TO STUDY FACTORS FACILITATING DISRUPTIVE INNOVATION TECHNOLOGY

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Abstract: Innovation has become a necessity for organisation to survive in the present competitive environment. Specifically, radical innovations are crucial to the economic sustainability of firms in industries that are dependent on competitive research and development for comparative advantage and long-term survival. Managers operate at a place between order and chaos. This study examines endogenous organisational factors facilitating disruptive innovation across two sectors Packaging and Energy. Result shows that radical innovation is facilitated by organisational culture of experimentation, clarity in vision and dedicated funding, intrafirm linkages and managing effective transitioning between projects and design of project teams.

Keywords: radical, intrafirm linkages, disruptive innovation, culture

Introduction: Innovation is a necessity for firms that compete in environments where change is pervasive, unpredictable, and continuous (Brown & Eisenhardt, 1997). It has been the focus of much work in strategy and related fields over the last 20 years (Drazin & Schoonhoven, 1996; Fiol, 1996; Glynn, 1996; Ibarra, 1993; Shane &Venkataraman, 2000; Van de Ven, Polley, Garud, & Venkataraman, 1999; Walsh & Linton, 2000). Although there is a volume of research on what strategies and structures make a firm innovative, there is less evidence on what processes (e.g., improvisation, experimentation, and transitioning from one project to the next) enable a firm to be continuously or more or less innovative (Brown &Eisenhardt, 1998). Moreover, studies rarely distinguish among types of innovation (Damanpour, 1992; Drazin & Schoonhoven, 1996; Klein &Sorra, 1996).

Literature Review: Research on innovation has progressed along a variety of course rather than a single one; it encompasses diverse types varying in scope, depth, and objective. Among the different types of innovation identified by researchers are administrative and technical, product and process, technological and architectural, and incremental and radical (Chiesa, Coughian, & Voss, 1996). Most innovations simply build on what is already there, requiring modifications to existing functions and practices, but some innovations change the entire order of things, making obsolete the old ways (Van de Ven et al., 1999, p. 171). Tushman and Romanelli (1985) along with other researchers (e.g., ersick, 1991) distinguish broadly between two types of organization change: incremental and radical.

Intrafirm linkages are defined as cross-functional and coordination mechanisms, designed toincrease integration. These linkages structurally link individuals from different functional units, thereby facilitating the exchange of ideas and the collaborative efforts of a variety of people concurrently working on different aspects of a project (Legnick-Hall, 1992; Spender & Kessler, 1995). Thus, our study considers it as factor influencing radical innovation.

According to complexity theory, innovation cannot be planned but must evolve; it requires experimentation, openness and improvisation (Lewin, 1999, p. 215). "Over time a firm is acombination of frequent small changes made in an improvisational way that occasionallycumulate into radical strategic innovations, changing the terms of competition fundamentally". (Anderson, 1999, p.224). Brown and Eisenhardt (1998), in their groundbreaking study of firms in the computer industry, found that successful innovators in the computer industry were able to improvise, experiment, and choreograph transitions from one project or product to the next. Thus, three other factors considered for the study were experimentation, openness, and improvisation.

Research Methodology: The research was exploratory in nature. Primary data was collected through self-administered questionnaire. Questionnaire was designed to identify factors that support disruptive innovation Technology in an organisation instead of incremental innovation. We assured executives of confidentiality and promised them a report of the aggregated findings once the study was completed. A reminder letter with a replacement survey questionnaire was mailed 3 weeks after the initial mailing.

We conducted semi structured follow-up interviews of a total of 15 executives who volunteered to talk with us. We conducted interviews to help generate descriptive indicators of radical innovation, to avoid misrepresentation or misinterpretation of the results from the questionnaire data, and to help strengthen the results of the quantitative analyses. The interviews were conducted on the telephone and lasted between 20 and 30 minutes.

