

**Institutional Logics, Isomorphic Pressures, and Coupling as Sources of Complexity in
the Network Structure of Public and Private Organizations**

Submitted by:

Navaneeth K.P. (Ph.D. scholar, IIM Kozhikode) (Corresponding Author)

Email: navaneethk16phd@iimk.ac.in

Prof. K Unnikrishnan Nair (Professor, OBHR, IIM Kozhikode)

Email: unni@iimk.ac.in

Contact Address:

Indian Institute of Management Kozhikode,
IIMK Campus P. O, Kunnamangalam, Kerala 673570, India

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ABSTRACT

Institutional theory has explored how institutions shape firm structure and behavior, but has paid little attention to how firm-level actions shape macro-level structures in the industry. We develop a multi-level model integrating institutional logic, isomorphic pressure, and organizational coupling that explains the geographic distribution of firms in a population. We argue that isomorphic pressures cause convergence of strategic actions, resulting in non-linear dynamics at the population level, which causes a particular pattern of geographic distribution to emerge. Using complexity theory, we propose that the geographic distribution fits a power-law curve under strong coupling conditions. We test our model on four populations – banks, medical practitioners, post offices, and government health centers – and find empirical support. Our study links micro-level institutional logic to macro spatial structures, extends organizational coupling theory, and presents geographic distribution as a novel construct in institutional analysis.

Keywords: Complexity, Power-law curves, Firm Population, Isomorphic pressure, Institutional Logics, Organizational Coupling

Word Count: 6639

Introduction

Literature on institutional theory has extensively analyzed the impact of institutions on firms. Research on the impact of firms on organizational field and institutions is relatively scarce (Greenwood et al., 2011). It has explored in depth how logics shape identity (Lok, 2010), practices (Lounsbury and Crumley, 2007), and microfoundations of a firm (Powell and Colyvas, 2008). These works explore how institutional theory shapes the internal structure and behavior of a firm; but externally oriented strategic decisions, like location strategy, and its impact is underexplored. Firms following similar institutional logic are likely to converge in their strategic decisions. Isomorphic pressures facilitate such a convergence. Location decision is a strategic decision for firms. Therefore firms which are distinct in their logic are likely to create distinct pattern of geographic distribution or firms guided by similar logic are likely to create similar pattern of geographic distribution. Despite the importance of location and potential impacts of institutional logic and isomorphism on it, no prior studies have investigated how institutional logic and isomorphism impacts geographic distribution of firm-population? In line with Smets et al. (2012), we analyze how firm level actions lead to macro level structures. We present a multi-level (firm level logic generates population spatial distribution) theoretic model that explains the spatial dispersion of firms and the impact of institutional logics on this distribution.

In this article we develop a theoretical model linking institutional logic of a firm, its actions, isomorphic pressures, and coupling to argue that firm actions lead to emergence of complex dynamics at a population (Hannan and Freeman, 1977) level. Organizations in a field are known to face isomorphic pressures that cause them to become more similar to each other over time. DiMaggio and Powell (1983) identified three types – coercive, mimetic, and normative isomorphism. Extant literature on isomorphic pressures has explained how they shape firm strategies, behavior, and culture (Ashworth et al., 2009; Carmona-Márquez et al., 2022; Yang et al., 2007). Extant literature has also shown how isomorphic pressures impact for-profit (Galaskiewicz and Wasserman, 1989), public (Ashworth et al., 2009; Frumkin, 2004), and non-profit (Frumkin, 2004; Hersberger-Langloh et al., 2021; Moreau, 2021) organizations. We show how isomorphic pressures shape the population of firms and extend the literature linking organizational responses and institutional field. First we show that institutional logics and isomorphic pressures cause firm action to be non-independent to each other. We then show that under different conditions of coordination and coupling, feedback loops arise. If the loops are sustained and reinforced the population dynamics evolves from orderly to complex or chaotic regime. Coordination and coupling are viewed as consequences of institutional complexity (Greenwood et al., 2011) of the environment around the firm. We examine if different populations are more or less likely to develop branch networks, whose distribution fits power law curve.

Multiple calls have been made to adopt complex paradigms in organization research (Andriani and McKelvey, 2009, 2007; Beamish and Hasse, 2022; Crawford et al., 2015; Tsoukas, 2017). It has been demonstrated that power laws describe various phenomena in organization and management studies (Alfarano and Lux, 2007; Andriani and McKelvey, 2009; Axtell, 2001; Gala et al., 2024; O'boyle Jr. and Aguinis, 2012) underscoring the need to adopt complexity paradigm in organization research.

