

Original Article

Proposal for the MSG's CS-LR Behavioral Model: Dual Formalization and Microeconomic Pivot of the Firm under Bounded Rationality

MAMADOU SALLA GUEYE

Tronc Commun (TC), Ecole Polytechnique Thies (EPT), Thies, Senegal.

ABSTRACT: *The CS-LR behavioral model developed by Dr. Mamadou Salla GUEYE presented in this paper is a single framework for managerial and systemic optimization at the crossroads of behavioral economics and management sciences. This research transcends the boundaries of purely transactional or financial models and models the impact of intangible relational variables - Confidence (C), Satisfaction (S) and Loyalty (L) - in reducing internal and external operational Risks (R). The true original contribution of the CS-LR model is to turn a perception-based model into a multimodal behavioral matrix. It constructs a structural triangulation between declarative perceptions (what actors say), observational behaviors (what actors really do) and systemic manifestations (objective organizational events). This paper introduces a conceptual proposition supported by illustrative applications. The proposed framework suggests that the analysis of structural alignment or divergence between declarations and observations is a powerful indicator of organizational friction. We formalize the trade-off between quantitative performance and multi-layered relational dynamics by introducing an organizational efficiency multiplier (θ) in an augmented production function via a dual Lagrangian resolution. To solve the problem of reverse causality and endogeneity, the framework is structuralized by a structural equation modeling (SEM) system that is designed for dynamic feedback loops and time-lagged parameters. The CS-LR model is conceptually applied to two major managerial challenges: steering an engineering institution and allocating activities in industrial delegation. The model describes a holistic, sustainable and powerful path for contemporary complex governance.*

KEYWORDS: CS-LR Model, Bounded Rationality, Multimodal Triangulation, Double-Loop Feedback, Transaction Costs, Dual Optimization, and Systemic Governance.

1. INTRODUCTION AND BACKGROUND

The economic contexts of today are marked by high levels of complexity and interdependency. Hence the organizations face a double challenge – to be quantitative rigorous and relationally resilient. The traditional firm theory frameworks dominate with short-term financial maximization paradigms and rigid hierarchical controls, but they do not reflect the intrinsic value of human and intangible dynamics.

In an effort to fill this conceptual void, this paper presents the mutated CS-LR behavioral model [developed by Dr. Mamadou Salla GUEYE]. The core contribution of this framework is not simply the introduction of risk (r) in organizational equations. It is a deeper epistemological shift: the CS-LR model transforms a behavioral framework historically based on self-reported declarations into a multimodal behavioral matrix able to put perception, observed cooperation, and objective systemic events into a dynamic feedback loop within complex organizations.

The traditional approach to engineering and operational management has been deterministic modeling. The emphasis is on optimizing tangible resources, such as physical capital and human labor. However, the modern management of complex socio-technical systems systematically faces the “human factor” that traditional models often reduce to a residual variable or a stochastic noise. But the CS-LR model contradicts this reductionism by embedding endogenous variables of human behavior directly into the mathematical optimization functions of the firm.

This study lies at the crossroads of behavioral economics and management sciences. Bounded and situational rationality substitutes the reductionist dogma of homo economics, offering the microeconomic foundations for the analysis of cooperative or opportunistic behaviors in behavioral economics. At the same time, management sciences offer the operational schemes to convert these psychological, social and observational variables into strategic management levers. The model does not treat intangible assets as abstract ideas, but lists these disciplines as strict determinants of the overall production function.

The theoretical contribution of this research is organized in two major managerial and operational challenges experimented in the field, here introduced as illustrative application scenarios to discuss the paradigm shift from the traditional core nucleus to

systemic governance: - Axis 1 (academic environment): strategic management of a service function in an engineering school (école d'ingénieurs), in which logics of different stakeholders (researchers, students, administration, industrial partners) meet and clash. - Axis 2 (industrial delegation): optimal distribution of functional activities between five autonomous entities, linked by sub-delegation contracts, without falling into the pitfall of prohibitive bureaucratic control.

To address these issues, the CS-LR framework models Confidence (C), Satisfaction (S) and Loyalty (L) as dynamic levers to minimize internal and external Risks (R) and operational uncertainties. Emerging social capital allows organizations to fluidize complex interfaces through replacing prohibitive agency costs with self-regulation of behavioral alignment.