Table 1: KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.816
Bartlett's Test of Sphericity	Approx. Chi-Square	4157.501
	df	210
	Sig.	.000

Table 2 : Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.900	42.382	42.382	8.900	42.382	42.382	7.605	36.216	36.216
2	3.851	18.336	60.719	3.851	18.336	60.719	3.119	14.853	51.069
3	1.705	8.120	68.839	1.705	8.120	68.839	2.826	13.458	64.527
4	1.371	6.531	75.369	1.371	6.531	75.369	2.277	10.843	75.369
5	.958	4.561	79.930						
6	.866	4.126	84.056						
7	.746	3.551	87.607						

Sample Design:

The respondent for the study comprised of employees working in Packaging and Energy sector.190 respondents were contacted for the collection of data, out of which 153 gave response. Out of 153 only 138 questionnaires were obtained completely, 15 were nullified due to incomplete responses.

Data Collection Tools: The questionnaire was designed to collect the data. It had two parts. Part I comprises of demographic data collection and part two contains 21 items to identify key factors that support disruptive innovation Technology in an organisation. Respondents were required to rate the responses on a 5-point rating scale ranging from Always accurate (5) to Very inaccurate (1).

Data Analysis: Van de Ven et al. (1999, p. 17) assert that the processes of innovation are fundamentally the same across very different organizational structures and settings. We performed analyses of variance to determine whether tests of the research had to be conducted while controlling for the effects of industry. We found no significant differences across the industries in the research variables; therefore, we aggregated data across the three industries

There were 21 items to study factors leading to disruptive innovation based on five point likert scale. Cronbach's alpha was calculated to check the internal consistency and reliability. The value of alpha coefficient was .9414 which indicates the scale is highly reliable.

KMO measure was taken and the result of Kaiser-Meyer-Olkin measure (.816) and Barlett's Test of Sphericity (chi-square- 4157.5 and significance- 0.00) indicate that the factor analysis done with all the variables is effective (Table 1)

Extraction Method: Principal Component Analysis.

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.a Rotation converged in 14 iterations.

Grouping of variables: From table 3, all the variables which have high positive loadings with factors (value more than .5) are grouped. Thus, it could be inferred that factor 1 (Experimentation) that accounts for 36% of variance comprise of variables- Extensive experimentation, Well defined metrics & Explicit project priorities.

Factor 2 (Vision) which accounts for 14.853% variance comprises of variables- Clarity of Collective vision, Attention to the future needs of customer, Dedicated fund supporting new product development. Factor 3 (Internal communication) which accounts for **13% of variation in the data comprises of variables** -Cross project communication & Project coordinator leading transition**.**

Factor 4 (Role of innovation champion) accounts for **10% of variation in the data comprises of variables -** need for innovation champion, core team leading product concept.

Table 5 :Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.095(a)	.679	.021	.30273

A Predictors: (Constant), factor4, factor2, factor3, factor1

A regression analysis of the sample reveals that the adjusted R2 value is .021, i.e., 2.1percent of the variation in the dependent variable disruptive innovation. Further, the significant coefficient value of all the dimensions is less than 0.050, showing that the independent variables all have a significant impact on the dependent variable innovation.

Table 6: ANOVA(b)

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	.980	4	.245	.301	.017(a)
Residual	106.756	131	.815		
Total	107.735	135			

A Predictors: (Constant), factor4, factor2, factor3, factor1

A Dependent Variable: innovation

Table 7: Coefficients(a)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta	B	Std. Error
1 (Constant)	1.276	1.121		1.139	.257
factor1	.052	.208	.453	.250	.003
factor2	.032	.129	.022	.249	.003
factor3	.231	.218	.100	1.060	.021
factor4	-.102	.359	-.061	-.284	.047

A Dependent Variable: innovation

Based on the above data, the regression equation will be –

DI =1.27+.052F1+.032F2+.231F3+.102F4

Where DI is disruptive innovation.

Conclusion: The results of this study suggest that factors favouring the frequency of radical innovation include organizational culture promoting continuous experimentation and explicit metrics to measure new products. Followed by clarity in vision and future scope of organisation and dedicated fund for new product development. Intra firm linkages also was identified as important stimulating factor and need for cross functional communication and project meeting was found to be essential. Design and composition of project team, emphasising specifically for need for project champion to lead the project, composition of team having old and new team members. It was interesting to observe that lack of talent and need for firm to have well-established

routines for leaving old business areas were not identified as facilitating factors.

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