We test our model through four studies - banks, medical practitioners, post offices, and public health centers and find support.

We make following contributions to institutional theory. First we show that institutional isomorphism not only leads to convergence of internal structures and practices, but also to population level macro-structure of organizations. Second, using institutional logic and isomorphism, we link firm level actions (micro or meso level) to the macro level. Third, we extend the concept of organizational coupling to explain how isomorphic pressures can

strengthen or weaken over time. Fourth, we present geographical distribution of organizations as a novel measure for institutional researchers.

Theoretical model and proposition development

Institutional Logic

Institutional logic is defined as “socially constructed, historical patterns of material practices, assumptions, values, beliefs, and rules by which individuals produce and reproduce their material subsistence, organize time and space, and provide meaning to their social reality”(Thornton and Ocasio, 2008). Institutional logic shapes the actions of the organization and its members. One of the mechanisms through which this shaping occurs is through collective identity. Members of an organization start to identify with the collective identity of the institutionalized group. In turn, the institutional logic of the collective starts shaping the actions of the members who identify with the collective. Another mechanism underlying behavior shaping is through contests for status and power. Institutional logic dictates how status and power are gained, and individuals must adopt these means to pursue status and power. Therefore, managerial actions are dictated by the institutional logic followed by those in positions of authority. Institutional logic can shape individual cognition through social classification and categorization. Individuals adopt the categories and classifications that are socially constructed by institutional logic. The organizational decision-maker allocates attention to issues following their interests and identities, which are influenced by institutional logic (Thornton and Ocasio, 2008).

Members of a population face pressure to be more like each other due to isomorphic pressures. The isomorphic pressures force the organization to align better with institutional orders, leading to higher compliance (Ashworth et al., 2009). Isomorphism impacts the strategy, structure, and behavior of a firm (Li and Ding, 2015; Nawaz and Guribie, 2024; Villadsen, 2013). Isomorphic pressure is sensed by organizations through strategic dissonance reflected in strategic performance metric(s) (Manville and Greatbanks, 2024). Isomorphism influences an organization through its strategy and structure, and also through the skills of their human resources (Moreau, 2021). Most of the studies look at how isomorphic pressure influences an organization. A notable exception is the study by Lepori et al. (2014) where the authors explain how competitive differentiation and isomorphic pressures results in differentiation and convergence processes in a field leading to diversity of organization forms. These prior works have theorized how organizational structures and behaviors converge. Isomorphic pressures are pervasive across the population of firms and firm level actions are modified in accordance with the logic that guides their actions. When many firms are guided by similar logics, under isomorphic pressures their actions are likely to converge leading to impacts at population level (Greenwood et al., 2011; Lepori et al., 2014). While Lepori et al. (2014) explores it at the level of professions or practice, similar firm level explorations are absent.

Interaction of institutional logic, isomorphic pressures, and network structure

“The interests, identities, values, and assumptions of individuals and organizations are embedded in the prevailing institutional logic”(Thornton and Ocasio, 2008). A firm's decisions result from an interplay between individual agency and institutional structure (Thornton and Ocasio, 2008). Therefore, an organization's decisions result from the institutional logic in which the ownership is embedded. A private firm aiming for profit maximization or shareholder return maximization will be dominated by the institutional logic of capital markets. A public organization with a government as a dominant shareholder will likely reflect the institutional logic in which the Government is embedded. This logic, in turn, will reflect in key decisions the organization makes in its day-to-day discharge of activities. Firms' decisions are also impacted by the isomorphic pressures experienced in their organizational field (Dimaggio and Powell, 1983). According to Dimaggio & Powell (1983)

an organizational field consists of various populations of firms that interact with each other, including customers, suppliers, regulators, etc. A population is a group of firms which have similar organizational form, interacting with each other and competing for common resources (Hannan and Freeman, 1977). While current studies emphasize the convergence of strategic actions and structures, they do not explore the consequences of this alignment or how it shapes spatial isomorphism of the population.