It is important to state clearly that this paper constitutes a conceptual proposition and a theoretical development. The two practical contexts described (the service function in an engineering institution and the industrial sub-delegation) are presented as illustrative applications designed to explore the operational potential of the model, rather than a definitive empirical validation.

2. THEORETICAL BACKGROUND AND LITERATURE REVIEW

To understand the contribution of the CS-LR behavioral model of Dr. Mamadou Salla GUEYE, its theoretical basis must be analyzed in relation to classical microeconomics and organization theory. Modern governance regimes are often afflicted by a contractual fiction, the fiction that a contract can be perfect in the sense of anticipating all future contingencies. In this section, we explore how the CS-LR model can overcome the limitations of traditional agency theories and transaction cost economics, through the use of multimodal behavioral insights.

2.1. AGENCY THEORY AND MORAL HAZARD MITIGATION

The delegation relationship was introduced by Jensen and Mackling (1976). In this relationship a principal delegates the implementation of performance to one or more agents. Two informational pathologies, information asymmetry and moral hazard, structurally undermine this organizational architecture. For the allocation of activities among five autonomous industrial entities (Axis 2), standard agency theory (Laffont and Marti mort, 2002) suggests complex incentive contracts or sophisticated monitoring systems. However, modern organizational economics (Gibbons and Roberts, 2013) demonstrates that incentives based solely on quantitative indicators lead to serious perverse effects such as distortions of effort and destruction of the organizational climate. The CS-LR model resolves this by making loyalty (L) an endogenous regulator of information asymmetry, converting external contractual constraints into internal behavioral commitments verified by both perceived and observed reality.

2.2. TRANSACTION COST THEORY AND INFLATION CONTROL

Oliver Williamson (1985, 2010) showed that economic coordination is never costless. In transactions characterized by asset specificity and uncertainty, organizations face significant transaction costs ex-ante (contract drafting) and ex-post (monitoring and dispute arbitration). Williamson's framework is built on two plausible behavioral assumptions: bounded rationality and possible opportunism. The traditional organizational response to potential opportunism is more bureaucracy and tight hierarchical control. However, recent research in systemic management (Puranam et al., 2014) shows that coercive control is prohibitively expensive, rigid and heavy structural costs. The CS-LR model provides a formal alternative: Confidence (C) and Loyalty (L) are non-market non-bureaucratic coordination mechanisms. Relational capital is a direct substitute for transaction costs, facilitating the smooth allocation of activities among entities without bureaucratic inflation.

2.3. THE CONCEPTUAL SHIFT: BEHAVIORAL ECONOMICS AND SOCIAL CAPITAL

The CS-LR model is based on the behavioral economics and social capital theory, to avoid the restrictive pure mathematical optimization. Herbert Simon (1997) recognized that people are not global maximizers but they operate under bounded rationality and use organizational routines and heuristics. Therefore, the structural performance is highly dependent on stabilizing constructive behavioral routines. Experimental economics, in particular the "Trust Games" of Berg, Dickhaut and McCabe (1995), has demonstrated that real economic agents tend to cooperate and reciprocate in ways that are not consistent with the model of homo economics. Elinor Ostrom's (2010) work on common-pool resources also supports that autonomous communities can self-organize in an optimal manner without strict external market or state mechanisms given there is enough social capital.

2.4. SUGGESTED CAUSAL FRAMEWORK AND MULTI-LAYERED LOGIC

To formalize the systemic dynamics of the CS-LR model, we develop a short causal framework to specify causal directions between Confidence (C), Satisfaction (S), Loyalty (L), Risk (R), Organizational Efficiency (θ) and Performance (Q), driven by a continuous Double-Loop (D-B) feedback system.

