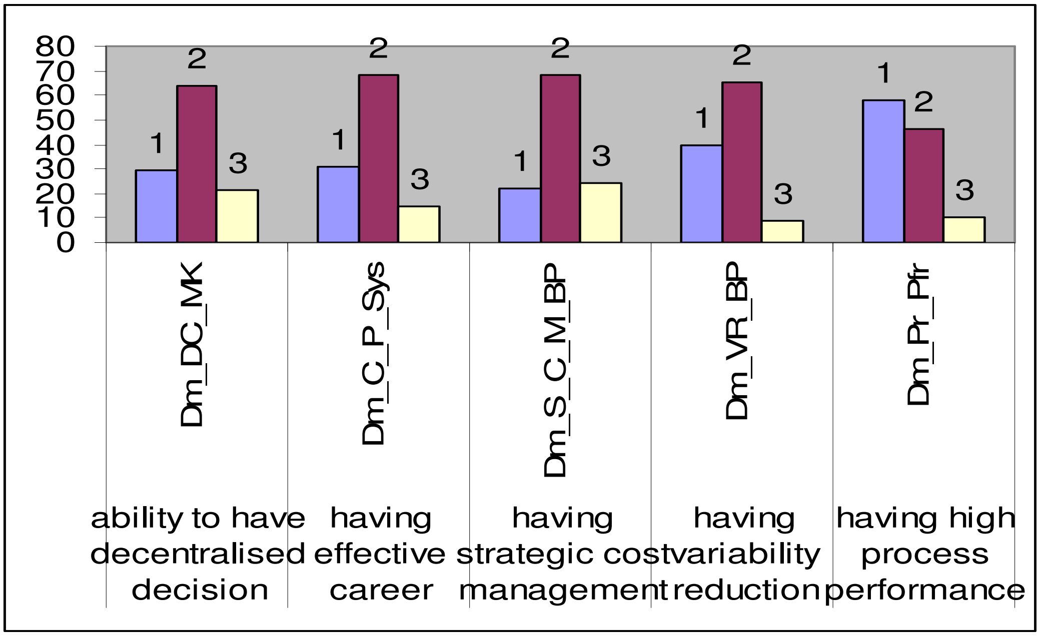
(1. Agreeing completely to the presence of the variable in the organization; 2. Disagreeing fully)

This information indicates that the organizations that do not manage Information. Knowledge assets have interest in business valuation. These two variables behave complementary to each other. Managing customer expectations, maintaining quality along the value chain and continuous monitoring of quality are all followed by more than 50% of the sample.

6.3.3 Group B variables

Ability to have Decentralised Decision Making Systems - Dm_DC_MK, Having Effective Career Planning Systems - Dm_C_P_Sys, Having Strategic Cost Management in Business Processes - Dm_S_C_M_BP, Having Variability Reduction in Business Processes - Dm_VR_BP, Having High Process Performance - Dm_Pr_Pfr. This second group of independent non-metric variables is compared below in Figure 6.4. The variables that capture answers in unclear form (yes / somewhat / no) are grouped and compared.

Figure 6.4 - Comparison between the Independent non metric variables (Group B)



(1. Agreeing fully to the variable's presence; 2. Somewhat agreeing; 3. Completely disagreeing)

Study of the comparison of Group B variables indicate that almost 50% of the organizations have a vague ability to decide decentrally, career planning systems, cost management systems, interest in reducing variability in the business process and high process performance interest. This indicates that there is a scope to improvise these variables to improve organizational Intelligence with the help of the regression model equation constructed. Process performance interest is getting ignored in these samples wherein other variables are attempted to be improvised by these organizations.

Thus Group A, B and the strategic Planning efficiency variables individually indicate the presence of interest in these organizations to attempt to improvise these variables amongst 50% of the organizations taken as samples. We perceive from these three figures that more than 50% of the organizations are indistinctly having principles represented by these variables for the improvisation of organization and roughly around 25% of organizations are already following the principles. This clearly indicates the interest of organizations to thrive and move ahead for better competitiveness. Performance and growth is also indicated, making the research more meaningful and useful.

6.4 More Findings from the Analyses

The key findings from Multiple Regression Analysis are;

i) Analysis reveals that Financial Returns is the best fit representative variable of OP out of all the 5 dependent variables. Financial Returns (FR) is most impacted by the components of independent variables representing OI compared to other dependent variables such as Market share growth, profit growth, business valuation and business expansion.

ii) It is evident that Organizational Value Orientation Index, Infrastructural Standards Index impact OP more than Information and Knowledge Deployment Index.

iii) The impact of Information and Knowledge Deployment Index on OP is lesser and negative compared to the rest of the OI components.

iv) The impacts of Organizational Value Orientation Index, Infrastructural Standards Index and Systems Effectiveness Index are larger and positive on OP.

v) The non metric independent variable 'strategic planning efficiency' is prominent in almost 50% of the samples.

vi) Study of Group A dummy variables indicates a few key findings:

1. *Observations of the behavior of variables*: 'Business valuation' and 'ability to manage knowledge and information assets' are complementary. Those organizations that are interested in valuing their business periodically are disinterested in managing knowledge assets.

