Measuring Uncertainty and its Strategic Implications

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Abstract

The study explored the measure of uncertainty of the market and also the linkage between the uncertainties of the business environment and the performance of the organizations in the specified sector that includes chemical ; petro - chemical process industry; agriculture related industry; processed food industry; bio - chemical related industry in the context of liberalized Indian economy. In this paper, the measure of uncertainty on the basis of subjective understanding of managers was validated by the objective measure of market uncertainty. The strong relationship between two measures of uncertainty was established and the subjective measure of uncertainty had a strong impact on the performance of the organization. The subjective measure has been classified into two dimensions, namely, internal uncertainty and external uncertainty. The paper also ascertained the relative influence of internal uncertainty (IU) and external uncertainty (EU) on the performance of the organization. The study also established that internal uncertainty has a greater impact than external uncertainty on the performance of the organization. Through this analysis, it is possible to ascertain how the organizations are able to combat the uncertain situation in the market for better performance.

Key words : **uncertainty measure, error variance, internal uncertainty, external uncertainty, performance, chemical sector, India**

JEL Classification : L21, L22, L25

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There is a rich relationship between the organization and its operating environment (Lawrence & Lorsch, 1967). As a subset of the business environment, organizations get all kinds of resources such as material, human, technical, and financial resources from their environment ; an organization receives flow of innovative ideas and information of market dynamics from it too, as also social values and norms, and in turn, an organization contributes to its environment both in tangible and intangible ways by providing quality goods and services, its earning shared with all the stakeholders as well as contributes to the GDP of the nation and development of quality manpower, and so forth. If the environment is hostile to the organization, the organization may face difficulties both in getting its required inputs and also providing the value added output to the society. Then, the sustainability of the organization comes under a big question, and the performance of the organization is greatly affected. Thus, the organization being able to operate in a favourable rather in a volatile environment is of great strategic advantage to the organization (Khandwalla, 1992).

The environment is visualized as a moderator of sources of perceived uncertainty variability. The uncertainty concepts can be defined by relating two dimensions of organization environments, complexity and dynamism.

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Both of the dimensions are completely based on managers' perception of uncertainty. Hence, the relationship between an organization and environment is constantly changing with the business environment, changing behaviour of the customer, technological sophistication, and so on. Within business structures, environment-performance relationship is also different from one organization to another organization, one sector to another sector, etc. The task environment where an organization performs is highly dynamic or we may say, time specific. So, the fluidity of the environment makes the situation completely "uncertain". Organizations may change their strategy depending of their flexibility but have very little to do to resist the environmental change. The change is obvious and to adapt with a changed environment is the main issue of research, innovation, or anything creative.

To address this complex issue of environment-performance relationship in which organization design parameters play a pivotal role, this research study was taken in the context of liberalized Indian economy focusing on selected organizations of the specific sector namely, chemical, petro-chemical process industry, agricultural related industry, processed food industry, and bio-chemical related industry. The objective of the study is to examine the relationship between market uncertainty and performance of the organizations.

Literature Survey

(1) Uncertainty Defined : Uncertainty can be defined as a state that exists when an individual defines himself/herself as engaging in directed behavior based upon less than complete knowledge of (a) his/her existing relationship with his/her environment, (b) the existence of and knowledge of conditional, functional relationships between his/her behavior and environmental variables to the occurrence of future (t_1) self-environment relation, and (c) the place of future (t_1) self-environment relations within the longer time frame ($t_2,\ldots t_n$) of a self environment hierarchy (Downey & Slocum 1975). Along with this fundamental concept of uncertainty, multiple definitions of uncertainty have been offered in the literature, including lack of knowledge for decision-making (Duncan 1972 ; Lawrence & Lorsch 1967; Thompson 1967) ; choice (Child, 1972) ; complexity (Galbraith, 1973); unpredictability (Cyert & March, 1963) ; and turbulence (Emery & Trist, 1965). The concept of uncertainty is a central point of discussions of the organization - environment interface, particularly in theories of organizational design (Burns & Stalker, 1961 ; Dill, 1958 ; Duncan, 1972 ; Lawrence & Lorsch, 1967 ; Thompson, 1967).