TABLE 1 The Msg's CS-LR Multimodal Component Matrix

Layer	Component	Description	Indicators / Measurement
Layer 1: Declarative	Captures Perceptions	What actors think, feel, and state.	Likert Scales, Interviews on Confidence (C), Satisfaction (S)
Confrontation & Double-Loop Dynamics (D-B)	Key Model Indicators	Identifies differences between Layer 1 and Layer 2.	Differences between declared perceptions and observed behaviors
Layer 2: Observational	Captures Behaviors	What actors do and execute.	Observed cooperation, adherence to contracts, delegation rates
Triangulation & Holistic Feedback (Re)	Risk Mitigation	Mitigates internal and external operational risks (R).	Triangulation of data and holistic feedback mechanisms
Layer 3: Systemic	Encodes Manifestations	Objective organizational outputs.	Delays, incidents, structural costs, overall performance (Q)

2.5. MODEL ASSUMPTIONS:

- Assumption 1 (Baseline Production Constraint): Traditional organization performance (Q) is a function of material inputs, Labor (Lb) and Capital (K) constrained by a linear resource constraint.
- Assumption 2 (Bounded Rationality). Actors in the system are boundedly rational. Information asymmetries and transaction costs naturally give rise to internal and external operational risks (R) and behavioral friction.

2.6. RESEARCH HYPOTHESES:

- Hypothesis 1 ($S \rightarrow C$): Satisfaction (S) of the user or collaborator has a positive influence on the development of mutual Confidence (C) within organizational interfaces.
- Hypothesis 2 ($C \rightarrow L$): Confidence (C) positively and directly affects long-term behavioral Loyalty (L).
- Hypothesis 3 ($L \rightarrow S$ / Feedback Loop): Loyalty (L) stabilizes organizational routines, producing a self-reinforcing feedback loop that maintains subsequent Satisfaction (S) over time.
- Hypothesis 4 ($R \rightarrow C, S, L$): Unmanaged operational or transactional Risk (R) negatively moderates the behavioral blocks (C, S, and L).
- Hypothesis 5 ($C, S, L, R \rightarrow \theta$): The interaction of positive relational variables (C, S, L) and mitigated risk (R) increases the organizational efficiency multiplier (θ), $\theta = \phi(C, S, L) \cdot (1 - \sigma R)$.
- Hypothesis 6 ($\theta \rightarrow Q$): Increased organizational efficiency (θ) directly scales the overall quantitative and systemic Performance (Q) by optimizing the marginal productivity of traditional tangible inputs.

3. METHODOLOGY AND MATHEMATICAL MODELING COMPLETE

The mutated CS-LR model fuses three different levels of information:

- Declarative Level (Perception): What the actor thinks, feels and evaluates about confidence, satisfaction or loyalty as measured by self-reported metrics.
- Observational Level (Behavior) Measures what the actor actually does, how he/she cooperates, respects commitments, controls, delegates and reacts to incidents.
- Systemic Level (Complex System Manifestation): Gathers objective organizational events Such as incidents, delays, errors, coordination costs and structural complaints.

The theoretical implication is important: the discrepancy between declaration and observation is no longer considered as a simple bias to be eliminated, but becomes a key explanatory variable of the model. Let δ be the vector of structural divergence (e.g. High stated confidence with high observed coercive control). This divergence is a direct measure of the structural friction in the firm.

3.1. A PRODUCTION FUNCTION AUGMENTED

The augmented production function is given by:

$$Q = \theta(C, S, L, R, \Delta) \times f(Lb, K)$$

Where θ is the managerial efficiency index, positively indexed on confidence, satisfaction and loyalty, negatively indexed on unmanaged risk and high behavioral divergence parameters:

$$\theta = \phi(C, S, L, \Delta)$$

$$(1 - \sigma R) \text{ with } \phi' > 0 \text{ and } \sigma \in [0, 1]$$

The budgetary resource constraint is still linear:

$$R_{\text{available}} = aLb + bK \text{ (a is the wage rate and b is the cost of capital).}$$

3.2. PRIMAL FORMULATION: PRODUCTION OPTIMIZATION

The goal is to maximize the overall level of production subject to a tight constraint on the budget for resources:

- $\max_{Lb, K} Q = \theta(C, S, L, R, \Delta)$
 • $f(Lb, K)$ subject to: $aLb + bK \leq R_{available}$
 The Lagrangian is (L_P):
 $L_P(Lb, K, \lambda) = \theta(C, S, L, R, \Delta)$
 • $f(Lb, K) + \lambda (R_{available} - aLb - bK)$

The first order conditions (FOC) indicate that the Marginal Rate of Technical Substitution (MRTS) is a function of the behavioral efficiency multiplier θ . The marginal productivity of the labor (Lb) and capital (K) increases with the increase of social confidence (C) or internal loyalty (L) and small divergence metrics (Δ).