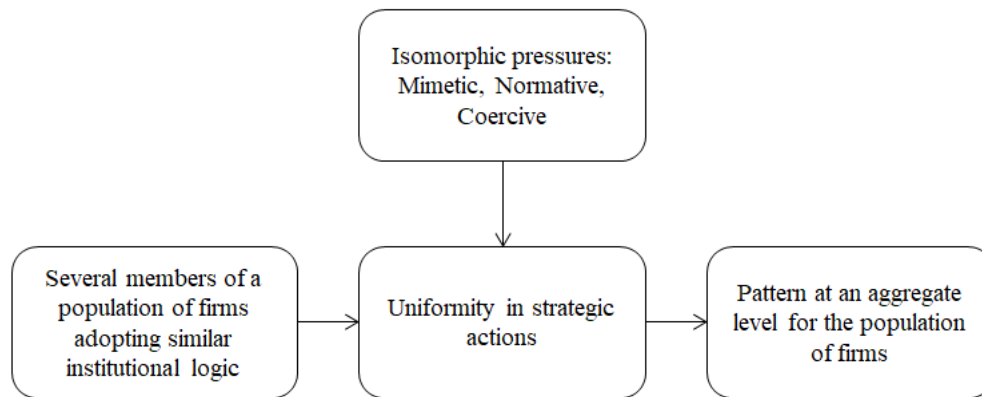


Figure 1. Conceptual model that links institutional logic, isomorphic pressures, and network structure

A firm that pursues the logic of capital markets will follow its peers to profitable markets. When entering new markets or opening new branches, organizations aim to maximize profits or ensure that they are seen as legitimately pursuing profits in the eyes of institutional stakeholders like shareholders, market analysts, etc. A firm following the logic of inclusivity and social equity will enter new markets or open branches to enhance inclusivity and social equity or ensure that they are seen as legitimately pursuing inclusivity and social equity in the eyes of institutional stakeholders like the Government, regulatory agencies, citizens, etc. At an aggregate level therefore the patterns generated by strategic actions taken by firms following distinct institutional logics will differ. In case of location choices, therefore, the distribution of locations or the production network of the firms will differ by the institutional logic pursued by the firm due to the influence of isomorphic pressures on individual firms. While every firm is distinct, the uniformity of institutional logic reinforced by isomorphic pressures leads to non-independence in their strategic decisions. The non-independence of strategic actions leads to creation of patterns unique for distinct institutional logic (figure 1). Location choice is a strategic decision. If location choice is influenced by firm's institutional logic, then the spatial distribution of firms should reflect the difference and similarities in logic.

Complexity and power laws: Emergence of complex geographic distribution of firms

The complexity paradigm applies to events that are not independent and identically distributed (i.i.d.) (Boisot and McKelvey, 2010). Under this paradigm, organizational or social events are connected, and society is not a collection of independent objects. Under the complexity paradigm, the connected nature of events or agents forms power-law curves when the system is at the edge of order and chaos (Kauffman, 1993).

Maguire (2011) lists the following features of a complex system. Complex systems consist of a large number of non-linearly interacting agents. The interactions occur in short range and through loops. Such systems are open, operate far from equilibrium, and have histories or path dependencies. Due to the interaction of institutional logic and isomorphic pressures, groups of firms or industries acquire complex characteristics. Industries have a large number of agents whose actions impact each other. Since strategic decisions are taken without mutual coordination and based on expectations of rival firms' actions, the action-

response cycles between firms acquire a nonlinear nature. Coordination can be seen as a consequence of centralization in a field. Since a firm cannot accurately estimate a rival firm's reaction, each action cannot be perfectly calibrated to match the rival firm's actions, resulting in nonlinear interactions.

Power law curves are a type of fat-tailed distribution, and in a generalized manner, it can be stated that fat-tailed distributions are evidence of complex processes (Guerrero and Garcia-Baños, 2020; Viswanathan et al., 2003). Andriani and McKelvey (2009) collated 15 empirical mechanisms that can lead to power-law curves in organizations. Preferential attachment, least effort principle, and spontaneous order creation are three mechanisms from this list.

The preferential attachment model states that when new agents arrive in a system, they are attracted to larger nodes, and the larger nodes become even larger (Barabási and Albert, 1999; Jeong et al., 2003). Studies have demonstrated that preferential attachment leads to the generation of power law distributions. Studies of collaboration among scholars in physics and biology have shown that the probability of acquiring new collaborators increases as the number of past collaborations increases, leading to clustering and power law distributions in the scholar networks (Newman, 2001). Studies on growing networks, where new nodes attach preferentially, have shown that such mechanisms generate power-law distributions (Jacob and Mörters, 2015). In a country with an 'n' number of markets, the markets with higher economic activity are likely to attract more firms to open operations than markets with lower economic activity. Over time, therefore, we are likely to observe that more firms have a presence in markets with higher economic activity than markets with lower economic activity. This scenario fits the preferential attachment model; therefore, the firm count distribution across markets will likely demonstrate power law distribution.