In a review of the environmental uncertainty literature, Jauch and Kraft (1986) stated three views in the study of uncertainty :

(i) The classical view (for example, Burns & Stalker 1961; Cyert & March 1963 ; Emery & Trist 1965) : As per the classical view, the researchers advocated that the business environment was the root cause of uncertainty and it had great influences on the structures, decisions, and performance of the organizations. The recommended strategy was the change in the internal structure to establish the "system equilibrium".

(ii) The transition view (for example, Child, 1972 ; Galbraith, 1973 ; Perrow, 1970 ; Thompson, 1967) : The researchers indicated that external and internal sources were responsible for the uncertainty and decisions makers could choose the strategies for changing the internal structure to mitigate the uncertainty issues.

(iii) The process view (for example, Duncan, 1972 ; Downey, Don , & Slocum Jr. , 1975 ; Lawrence & Lorsch, 1967).

(2) Measurement of Uncertainty and its Impact on Performance : The basic problem is associated with measuring the construct of environmental uncertainty.

Significant theorizing and research have focused upon the nature of the relationship between an organization and its environment, and the construct of environmental uncertainty has been central to most of these inquiries (Aldrich, 1979; Boulton, Lindsay, Franklin, & Rue, 1982 ; Downey & Slocum, 1975 ; Duncan, 1972 ; Emery & Trist 1965 ; Hambrick 1983a ; Jauch & Kraft, 1986 ; Pfeffer & Salancik, 1978 ; Smircich & Stubbard, 1985 ; Thomson, 1967).

Two uncertainty instruments and conceptualizations have received widespread attention. They are those of Lawrence and Lorsch (1967) and Duncan (1972). Lawrence and Lorsch (1967) identified the uncertainty parameters related with research department, manufacturing department, and marketing department and evaluated the degree of uncertainty of three different organization subsystems. Duncan's (1972) instrument seeks to measure uncertainty on the basis of three characteristics: (a) the lack of information regarding environmental factors associated with decision making situations, (b) the lack of knowledge about the organizational consequences of a decision if the decision is incorrect and, (c) the ability or inability to assign probabilities as to the effect of environmental factors on the success or failure of the organization in performing its functions.

Some authors conceived of uncertainty as an objective dimension of the external environment while others viewed uncertainty as interpretative or as the end result of the perceptual process through which decision-makers assign meanings to their situations (Milliken, 1987). It has been evidenced that the researchers have not given much emphasis on objective environmental uncertainty. They have argued that decision makers' perceptions, their cognitive process, and the understanding of the internal structures of their own organizations could resolve the issues. However, differing perspectives on environmental uncertainty remain common in the literature today (Milliken, 1987).

Despite the fact that the field has attributed great theoretical significance to the construct of uncertainty, research generally has yielded inconsistent results (Duncan, 1972 ; Downey et al., 1975). Problems range from findings from poor reliability and validity evidence for measurement instruments (Downey & Slocum, 1975 ; Tosi, Aldag, & Storey, 1973) to a failure to find clear evidence of a relationship between "objective" characteristics of the organizational environment and perceptions of environmental uncertainty (Duncan, 1972; Downey et al., 1975 ; Pennings, 1975; Pfeffer & Salancik, 1978 ; Tosi et al., 1973). Bourgeois (1978) criticized Tosi et al.'s (1973) volatility measure and developed a more systemic and predictable model of measuring industry volatility. Snyder and Glueck (1982) used Tosi et al.'s (1973) measures for scaling the volatility of the industry environments and established a positive correlation of the perceptual uncertainty with Tosi et al.'s objective measures for six industries.

The works of Miles, Snow, and Pfeffer (1974) and Miles, Snow, Mayer, and Coleman (1978) emphasized that performance of the organizations can be influenced by proactive nature of the decisions makers, their perceptions of the environment, and applied philosophies in relation to uncertainty, ignoring the role of objective environment on the performance. Khandwalla (1976) and Miles and Snow (1978) indicated that strategic managers in more uncertain environment tend to become more proactive and innovative. More research studies in this field have also argued that strategic decisions based on environment constraints coupled with internal structures have an impact on performance. Rumelt (1982) identified that diversification strategy of the organizations in response to market conditions has an impact on performance. Prescott (1986) developed a model to examine the joint impact of environment and strategy on the organizational performance. Miller (1993) developed the uncertainty measurement scales based on two perspectives of perceived uncertainty of managers - (a) international management perspective primarily focuses on the assessment of political, government policies, and macroeconomic uncertainties, and (b) industry or sector perspective focuses on the procurement, market demand, competition etc.