2. 70% of the organizations show interest in managing customer expectations maintain quality along the value chain and monitor quality continuously.

vii) Study of Group B dummy variables indicates the following findings

1. 60% of the organizations have high process performance.
2. 65% of the organizations 'somewhat' care to:
   a. Empower employees for decision making,
   b. Have effective career planning for employees,
   c. Have strategic planning for cost management,
   d. Reduce variability in the business processes.

viii) OI can be measured by 4 key indices. They are, Organizational Value Orientation Index, Information and Knowledge Deployment Index, Infrastructural Standards Index and Systems Effectiveness Index.

1. *OI1 (Organizational Intelligence component 1) = f {Organizational Value Orientation Index}*
2. *OI2 (Organizational Intelligence component 2) = f {Information and Knowledge Deployment Index}*
3. *OI3 (organizational Intelligence component 3) = f {Infrastructural Standards Index}*
4. *OI4 (Organizational Intelligence component 4) = f {Systems Effectiveness Index}*

ix) There is a relationship established between OP and OI. OI represented by variables such as Organizational value Orientation, Information and Knowledge Deployment, Infrastructural Standards and Systems Effectiveness triggers OP.

1. *OP (Organizational Performance) = Financial Performance Component1= f {Financial Returns}*
2. OI - OP relationship Model is represented by Equation 6.12. *Y = 0.644 + 0.444 × Organizational Value Orientation Index – 0.171 × Information and Knowledge Deployment Index + 0.259 × Infrastructural Standards Index + 0.188 × Systems*

Effectiveness Index + ξ; where, 'ξ' – Error Term & 'α' – Constant term of the multi variate equation

These findings from Exploratory Factor Analysis and Multiple Regression Analysis could lead us to develop the conceptual models as defined by our research objectives. They are discussed below.

6.5 Conceptual Model of Organizational Intelligence Instrument

i) ***Organizational Value Orientation Index*** *= A_S_N x 0.143498 + E_Inn x 0.162141 + Pfr_M_S x 0.158165 + ICTOS x 0.177259 + Bus_P_Ef x 0.176355 + Eff_Q_M x 0.182582*

ii) ***Maturity Index*** *= Age x 0.501795 + Total_exp x 0.498205*

iii) ***Organizational competitiveness Index*** *= CO_CA x 0.471381 + C_M_Val x 0.528619*

iv) ***Organizational Wisdom Index*** *= E_O_L x 0.329021 + A_L x 0.385211 + Pft_Sh x 0.285768*

v) ***Information and Knowledge Deployment Index*** *= Bus_Cnt x 0.638528 + t_og_s_b x 0.904237 + S_I_T_N x (-0.54276)*

vi) ***Infrastructural Standards Index*** *= Wlf_Emp x 0.561938 + Ef_U_Inf x 0.438062*

vii) ***Systems Effectiveness Index*** *= Em_Intel x 0.444049 + Stk_Stis x 0.239985 + W_F_Sys x 0.315966*

viii) ***Process Efficiency Index*** *= T_I_Plg x 0.231245 + N_T_B_P x 0.463595 + PU_QPMS x 0.305161*

ix) ***Proficiency in Planning Index =*** *Inf_S_Pg x 1.0*

x) ***Proficiency in Execution Index*** *= AT_Prg x 1.0*

These 10 representations can be re-written with the complete names of the variables that got grouped in the factors, as 10 different equations as below.

i) *Organizational Value Orientation Index = Ability to have awareness on stakeholder needs x 0.143498 + Ability to encourage innovation x 0.162141 + Capacity to utilize performance measurement systems effectively x 0.158165 + Having improvement on cycle time on operating systems x 0.177259 + Having high business process efficiency x 0.176355 + Having highly efficient quality management systems x 0.182582* ---------------- *Equation 6.13*

ii) *Maturity Index = Age x 0.501795 + Total work experience x 0.498205* ---------------- *Equation 6.14*

iii) *Organizational Competitiveness Index = Capacity to operate on customer oriented competition analysis reports x 0.471381 + Capacity to utilize customer and market valuation analysis x 0.528619* ---------------- *Equation 6.15*

iv) *Organizational Wisdom Index = Ability to encourage organizational learning x 0.329021 + ability to apply the learning x 0.385211 + Capacity to share profit among the employees x 0.285768* ---------------- *Equation 6.16*

