PROBLEMISTIC SEARCH: EXAMINING THE EFFECTS OF ENVIRONMENT AND MULTI-LEVEL ATTRIBUTES ON FIRM BEHAVIOR

A THESIS

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1. General Introduction

1.1 A Behavioral Theory of the Firm

A Behavioral Theory of the Firm, published by Richard Cyert and James March in 1963, has been one of the most influential management books of all time and has inspired new approaches to studying organizations. Departing from the predominant approaches of studying organizations based on the neoclassical economics' conceptualization of the theory of the firm, A Behavioral Theory of the Firm proposes several behavioral assumptions. Doing so has led to the pursuit of a more realistic and grounded understanding of organizations. Of utmost importance has been the assumption of bounded rationality of decision-makers (Simon, 1947,1991), which leads a firm to make satisficing choices and has encompassing effects on the firm's decision-making and adaptation processes. In addition, organizations are conceptualized as coalitions of individuals with conflicting goals, thereby emphasizing the plurality of organizational interests. Besides, the theory places significant emphasis on organizational routines as a precursor of persistence in firm behavior. Whereas search processes triggered by problems and excess slack are seen as sources of variation and change.

Specifically, the theory proposes four relational concepts of *problemistic search, uncertainty avoidance, quasi resolution of conflict, and organizational learning*. Problemistic search assumes that search is motivated by problems, simple-minded, mechanistic, and biased by organizational experiences. Uncertainty avoidance implies that firms avoid uncertainty by either delaying decisions till uncertainty is resolved or negotiate with the environment through contracts. Quasi resolution of conflict involves coping with conflict by attending to organizational goals sequentially and using satisficing levels while identifying solutions. Organizational learning implies learning from their own experience and the experience of others.

In the current theses, the author deals with the relational concept of *problemistic search* in detail, which is discussed in the subsequent section.

1.2 Problemistic Search and A Behavioral Theory of the Firm

Problemistic search, also known as the theory of performance feedback, is a theory of organizational search motivated by organizational problems. Since organizations are goal-directed entities, failure to achieve pre-set goals, also known as aspirations, triggers a search for solutions, resulting in organizational changes and risk-taking initiatives (Cyert & March, 1992; Greve, 1998). Guided by existing routines, Cyert and March (1963) suggest that the search for solutions is near the source of the problem, the firm's experiences, and expertise. Hence, the process of problemistic search is path-dependent. According to the behavioral theory, aspirations are a function of both: i) aspirations' adaptation to the past experience of the organization, i.e., *historical aspirations*; ii) aspirations' adaptation to the experience of comparable organizations, i.e., *social aspirations*. Historical aspiration is a function of the firm's recent performance and the past aspiration level, whereas social aspiration is determined by the other firms' performance (Greve, 2003; Xu, Zhou, & Du, 2019; Yu, Minniti, & Nason, 2018).

The theory of performance feedback or problemistic search has spurred a growing body of empirical research, with a specific focus on the nature of firm responses to performance feedback. Much work has shown that performance below the aspiration level affects specific outcomes such as research and development and innovations (Blagoeva *et al.*, 2019; Greve, 2003, 2011; Ye, Yu, & Nason, 2020), internationalization (Ref & Shapira, 2017), divestitures (Kuusela, Keil, & Maula, 2017), alliances (Baum *et al.*, 2005; Tyler & Caner, 2016) and acquisitions (Iyer & Miller, 2008; Iyer *et al.* 2018). Empirical research also shows that performance below the aspiration levels enhances risk-taking by firms (Greve, 1998) and leads them to intensify their search efforts (Chen, 2008; Chen & Miller, 2007). However, research remains inconclusive about how performance shortfall relative to aspiration determines organizational changes and risk-taking behavior. Particularly, empirical studies find that organizations exhibit risk-taking (Greve, 2003) and risk-aversion behavior (Iyer & Miller, 2008) when they face poor performance relative to aspirations and hence remain indeterminate.