The Miller scale was tested in many countries such as the Netherlands, the UK, and six Latin American countries. Elbanna and Gherib (2012) used Miller scale of uncertainty (1993) to measure the applicability and generality of the modified scale in the Arab Region. Bhattacharya and Kundu (2013) also made a study to find out

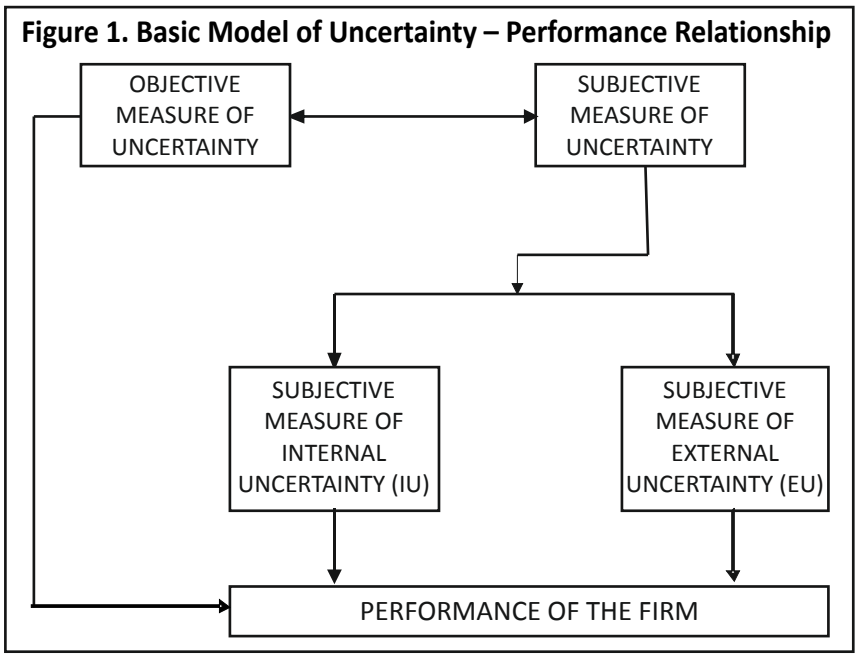
the impact of volatility of the business environment along with differentiation and integration on the performance of the selected Indian organizations.

Hambrick (1982) indicated that environmental uncertainty had main impact on three performance measures such as return on investment, cash flow, and market share. The GLOBE study surveyed middle- level managers in about 800 firms across 62 societies and the study revealed that organizational cultural practices of uncertainty avoidance had a significant positive effect on high performance organizational practices (Gupta, 2011). Andrews (2008) performed an extensive empirical analysis on perceived environmental uncertainty among managers with public organizations. A strong relationship was established in between perceived socioeconomic uncertainty & political uncertainty with the strategic moves of the public organizations for better organizational effectiveness. Kundu (2014) also developed the linear programming model to estimate the impact of design parameters namely, uncertainty reduction, differentiation, and integration on the performance of the organizations.

Uncertainty reduction strategies are mainly comprised of (a) internal uncertainty reduction, (b) external uncertainty reduction, (c) internal uncertainty stimulation, and (d) external uncertainty stimulation (Jauch & Kraft, 1986). None of the strategies are new but out of these four, the first one is the most highlighted and the other three are under represented. It has been observed that several organizations had adopted any one of the strategies to cope with the challenges of the environment and ultimately, outperformed others.

The theoretical importance of the environmental uncertainty construct in organizational research would require greater efforts in developing appropriate measures. Perceptions of uncertainty may be inherently unstable because environmental complexity and dynamism may prevent individuals in organizations from developing stable assessments of the environment itself (Buchko, 1994). Hence, a research gap exists in the area of developing subjective measures of uncertainty based on perceptual study and establishing its reliability by linking it with the appropriate objective measure of environmental uncertainty of an organization. A perceptual measure of environmental uncertainty in both of the dimensions, namely, internal and external uncertainty, would identify the possible strategy mindset of the decisions makers of a particular organization in a specific sector and also indicate the strategy outcome for superior performance. The conceptual framework of the uncertainty-performance relationship model has been represented in the Figure 1.