The least effort principle was first demonstrated in Zipf's analysis of word usage. In a network of speakers, each one minimizes the use of words others don't understand and avoids learning words that one doesn't intend to use (Boisot and McKelvey, 2011). This mechanism was found to apply to languages undergoing changes in their usage. A similar effect has been demonstrated in firms and economies under transition (Ishikawa, 2006; Podobnik et al., 2006). Regarding location choice, we predict that firms will have incentives to expand in markets closer to them as this will reduce uncertainty and facilitate coordination. Therefore, a firm pursuing the least effort approach will likely generate a production network distributed in a power-law manner.

Spontaneous order creation involves agents learning or copying actions from each other to improve fitness, forming groups and hierarchies (Boisot and McKelvey, 2011). According to Kauffman (1993), spontaneous order creation requires three pre-conditions – heterogeneous agents, connections, and motives to connect (improved performance, improved survival, etc.). When firms evaluate location choices, they are likely to be influenced by the location choices of firms they consider peers. Such actions are motivated by the need for efficiencies, closer coordination, and better information exchange with peers or partners. Therefore, a group of firms choosing locations based on each other's actions will likely result in spontaneous order creation, leading to power law distributions.

Johnson et al. (2014) have demonstrated that single mechanisms do not always result in the emergence of power-law curves in social interactions; multiple mechanisms are involved. In the above analysis, we demonstrate that firms can pursue actions similar to those of their peers or experience isomorphic pressures through multiple mechanisms that generate power law curves.

It has been shown that coupling between agents impact the tendency of the system to display complex dynamics. A population of firms that are tightly coupled is more likely to exhibit complex power law dynamics than a population of firms that are loosely coupled (de

Oliveira et al., 2014; Gupta et al., 2012; Vakarin and Badiali, 2006). Given that power-law curves are markers of complex dynamics, a population with tight coupling is likelier to fit a power-law curve than a population with loose coupling.

Coupling captures a tradeoff between determinacy and indeterminacy in the agents' actions or a tradeoff between interdependence and independence in the agents' actions (Orton and Weick, 1990). Coupled events are “responsive, preserves its own identity, and retains evidence of its physical or logical separateness” (Weick, 1976). Coupled aspects are determinate and interdependent; the de-coupled aspects are indeterminate and independent. Agents who are tightly coupled are interdependent, and therefore, their actions display a certain degree of determinacy. In contrast, loosely coupled agents are independent, and their actions are indeterminate with respect to each other. Coupled systems are, therefore, stable and loosely coupled systems display flexibility because they can act independently of other agents. In institutional theory, coupling refers to the link between the structure of the firm's structure and its actions (Meyer and Rowan, 1977). Organizations can symbolically adhere to practices without fundamentally changing their internal structure in case of loose coupling. In the case of tight coupling, organizations must alter their structure and behavior for any environmental changes to ensure sustained legitimacy.

Between for-profit firms and public sector firms, for-profit firms are more tightly coupled than public firms for the following reasons. According to institutional theory, firms strive to achieve legitimacy with institutions valued by the firm's key stakeholders. Maintaining legitimacy drives the strategic actions of the firms. For-profit firms have to be more responsive to changes in their organizational field to sustain legitimacy. Organizational fields dominated by for-profit firms are likely to undergo a higher rate of change owing to the more responsive nature of such firms and their pursuit of higher profits through product or service differentiation.

In contrast, public sector firms cater to a broad array of stakeholders with diverse needs. Competitive pressures do not drive them; they are more stable over time. The Government or regulators determine the changes to public sector organizations, which happen less frequently than in a for-profit firm. Therefore, the need for tight coupling is much higher in for-profit firms due to pressures to sustain legitimacy in a fast-changing environment. For a public sector firm, the legitimacy is protected by the Government or regulator and is insulated partly from rapid environmental changes. Therefore, they can be loosely coupled. Public sector firms also experience a fragmented external environment since they are incapable, due to government mandates, of denying services or exclusively focusing on narrow segments of customers. For-profit firms are exclusive and achieve efficiencies by focusing on narrow segments. Dispersed environmental stimuli and incompatible expectations create loosely coupled systems (Orton and Weick, 1990).

A group of tightly coupled for-profit firms also creates a tightly coupled population. There are no formal coordination mechanisms that exist among for-profit firms. The absence of coordination mechanism gives rise to the need to observe each other's competitive actions closely through formal and informal channels. This behavior results in tight coupling between firms. Such a requirement does not arise for public sector firms. Government is a key stakeholder for public sector firms. Government and regulators act as coordination mechanisms for the public sector firms. Therefore they have minimal need to be tightly coupled with peers. Therefore, the population of for-profit firms is tightly coupled, and a population of public-sector firms is relatively loosely coupled.