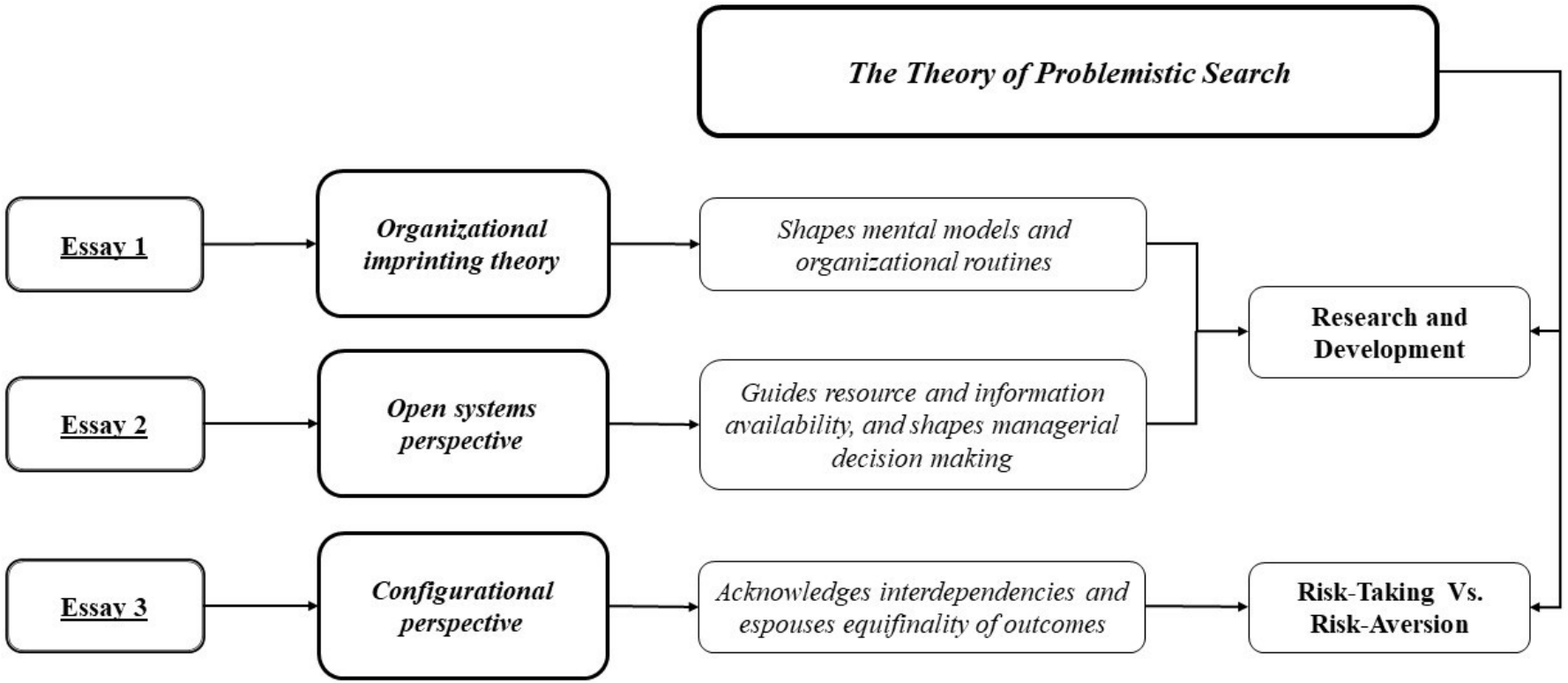
To explain heterogeneity in firm behavior following performance shortfall, research has identified several organizational, individual, and performance specific contingencies. Firm-level factors such as firm age (Desai, 2008), firm size (Audia & Greve, 2006), organizational experience (Desai, 2008), and the firm's proximity to bankruptcy (March & Shapira, 1992) are conditions that contribute to variation in firm responsiveness. Individual specific factors such as managerial incentives (Alessandri & Pattit, 2014; Lim & McCann, 2014), CEO power (Blagoeva *et al.*, 2019), CEO overconfidence (Schumacher, Keck, & Tang, 2020) also influence the decision-makers' interpretation of performance feedback and their motivation to implement organizational changes. Finally, performance-specific contingencies such as persistence of performance feedback (Iyer *et al.*, 2018; Yu *et al.*, 2018) and inconsistent performance feedback (Joseph & Gaba, 2015; Lucas, Knoben, & Meeus, 2018) are also found to impact the extent to which organizations respond to performance shortfalls.