Figure 1. Basic Model of Uncertainty – Performance Relationship



Objectives of the Study

In this research paper, an attempt has been made to understand the volatility present in the business environment after liberalization of the Indian economy and to establish the relationship between market uncertainties and performance of the organizations taking into consideration a specific sector namely, chemical, petro-chemical process industry, agriculture related industry, processed food industry, and bio-chemical related industry. The objectives of the paper are as follows :

(i) To ascertain the level of influence of the objective uncertainty measure on different parameters (such as sales turnover, profit after tax, capital employed, PAT/average capital employed, debt-equity ratio, turnover/ capital employed) which are indicative of different dimensions of the performance of organizations.

(ii) To estimate a measure of uncertainty on the basis of subjective understanding of the managers with regard to uncertainty of the market.

(iii) To ascertain the relative influence of the internal uncertainty and external uncertainty based on subjectivity on the performance of the organizations.

Research Hypotheses

From the objectives of the study, it is evident that the research part of this paper has two distinctive parts, one being concerned with the estimation of the subjective measure of uncertainty based upon the understanding of managers of the organization under study, and the other dealing with causal research explaining the relationship between the measures of uncertainty, both objective and subjective, and the dimensions of performance parameters of the organizations. It is to be mentioned that strength of relationship between objective and subjective measures of uncertainty was also checked.

With the above in the background, the following hypotheses have been formulated.

- **H1 :** Objective measure of uncertainty has a strong influence on performance of the organizations.
- **H2 :** There exists a strong correspondence between objective and subjective measures of uncertainty. Subjective uncertainty can be classified into two, namely; internal and external. These two types of uncertainty have a differential effect on performance and these effects depend on the type of organizations.
- **H3 :** Relative influence of internal and external uncertainty on the performance is statistically significant and it is different for different types of organizations.

Research Design

(1) Sampling Frame : The present research work examines the level of influence of uncertainty on the different financial parameters which are indicative of the performance of the organizations. The relevance of those measures of market volatility is judged by subjective understanding of top executives of the selected firms in the specific sectors, that is, chemical, petro-chemical industry, agriculture related industry, and food processing industry in the context of the liberalized economy of India.

(2) Sources of Data : The unit of observation for this study is the organizations belonging to the sectors, namely, chemical, petro-chemical process industry, agriculture related industry, processed food industry, and bio-chemical related industry.

The selection of the firms of the specified sectors were basically made by an exhaustive study of the print version of Economic Intelligence Service named Industry Market Size & Shares published by Centre for Monitoring Indian Economy Private Limited (CMIE). The database of CMIE of the detailed performance report of Indian firms in the form of software PROWESS 3 and 4 were used as the source of performance data of the respective organizations. The time frame of the research study was within the period from 2009-2014.

An attempt has been made to consider almost all the representatives of the sub sectors belonging to the chemical and chemical related industries in the Eastern Region of India. These sources generated a sample size of 18 organizations in the specified sector that included large, medium, and small sized organizations both from the private and public sector that underwent a change process.

The top management of those selected organizations was contacted through telephone or email and was requested to provide an appointment stating the objectives of the research. A meeting was fixed based on the prior approval by sending a letter of invitation to the CEO/Managing Director/Executive Director-HR to participate in the study. The letter of invitation provided a brief description about the study, a commitment stating that the perception study/data would be used only for research purposes, and a complete anonymity of the respondents and the firms was assured. Personal interviews were conducted with structured questionnaire with more than one senior executives who had an adequate knowledge of the company's history, business strategy, changes in the business environment, and the changes with the organization to discuss over the questionnaire and get his/her perception. A structured questionnaire was developed based on the model of Prof. P. N. Khandwalla (2002) and Prof. A. Som (2002). The instrument was designed to ask for ratings on an ordinal Likert type 5-point scale (5 = *Strongly Agree* ; 1= *Strongly Disagree*) to get the perception of organization design. In this context, it is to be mentioned that there were some negative statements for which the information was adjusted at par with the positive statements. The perceptual study of uncertainty consists of 11 Likert-type items.

U1: Employees' suggestions are not generally accepted by the management.

U2: Role and scope of work of the departments are clearly specified.

U3: Indicate the level of expenditure on research, forecasts, data-based analysis for formulating goals and strategy.

U4: Investment to install the software tools for the selection of best cost-effective options is not sufficient.

U5: The extent of sharing of relevant information related to environmental challenges, goals etc. within the organization for the purpose of achieving high performance is not sufficient.

U6: Indicate the width of information sharing between the departments by using formal computer based information system.