v) *Information and Knowledge Deployment Index = Business continuity capacity x 0.638528 + ability to know the trade off between organizational goal and stakeholder benefits x 0.904237 + having stable information technology network x (-0.54276)* ---------------- *Equation 6.17*

vi) *Infrastructural Standards Index = Ability to provide schemes on employee welfare x 0.561938 + capacity to use information effectively x 0.438062* ---------------- *Equation 6.18*

vii) *Systems Effectiveness Index = Ability to provide societal sensitiveness in the system x 0.444049 + Ability to focus on High level of stakeholder satisfaction x 0.239985 + Capacity to have effective workflow systems x 0.315966* ---------------- *Equation 6.19*

viii) *Process efficiency Index = Ability to incorporate technology and innovation in Planning* x *0.231245 + Ability to deploy new technology for business process planning* x

0.463595 + ability to have periodic up gradation of quality management processes x *0.305161* ---------------- *Equation 6.20*

ix) Proficiency in Planning Index = Ability of incorporating information in strategic planning x *1.0* ---------------- *Equation 6.21*

x) Proficiency in Execution Index = Ability of tracking the progress x *1.0*

---------------- *Equation 6.22*

Organizational Intelligence is thus a function comprising of these 10 components (8 factors and 2 unique variables) represented by Equations 6.13 to 6.22. Thus, Conceptually, Organizational Intelligence can be measured through a quotient that may be represented as,

Organizational Intelligence Quotient = f { Organizational Value Orientation Index, Maturity Index, Organizational Competitiveness Index, Organizational Wisdom Index, Information and Knowledge Deployment Index, Infrastructural Standards Index, Systems Effectiveness Index, Process efficiency Index, Proficiency in Planning Index, Proficiency in Execution Index } *-- Equation 6.23*

This Equation 6.23 can be called as the Conceptual Model of Organizational Intelligence Quotient. Predictions and applications of this model are discussed in the next chapter.

6.6 Conceptual Model of OI-OP Linkage

Out of these 10 components, 4 become prominent from the Multiple Regression Analysis (Equation 6.12) when *Financial Returns* is found to be the best fitting proxy variable for Financial Performance of the given sample set for Multiple Regression Analysis. They are, *Organizational Value Orientation, Information and Knowledge Deployment, Infrastructural Standards and Systems Effectiveness.*

When 'Organizational Performance' is measured only in terms of "Financial Performance" and if Financial Returns represents best Financial Performance, Organizational Value Orientation, Information and Knowledge Deployment, Infrastructural Standards and Systems Effectiveness would represent 'Organizational Intelligence'

i) OI1 (Organizational Intelligence component 1) = f {Organizational Value Orientation Index}

ii) OI2 (Organizational Intelligence component 2) = f {Information and Knowledge Deployment Index}

iii) OI3 (organizational Intelligence component 3) = f {Infrastructural Standards Index}

iv) *OI4 (Organizational Intelligence component 4) = f {Systems Effectiveness Index}*

v) OP (Organizational Performance) = Financial Performance Component1= f {Financial Returns}

Conceptually the relationship between OI and OP can be written as,

OP = f (OI1, OI2, OI3, OI4) --------- *Equation 6.24*

This Equation 6.24 can be termed as the Conceptual Model of OI-OP Linkage. Interpretations and applications of this model are discussed in the next chapter.

6.7 Conclusion

In this chapter, we have discussed in detail the Exploratory Factor Analysis of the chosen Variables. Variable selection, types and grouping of variables, Factor Analysis design, sampling adequacy tests and the results, component analysis, estimation of factor model and the factor loading calculations and the formation of 8 factors have been explained. Those 8 factors and 2 unique variables have been considered for Multiple Regression modeling. Four different dependent and metric variables were chosen for regression analysis, and the model with the best fit was selected to explain the relationship between OP and OI. The assumptions such as Heteroscedasticity and Multicollinearity are explored. The behavior of non metric variables explains other organizational capabilities present in these organizations. Had these been metric variables, there might have been changes in the constructs of factors of OI from exploratory factor analysis.

The key findings here lead to develop the instrument for measuring OI. The conceptual model representing the relationship between OI and OP is developed. However, validation of the model will depend on the consistency of the results on repeating the entire experiment a few times with new sets of samples. This validation of the model is not done as sampling and data collection and sorting would consume a large amount of time. This exercise can be dome as an empirical study of verification of the instrument design done in this research work.

In the next chapter, we will discuss the predictions of OI Measurement Model developed here and OI – OP Linkage in detail. The merits and demerits of the model, deliverables, benefits of this study to organizations and suggestions for the future are also included in the next chapter.