The behavioral theory in conceptualizing problemistic search as an automated process assumes the following concerning organizational search for performance-enhancing solutions. First, it recognizes that the organizational search for solutions is guided by existing routines and capabilities, underscoring the importance of initial conditions. Second, the theory and subsequent empirical research have focused on the firm's internal environment, particularly the dominant coalition and the processes through which they negotiate with the environment. In doing so, research has underacknowledged the importance of environmental forces that influence the availability of resources and information guide managerial decision making by impacting cognitive processes such as attribution and attention. Third, behavioral theorists suggest that organizational action results from a joint influence of multi-level attributes (Argote & Greve, 2007; Gavetti *et al.*, 2012) across the firm's opportunity, motivation, and ability (Greve, 1998). This highlights interdependencies between various forces impacting complex entities such as organizations, and the presence of teleological elements of organizational change, emphasizing equifinality of outcomes.

1.3 Overarching Research Framework

Drawing from the concepts discussed above, the author in the first and the second essay of this thesis seeks to understand the effects of historical conditions and the current environment on under-performing firms' organizational responses. Leveraging the organizational imprinting theory (Stinchcombe, 1965) and the perspective of organizations' being open systems (Kast & Rosenweig, 1972) in the theory of performance feedback, the author hopes to bring forth how these influences shape the process of problemistic search and determine organizational responses to performance shortfall. While in the last essay, the author wishes to resolve the theoretical and empirical deadlock between the risk-taking and risk-aversion behavior of firms by adopting a configurational perspective of organizations. Figure 1.1 illustrates the overall research framework of the current thesis.

Figure 1.1. Thesis Framework



1.4 Summary of the Thesis Essays

This thesis comprises of the below mentioned three essays:

In the first study, the author integrates insights from the organizational imprinting theory with the problemistic search literature to inquire how a firm's historical environments affect the adaptive process of innovative search during periods of performance shortfall. Utilizing the context of institutional transitions in the emerging economy of India, the author suggests that imprints stamped by the inhibitory policy environment of the pre-liberalization institutional epoch shape decision-makers' mental models, organizational routines, and capabilities and hence impede innovative search by firms facing performance shortfall. Additionally, the author postulates that the strategic choices of firms about international search and exogenous conditions of foreign competition attenuate the effects of initial institutional imprints on the relationship between performance shortfall and innovative search. We test our predictions on a large unbalanced panel dataset of 9094 firm-year observations from 1556 unique firms belonging to the Indian manufacturing industry during 1995 – 2010 and find support for our hypotheses. Our findings unravel the importance of a firm's historical conditions in explaining path-dependent processes of problemistic search and offer implications for research on the innovative search behavior of firms facing performance shortfall.

In the second study, the author cognizes that organizations are open systems that are subject to environmental influences, and hence theorizes that the organizational task environment regulates search intensity in response to performance shortfall. While the behavioral theory treats the environment as an entity that is controllable by the focal firm, recent developments in this tradition have called for a more active role of the environment in problemistic search. To that end, this study examines the contingent effects of three dimensions of task environment — environmental dynamism, munificence, and complexity on the relationship between performance shortfall and the firm's R&D search. Specifically, we argue that these dimensions of the task environment influence information and

resource availability and shape managerial decision- making processes, hence guide a firm's response. Accordingly, we predict that environmental dynamism would weaken, and environmental munificence and complexity would strengthen the relationship between performance shortfall and R&D search. We test for our predictions on a sample of 4719 R&D investments made by 988 manufacturing firms from the United States from 2010 through 2016. Overall, our findings suggest a more salient role of organizational task environments in guiding firm search behavior post negative performance discrepancy.