U7: Indicate the depth of involvement of the departments with regard to sharing of targets, budgets, performance of each department etc.

U8: Indicate the extent of information sharing between the organization and the supply chain members.

U9: Indicate the extent of sufficiency in respect of periodic performance review meetings of top management.

U10: Indicate the extent of emphasis on research and data-based decision making.

U11: Rate the extent of use of MIS techniques in your organization.

The structured questionnaire covered both the dimensions, namely, internal uncertainty (U_1, U_2,U_5,U_6, U_7, U_9, U_{11}; seven perceptual questions in number) and external uncertainty (U_3 , U_4 , U_8 , U_{10} ; four perceptual questions in number) and the measures are used to estimate the relative influence of both.

Methodology

Uncertainty in the market place is dynamic and it is time and environment specific. Considering a fixed set of environment and time specificity, the uncertain situation in the market is conceptually reflected in the movement of the variable straightway relating to the market such as sales turnover. To suggest a measure reflecting the uncertainty in the market, it is necessary to ascertain the pattern of movement of the variable mentioned above. At the first stage of analysis, the following model is estimated : $y = f(t)$ where y represents sales turnover for the individual firm and t represents time. In estimating the above model, there emerges an error variance associated with the above estimated model. Error variance in this context reflects the extent of fluctuations of the variables over time. In fact, if the extent of fluctuations is more, market seems to be more uncertain (Kundu, 2011). Therefore, error variance turns out to be a measure of uncertainty of the market.

Discriminant scores have been estimated on the basis of subjective understanding of the top level manager in regard to market uncertainty. These scores are then checked with the objective measure of market uncertainty, that is, error variance, in order to ascertain whether the discriminant scores are a reflection of the level of uncertainty in the market. The subjective measure of uncertainty is then divided into two parts, one being internal uncertainty scores, the other being external uncertainty scores.

Furthermore, regression analysis has been performed taking the validated financial measures (sales turnover, profit after tax, and capital employed) as dependent variables and uncertainty scores (both internal and external) as independent variables for each case to ascertain the level of influence of each on the performance of the organization.

↳ **Reliability Measure :** The reliability of uncertainty reduction variable is measured with 11 items for 18 organizations and the results (Cronbach's alpha = 0.9005) indicate that satisfactory internal consistency existed.

Results and Discussion

(1) Analysis – Stage I : Error variance, which is estimated on the basis of time series data on sales for 18 organizations, is taken as a measure of uncertainty in respect of the variable because it shows the degree of market volatility of the concerned sector. The six financial parameters have been identified as measures of financial performance of the organizations. These six variables have been classified into two segments. The first segment consists of sales turnover, profit after tax (PAT), and capital employed. The second segment consists of PAT/average capital employed, debt-equity ratio, and turnover/ capital employed (TRANCAPE). The level of influence of the market uncertainty on the financial parameters which are of organizational performance is measured by performing regression analysis. The results (Table 1) indicate that out of the six variables, only sales turnover, profit after tax (PAT), and capital employed turn out to be highly significant.

Table 1. Output of Regression Analysis

Dependent variables	R^2	Significance concerning the coefficient associated with the dependent variable
1. Sales Turnover	**0.836**	**0.000**
2. Profit After Tax	**0.792**	**0.000**
3. Capital Employed	**0.964**	**0.000**
4. PAT/Avg. Capital Employed	0.023	0.560
5. Debt - Equity Ratio	0.037	0.445
6. TRNCAPE	0.144	0.120

Independent Variable: Error variance - Objective measure of Market Uncertainty

The first set of variables is the reflection of the interaction of the organizations with the market directly. It shows that market uncertainty has a strong influence on the first set of parameters indicating the financial performance of the organizations. In this case, coefficients associated with performance parameters turn out to be highly statistically significant. The second set of variables is modified incorporating internal adjustments of the organizations. Hence, in case of the second set of variables, the impact of error variance turns out to be insignificant. Hence, the first hypothesis turns out to be justified.

(2) Analysis – Stage II : *Cluster analysis* was performed on the basis of three financial parameters, that is, sales turnover, profit after tax, and capital employed and the objective is to form two clusters with relatively homogeneous groups. Then, on the basis of these two groups, discriminant analysis was performed. Before that, normality test for 11 variables that are used to measure uncertainty of the market was performed. The value of significance indicates that all the independent parameters are normally distributed. Discriminant analysis has to be performed on the basis of two groups, and the discriminant scores have been obtained for each organization. The classification table (Table 2) measures the extent of correct classification of this sample. The results indicate that 88.9% of the cases are classified correctly.