3.3. DUAL FORMULATION: MINIMIZING THE RESOURCES

The purpose is to minimize the consumption of physical and financial resources in an effort to obtain a pre-defined production (Q_0), defined by the management:

- $\min_{\{Lb, K\}} R_{cost} = aLb + bK \text{ s.t. : } \theta(C, S, L, R, \Delta)$
 • $f(Lb, K) \geq Q_0$
 Writing down the Lagrangian (L_D):
 $L_D(Lb, K, \mu) = aLb + bK + \mu (Q_0 - \theta(C, S, L, R, \Delta))$
 • $f(Lb, K)$

In case the CS-LR levers are successfully optimized, a high value of θ is obtained, which reduces the physical input (Lb, K) quantities required to reach Q_0 . This mathematically shows the economic utility of the multi-layer behavioral model.

3.4. SEM MEASUREMENT AND MEASUREMENT SPECIFICATION

To ensure the reproducibility of the proposed validation protocol, table 2 presents the operationalization of each latent construct within the structural equation modeling (sem) framework, including the target respondent groups, measurement sources, and the epistemic nature (reflective vs. formative) of the indicators.

TABLE 2 SEM Measurement Specifications for Protocol Validation

Latent Construct	Specification	Respondent Group	Measurement Source / Indicators	Justification
Satisfaction (S)	Reflective	Axis 1: Students	Perceived quality scales (SERVQUAL), survey forms, and expectation-delivery gaps.	Underlying satisfaction causes variations in observed evaluation items, which are highly correlated.
Confidence (C)	Reflective	Axis 1: Collaborators; Axis 2: Entity CEOs	Validated Likert scales measuring perceived integrity, competence, and benevolence of partners.	Confidence is a psychological state manifested in co-varying perceptions of reliability.
Loyalty (L)	Formative	Axis 1: Alumni; Axis 2: Operators	Behavioral metrics: renewal rates, duration of retention, and Net Promoter Scores (NPS).	Loyalty is made up of unique behavioral actions; indicators are not necessarily correlated.
Risks (R)	Formative	Risk Officers & Managers	Frequency of disruptions, contract breaches, delivery delays, and operational financial variances.	Risk is a composite construct created by the collection of distinct structural vulnerabilities.
Efficiency (θ)	Formative	Calculated Objective Metric	Multiplier based on the ratio of material inputs (Lb, K) to actual total output (Q).	Efficiency is determined by combining behavioral optimization for physical output measures.

This Table 2 is the same than the one above, it is just to clarify it.

3.5. METHODOLOGICAL SOLUTION OF ENDOGENEITY AND REVERSE CAUSALITY

One major difficulty in behavioral dynamics is the reverse causation within the feedback loops. Static cross-sectional data analyzed with SEM does not allow us to prove causal directions or eliminate endogeneity biases.

In practice, to solve this, the proposed validation protocol requires longitudinal research design with lagged measures (time-series cross-sectional data). The feedback loop is modeled dynamically for discrete time intervals ($t, t+1, t+2$) with the vectors of behavioral divergence (δ):

$$C_{t+1} = \beta_1 S_t + \beta_2 \Delta S_{t-1} - \gamma_1 R_t + e_{1,t+1} \quad L_{t+2} = \beta_3 C_{t+1} + \beta_4 \Delta C_{t+1} - \gamma_2 R_{t+1} + e_{2,t+2} \quad S_{t+3} = \beta_5 L_{t+2} + e_{3,t+3}$$

Where β_i are the structural path coefficients, γ_i are the negative incidence of internal and external risks and e_i is the stochastic disturbance terms.

- Temporal lagging: relational variables are measured at different points in time. Confidence at Time t+1 is predicted by Satisfaction and its behavioral divergence at Time t, which in turn predicts Loyalty at Time t+2.
- This temporal ordering ensures that the cause precedes the effect, thus satisfying the criteria of Granger causality.
- Repeated Observations: The validation protocol requires panel data of the same five autonomous industrial entities (Axis 2) or academic cohorts (Axis 1) across multiple consecutive quarters (minimum of 4 to 6 observation periods).
- Instrumental Variables (IV) and Controls: macro-environmental shocks (market volatility, shifting academic budgets) should be introduced as exogenous controls to control for omitted variable bias in the structural equations, or, to use internal instruments, historical lags should be used as IVs in a dynamic panel estimation.