This third study integrates the configurational perspective with the problemistic search literature to derive the constellations of factors that impact firm risk-taking when performance falls short of aspiration levels. The dominant perspective in problemistic search literature adopts a contingency view by analyzing the isolated effects of individual determinants on firm risk-taking. The present study leverages the configurational perspective to explore how combinations of multi-level predictors across the individual, organizational and environmental context that shapes the firm's opportunity space, motivation, and ability, influence firm risk-taking post-performance shortfall. The author adopts the fuzzy set methodology to conduct this inductive research in the US pharmaceutical industry, and our sample comprises 635 firm-year observations from 2007 to 2016. Our exploratory analysis reveals five configurations, each for high and low levels of firm risk-taking on underperformance, emphasizing equifinality, and provides support for complex interactions among predictor conditions. Based on the findings, the author outlines an integrative theoretical framework and develops a mid-range theory of firm risk-taking on negative performance discrepancy. Our findings provide novel theoretical insights with important implications for the behavioral theory of the firm. Table 1.1 provides a glimpse of the thesis essays.

Table 1.1. Overview of thesis essays

Motivation	Essay	Theoretical lens	Study context	Sample and empirical model	Main findings	Contribution
The role of history in path-dependent processes and outcomes of problemistic search	Essay I	i) Problemistic search ii) Organizational Imprinting Theory	Indian manufacturing industry	9094 firm-year observations from 1995 - 2010. Fixed effects OLS panel regression with Heckman 2 stage model to address sample selection bias	Imprints stamped by the institutional epoch prior to liberalization negatively moderates the relationship between performance shortfall relative to aspirations and innovative search	Firm outcomes following path-dependent processes of problemistic search are sensitive to initial environmental conditions
How does the environment influence R&D search intensity?	Essay II	i) Problemistic search ii) Open systems perspective, Information processing, Resource Dependence View, Mental Models	U.S. manufacturing industry	4719 firm-year observations from 2010 - 2016. Fixed effects OLS panel regression with Heckman 2 stage model to address sample selection bias	Environmental dynamism (complexity) negatively (positively) moderates the relationship between performance shortfall relative to aspirations and R&D search	The intensity of R&D search following performance shortfall is guided by the task environmental influences

Under what conditions do firms exhibit risk-taking versus risk-aversion tendencies?	Essay III	i) Problemistic search ii) Configurational theory	U.S. pharmaceutical industry	Six hundred thirty-five firm-year observations from 2006 - 2017. Fuzzy sets qualitative comparative analysis 3.0	Several combinations of conditions lead firms to take exhibit risk-taking vs. risk aversion following performance shortfall.	Risk-taking and risk aversion behavior are shaped by interdependencies between elements that influence opportunity, motivation, and ability across the individual, organization, and the environment. Equifinality of firm risk-taking behavior

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7. Appendix A

1. Details of the measure: 'Pre-liberalization institutional imprint'

As we discuss in the methods section, we track the industry wise imports and domestic production data from 1956 – 1991 and couple it with the strength of reforms index to measure the extent of imprints impressed by the pre-liberalization institutional epoch. Below, we have elaborated on the measurement of the variable of 'pre-liberalization institutional imprint' for two of the observations from our sample, where the firms belong to the National Industry Classification code – 241 (Manufacture of basic iron and steel).

The industry wise data of average imports and average domestic production (in Rs. Millions) of the NIC code 241 for the periods: 1956 – 1960, 1961 – 1970, 1971 – 1980 and 1981 – 1991 is tabulated below:

Manufacture of basic iron and steel (NIC code – 241)

a	Time periods	1956 – 1960	1961 – 1970	1971 – 1980	1981 - 1991
b	Average imports (in Rs. Millions)	25.75	105	471.5	1155
c	Average domestic production (in Rs. Millions)	315	926	3737.5	16783.5
d	Import penetration (b/c)	0.082	0.113	0.126	0.069

Firm specific details about two sample observations along with the calculation of the 'pre-liberalization institutional imprint' measure is provided below:

S. No	***Firm name***	***Year of incorporation***	***Focal year***	***Duration spent under different time periods (in years)***				***Import penetration under different time periods***				***Decay gradient***	***Pre-liberalization institutional imprint***
				1956-60	1961-70	1971-80	1981-91	1956-60	1961-70	1971-80	1981-91		
1	Firm A (Avon Ispat and Power Limited)	1968	2005	0	2	10	11	0.082	0.113	0.126	0.069	0.82	= {0 × (1 - 0.082) + 2 × (1 - 0.113) + 10 × (1 – 0.126) + 11 × (1 – 0.069)} × 0.82 = ***17.03***
2	Firm B (Tata Steel Limited)	1907	1997	5	10	10	11	0.082	0.113	0.126	0.069	0.90	= {5 × (1 - 0.082) + 10 × (1 – 0.113) + 10 × (1 – 0.126) + 11 × (1 – .069)} × 0.90 = ***28.46***

2. Analysis after inclusion of an additional control variable 'Avg. industry R&D intensity'

Table A.2. Fixed Effects OLS Panel Regression to Predict Innovative Search

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Firm size (ln)	-0.013^{+}	-0.012	-0.009	-0.010	-0.009	-0.010
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Unabsorbed slack	0.004	0.004	0.004	0.004	0.004	0.004
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Absorbed slack	-0.169	-0.165	-0.168	-0.217^{+}	-0.166	-0.218^{+}
	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
Potential slack	0.009*	0.009*	0.009*	0.008*	0.008*	0.008*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Bankruptcy risk	-0.010	-0.012^{+}	-0.011^{+}	-0.011^{+}	-0.012^{+}	-0.012^{+}
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Duration of underperformance	0.003	-0.000	-0.000	-0.000	0.000	0.001
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Avg industry R&D intensity	0.288***	0.283***	0.283***	0.286***	0.295***	0.296***
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
Industry dynamism	0.203***	0.217***	0.212***	0.212***	0.222***	0.222***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Industry munificence	0.034	0.029	0.029	0.029	0.021	0.020
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Performance relative to historical aspiration	-0.032	-0.028	-0.030	-0.034	-0.038	-0.041
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Underperformance intensity		0.185***	0.175***	0.173***	0.162***	0.166***
		(0.04)	(0.03)	(0.04)	(0.03)	(0.04)
Overperformance intensity		0.079^{+}	0.070	0.074^{+}	0.075^{+}	0.078^{+}
		(0.05)	(0.04)	(0.04)	(0.04)	(0.04)
Pre-liberalization institutional imprint			-0.012^{+}	-0.012^{+}	-0.012^{+}	-0.013^{+}
			(0.01)	(0.01)	(0.01)	(0.01)
Underperformance intensity × Pre-liberalization institutional imprint (H1)			**-0.008***	-0.007^{+}	-0.007*	**-0.007***
			(0.00)	(0.00)	(0.00)	**(0.00)**

International search				0.064*		0.068**
				(0.02)		(0.03)
Underperformance intensity × International search				0.211		0.101
				(0.15)		(0.16)
Pre-liberalization institutional imprint × International search				0.001		0.001
				(0.00)		(0.00)
Underperformance intensity × Pre-liberalization institutional imprint × International search (H2)				**0.016**		**0.017**
				(0.01)		**(0.02)**
Intensity of foreign competition					0.363***	0.371***
					(0.07)	(0.07)
Underperformance intensity × Intensity of foreign competition					-1.833***	-1.789***
					(0.37)	(0.40)
Pre-liberalization institutional imprint × Intensity of foreign competition					-0.014*	-0.014*
					(0.01)	(0.01)
Underperformance intensity × Pre-liberalization institutional imprint × Intensity of foreign competition (H3)					**0.056+**	**0.068***
					(0.03)	**(0.03)**
Inverse mills ratio	0.040**	0.043**	0.045***	0.046***	0.037**	0.039**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.004	-0.012	-0.009	0.006	0.001	0.017
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
N	9094	9094	9094	9089	9094	9089
Model F	9.763***	10.032***	9.572***	9.002***	8.299***	7.830***

Note: + p<0.10; * p<0.05; ** p<0.010; *** p<0.001