Table 2. Classification Table of Predicted Group Membership

Classification Results [a]					
			Predicted Group Membership		
		Cluster Number of Case	1	2	Total
Original	Count	1	2	0	2
		2	2	14	16
	%	1	100.0	.0	100.0
		2	12.5	87.5	100.0

a. 88.9% of original grouped cases correctly classified.

The discriminant scores can be taken as a resultant effect of both internal uncertainty and external uncertainty for each organization. The construct of uncertainty measures can be formed based on the unstandardized canonical discriminant function coefficients (a_1, a_2, a_3,....a_{11}) of two strategies, namely, internal uncertainty reduction (IUR) and external uncertainty reduction (EUR) (Table 3).

Table 3. Unstandardized Canonical Discriminant Function Coefficients of Uncertainty

Uncertainty [U_i]	Strategies	Associated Co-efficient [a_i]	Coefficient Value
[U_1]	IUR	a1	1.672
[U_2]	IUR	a2	-0.6
[U_3]	EUR	a3	0.7
[U_4]	EUR	a4	0.342
[U_5]	IUR	a5	0.885
[U_6]	IUR	a6	0.004
[U_7]	IUR	a7	-0.759
[U_8]	EUR	a8	-1.604
[U_9]	IUR	a9	0.862
[U_{10}]	EUR	a10	-1.337
[U_{11}]	IUR	a11	1.422

The uncertainty measure *(U)* based on both internal and external uncertainty can be represented in the following mathematical form :

$$U = a_1U_1 + a_2U_2 + a_3U_3 + a_4U_4 + a_5U_5 + a_6U_6 + a_7U_7 + a_8U_8 + a_9U_9 + a_{10}U_{10} + a_{11}U_{11} \text{ ---------- } (1)$$

U is constructed on the basis of subjective understanding of the top level of managers in regard to market uncertainty.

(3) Analysis – Stage III : To check whether this discriminant score can also be considered as one of the measures of uncertainty, this is mapped with the error variance, an objective measure of the uncertainty which is mentioned in Analysis - Stage I. In this context, a simple correlation coefficient between these two measures is calculated. The R^2 is above 80% and is significant at 0.00 (Table 4 & 5). The results justify the second hypothesis. Not only that, the contemporary studies in this field either consider subjective measures of uncertainty or objective measures of uncertainty to explore the moderating influence of environment on the relationship between strategy and performance. That is the uniqueness of the present study that considers both the uncertainty measures and establishes a strong correlation between them.

Therefore, the discriminant score which was constructed on the basis of subjective understanding of uncertainty can logically be treated as a measure of uncertainty (Table 6). This is very interesting to note that both objective and subjective measures of uncertainty tally with each other significantly.

(4) Analysis – Stage IV : It is evidenced that perceptions of environmental uncertainty play an important role in describing the strategies. Internal uncertainty reduction strategies may be interpreted as a means of acquiring and sharing of knowledge within the organizations effectively about the operation of the environment. External uncertainty reduction may be defined as the effort of the organizations to collect the market information through their channel members and timely processing the data using sophisticated tools to forecast the possible change of environment in a proper time.

Based on the discriminant function coefficients, scores of internal uncertainty *(IU)* and scores of external uncertainty *(EU)* can also be determined for each organization based on following two equations :

Table 4. Output of Regression Analysis

Model Summary				
Model	***R***	***R* Square**	**Adjusted *R* Square**	**Std. Error of the Estimate**
1	.802[a]	.643	.621	9316637892

Dependent Variable: Objective Measure of Market Uncertainty

Independent Variable: Subjective Measure of Market Uncertainty

Table 5. Significance of the Relationship Between Two Measures

Coefficients[a]					
	Unstandardized Coefficients		**Standardized Coefficients**		
Model	**B**	**Std. Error**	**Beta**	***t***	**Sig**
1. (Constant)	5E+009	2E+009		2.370	.031
Discriminant Scores from Function 1 for Analysis 1	8E+009	1E+009	.802	5.369	.00

a. Dependent Variable: Error Variance : A measure of Market Uncertainty

$$IU = a_1U_1 + a_2U_2 + a_5U_5 + a_6U_6 + a_7U_7 + a_9U_9 + a_{11}U_{11} \quad \text{----------(2)}$$
$$EU = a_3U_3 + a_4U_4 + a_8U_8 + a_{10}U_{10} \quad \text{----------(3)}$$

where,
IU: Measure of Internal Uncertainty,
EU: Measure of External Uncertainty.