4. CS-LR PATH MODEL STRUCTURAL SPECIFICATION

To make clear the conceptual character of this propositional schema, we explicitly note that no empirical dataset is analyzed in this paper. Instead, we offer the structural specifications and the Path Diagram (Figure 1) for future empirical testing of the multi-layered CS-LR model.

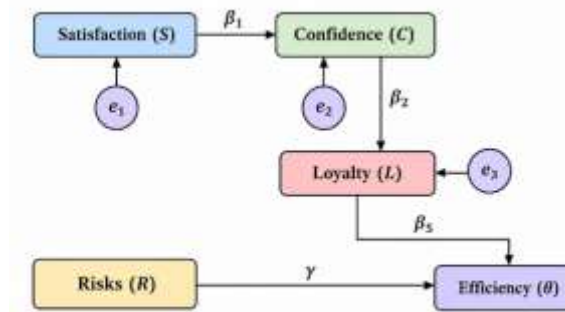


FIGURE 1 Path diagram of the CS-LR structural equation model

The present formal model offers a prescriptive framework for researchers when collecting field data on Axis 1 (academic institutions) and Axis 2 (the 5 industrial entities).

5. DISCUSSION AND EPISTEMOLOGICAL MAPPING

In an effort to find the analytical tools of the CS-LR model within the evolution of economic science we suggest the following taxonomy:

- Standard Theory (Neoclassical): Emphasizes perfect rationality and symmetric information. The CS-LR model sustains analytical dialog here via dual optimization modeling (Lagrangians), production isoquants, and structural optimization parameters.
- Extended Standard Theory: Considers information asymmetries and transaction costs. These concepts are built into the CS-LR model, but they use Loyalty regulation (L) against opportunistic profiles, rather than rigid bureaucratic monitoring.
- Non-standard theory (behavioral/institutional): bounded rationality (simon 1997) and behavioral heuristics. The CS-LR model functions through multi-layered triangulation to confront declarative perceptions with observational behaviors in a mapping out of systemic governance processes.
- Experimental Theory: Tests behavior hypotheses by empirical games. The CS-LR model is incorporated into this current by proposing laboratory or field protocols (e.g. Trust Games) to measure the objective propensity of actors to cooperate (C) and remain loyal (L).

6. CONCLUSION, LIMITATIONS AND EPISTEMOLOGICAL OUTLOOKS

This paper formalized the structural scope [of the Dr. Mamadou Salla gueye CS-LR behavioral model] as a framework for managerial and systemic optimization in complex organizations. The CS-LR framework: the virtual core value is not in the mere addition of risk (r). it goes deeper: the model reduces the gap between purely declarative perceptions, observed behavioral conformance and objective organizational outputs, making the chasm between words and deeds rich diagnostic data.

By introducing the organizational efficiency multiplier (θ) in an augmented production function, this study mathematically demonstrates that optimality is not only a function of the mechanical alignment of physical inputs, but rather the structural

alignment of the underlying relational layers. The dual Lagrangian resolution reveals that the maximization of output and the minimization of transactional friction are structurally indexed on this behavioral block.

Operationally, the model provides a basis for addressing two classic management challenges:

- In academic contexts (Axis 1), it transforms the management of complex services into a collaborative process where user-satisfaction loops become a driver of structural efficiency, minimizing friction costs.
- The industrial delegation (Axis 2) states that the fact that declarations are confronted with actual observed cooperation among five autonomous entities is a direct substitute for coercive monitoring mechanisms and reduces moral hazard without increasing administrative costs.

LIMITATIONS AND FUTURE DIRECTIONS

The mathematical structure is rigorous, but there are limits to how the framework can be implemented. Variables are multi-layered and require advanced methods of data collection including self-reported metrics, behavioral tracking and objective ledger assessments. Moreover, the use of structural equation models for small networks calls for PLS-SEM specific techniques to guaranty statistical convergence.

This work remains a fundamental proposition, laying a rigorous conceptual schema. The empirical work already done on the core c-s-l nucleus remains a solid ground for this framework. At the same time, this new multimodal architecture and triangulation schema is a distinct theoretical proposition. Future empirical research will be key to enrich, validate, and fill out this theoretical speculation, testing the path coefficients across various operational environments to confirm the model's systemic generalizability.

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