Now, to estimate the level of influence of subjective measures of uncertainty on the performance of the organizations, regression analysis has been performed taking sales turnover, profit after tax (PAT), and capital employed as independent variables. In this context, an attempt has been made to estimate the following regression model:

$$Y = \beta_0 + \beta_1 (IU) + \beta_2 (EU) + \varepsilon \quad \text{----------(4)}$$

where,
Y = Sales turnover/Profit after tax/Capital employed,
β_0= Constant,
β_1= Coefficient associated with Internal Uncertainty *(IU)*,
β_2= Coefficient associated with External Uncertainty *(EU)*,
ε = Error term.

The rationale of selection of dependent variables (i.e. sales turnover, profit after tax, capital employed

Table 6. Organization - Wise Error Variance, Discriminant Score, and Measures of Internal *(IU)* & External Uncertainty *(EU)*

Organization	Error Variance	Discriminant Score	IU	EU
01	63800000000	12.16	16.82	-4.66
02	1205120.167	8.47	16.36	-7.89
03	11960000000	9.48	17.43	-7.95
04	1093665.162	7.94	17.43	-9.49
05	869253.3590	6.72	12.42	-5.7
06	2034422.800	7.31	11.26	-3.96
07	11140000000	10.18	17.43	-7.25
08	722566.7710	7.32	16.52	-9.2
09	248893258.6	6.84	12.84	-5.99
10	389686.5410	6.67	14.97	-8.3
11	13925265.78	6.25	14.54	-8.3
12	104958.6170	6.69	14.85	-8.16
13	17442507.43	6.76	14.41	-7.66
14	5390171.667	7.67	12.71	-5.04
15	67917206.05	6.73	14.62	-7.89
16	33703770.04	9.35	14.70	-5.36
17	6398536016	8.06	16.22	-8.16
18	251331.3010	7.76	12.41	-4.66

Table 7. Output of Regression Analysis

Model Summary[b]					
Model	***R***	***R* Square**	**Adjusted *R* Square**	**Std. Error of the Estimate**	**Durbin-Waston**
1	.865a	.748	.714	423944.3923	2.515

a. Predictors : (Constant), external uncertainty, interanl uncertainty

b. Dependent Variable: Sales Turnover

Table 8. Significance of Perceptual Uncertainty Measures

Coefficients[a]					
		Unstandardized Coefficients		**Standardized Coefficients**	
Model		**B**	**Std. Error**	**Beta**	***t***	**Sig**
1.	(Constant)	-3372851	801967.2		-4.206	.001
	internal uncertainty	454168.0	69892.659	1.116	6.498	.000
	external uncertainty	430010.4	79697.218	.926	5.396	.00

a. Dependent Variable: Sales Turnover

Table 9. Output of Regression Analysis

Model Summary[b]					
Model	***R***	***R* Square**	**Adjusted *R* Square**	**Std. Error of the Estimate**	**Durbin-Waston**
1	.634[a]	.401	.322	20897.9297	2.226

a. Predictors : (Constant), external uncertainty, internal uncertainty

b. Dependent Variable: Profit after Tax

Table 10. Significance of Perceptual Uncertainty Measures

Coefficients[a]					
		Unstandardized Coefficients		**Standardized Coefficients**	
Model		**B**	**Std. Error**	**Beta**	***t***	**Sig**
1.	(Constant)	-63918.8	39532.201		-1.617	.127
	internal uncertainty	10232.460	3445.291	.786	2.970	.010
	external uncertainty	10944.889	3928.597	.737	2.786	.014

a. Dependent Variable: Profit after Tax

indicating the financial performance of the organizations is explained in Analysis Stage - I.

(i) Case I : Regression analysis has been performed taking sales turnover as a dependent variable and both internal and external uncertainty scores as independent variables. High values of *R* square (0.748) indicate that the model fits the data very well and *R* Square value indicates that uncertainty of the environment can explain the sales turnover of the select organizations at about 74.8 % level (Table 7). The coefficient that is associated with internal uncertainty and external uncertainty indicates that both of them are statistically highly significant (Table 8).

(ii) Case II : Regression analysis has been performed taking profit after tax (PAT) as a dependent variable and both internal and external uncertainty scores as independent variables. The results show that *R*- value stands good for the association between variables and *R* Square value indicates that uncertainty can explain the profit after tax of

Table 11. Output of Regression Analysis

Model Summary[b]					
Model	***R***	***R* Square**	**Adjusted *R* Square**	**Std. Error of the Estimate**	**Durbin-Waston**
1	.831a	.690	.649	137921.2902	2.510

a. Predictors : (Constant), external uncertainty, internal uncertainty

b. Dependent Variable: Capital Employed

Table 12. Significance of Perceptual Uncertainty Measures

Coefficients[a]					
	Unstandardized Coefficients		**Standardized Coefficients**		
Model	**B**	**Std. Error**	**Beta**	***t***	**Sig**
1. (Constant)	-872979	260903.0		-3.346	.004
internal uncertainty	126373.9	22738.090	1.057	5.558	.000
external uncertainty	125818.4	25927.795	.923	4.853	.000

a. Dependent Variable: Capital Employed

Table 13. Representation of Results of Regression Analysis

	Sales Turnover	**PAT**	**Capital Employed**
No of Organization	18	18	18
R Value	0.865	0.634	0.831
R-Square Value	0.748	0.401	0.690
Standardized Coefficient of Internal Uncertainty *(IU)*	1.116	0.786	1.057
Standardized Coefficient of External Uncertainty *(EU)*	0.926	0.737	0.923

the select organizations at about 40.1 % level (Table 9). The coefficient that is associated with internal uncertainty and external uncertainty indicate that both of them are statistically significant at the level of 1% and 1.4%, respectively (Table 10).

(iii) Case III : Regression analysis has been performed to analyze the associative relationship between a dependent variable (capital employed) and two uncertainty reduction mechanisms namely, internal and external, as independent variables. The results show that *R* - value stands good for an association between variables and the *R* Square value indicates that uncertainty reduction strategies can explain the capital employed of the select organizations at about 69.0 % level (Table 11). The coefficient that is associated with internal uncertainty and external uncertainty indicates that both of them are statistically highly significant (Table12).

Another significant observation that comes out from the above three regression analysis is that in each case, standardized coefficients associated with internal uncertainty *(IU)* are always greater than the standardized coefficients associated with external uncertainty *(EU)*. The results also justify the third hypothesis that the levels of influence of internal uncertainty are quite different from the levels of influence of external uncertainty. It is to be mentioned that in all the regression models estimated above, the multicollinearity phenomenon does not appear to be very much problematic. This is supported by the condition index. The results are summarized in the Table 13.

Conclusion and Managerial Implications

The study gets its inspiration from a long time debate between subjective and objective measures of uncertainty. Moreover, the justification of subjective measures has not been satisfactorily done in earlier literature. The purpose of the research was first to determine the generic construct of objective measure of volatility. The direct measure of market uncertainty was obviously reflected in sales turnover. For that reason, error variance has been measured on the basis of extent of variation of sales turnover over time. In the next phase, the subjective measure of uncertainty based upon the perception of the top executives of the organizations has also been established. Not only that, the subjective measure has also indicated two dimensions, that is, internal uncertainty and external uncertainty. The most significant part of the research is that there is a strong correspondence between subjective measure and the error variance, which is a measure of market volatility. The subjective measure of uncertainty has received a strong support from the market end which was basically the true mirror of the environment of the said sector in the context of the liberalized Indian economy. Now, we have established the level of influence of the subjective measure on the performance of the organizations, namely, sales turnover, profit after tax (PAT), and capital employed. This research output would provide enough potential to bridge the gap in between these two measures. In addition to that, it is also indicated that internal uncertainty (IU) should receive more attention than external uncertainty (EU) to combat market volatility. This outcome would also motivate strategic decision makers of the organizations to formulate effective models to address uncertainty for better performance.

Limitations of the Study and Scope for Future Research

The findings reported in this paper suggest that future research efforts should be directed towards determining volatility for more sectors. This model will enable researchers to study the effect of market volatility on organizational functioning and performance. It will also facilitate cross-industry comparisons. Each of the 18 organizations may also be mapped based on their internal and external uncertainty and the policy framework may also be devised for each organization separately.

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