In a tightly coupled environment, firms are likely to experience higher isomorphic pressure than in a loosely coupled environment. More isomorphic pressure drives wider compliance among participants, which in turn increases the legitimacy of the institution. Increased legitimacy attracts more firms to adopt the logic and strengthens the isomorphic

pressure. We argue that this phenomenon leads to a positive feedback loop between institutional strength and isomorphic pressure, each reinforcing the other (figure 2). This mechanism can operate in a reverse direction wherein loose coupling leads to weaker isomorphic pressures, weakening institutional legitimacy. This result in the exit of members from an institution can reduce the isomorphic pressure and can cause weaker isomorphic pressures. As a result, a negative feedback loop arises, further weakening institutions and leading to accelerated exits of firms (figure 3).

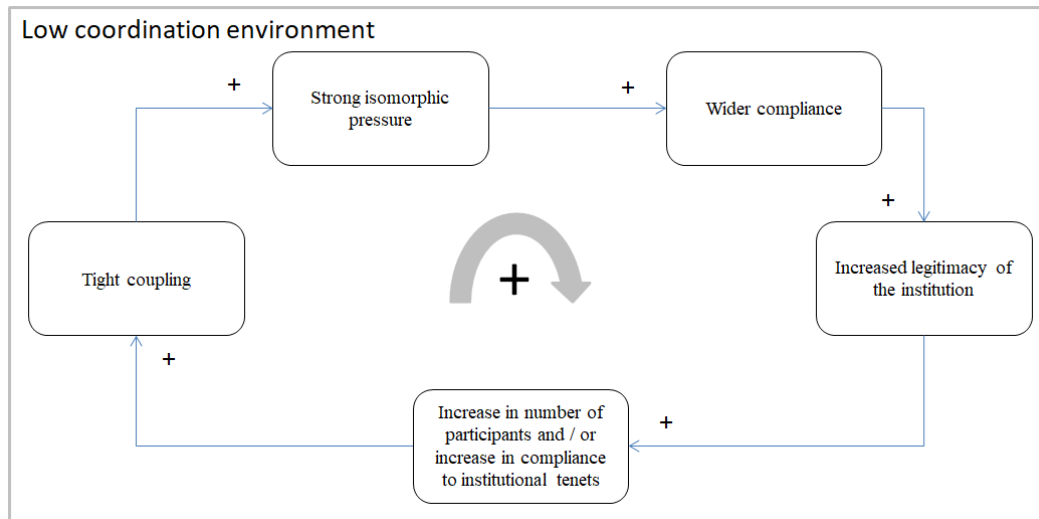


Figure 2. Tight coupling and positive feedback loop

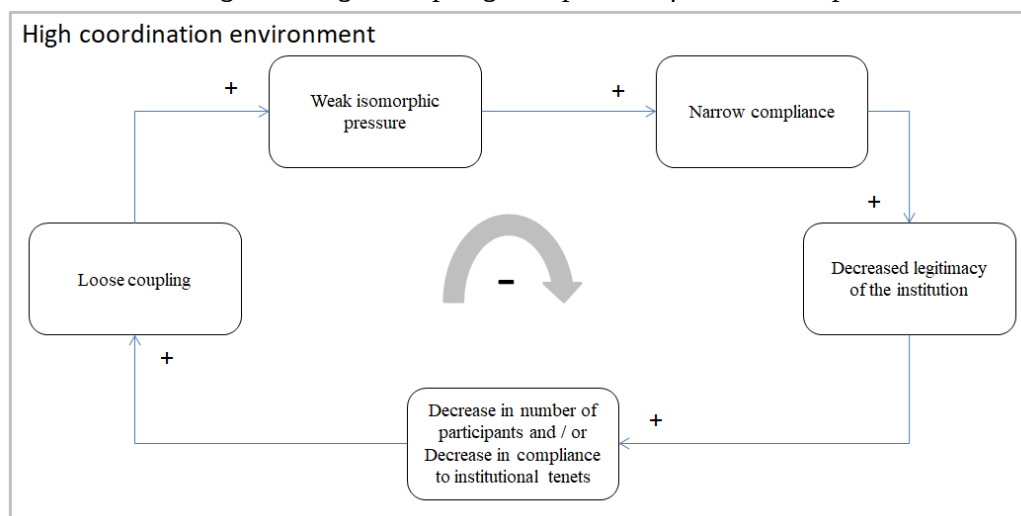


Figure 3. Loose coupling and negative feedback loop

When the positive feedback loops run their course multiple times, the dynamics of the population of firms will transition from an ordered regime to a complex regime in the Ashby space (Boisot and McKelvey, 2011). In the complex regime, the distribution of production nodes by location will follow the power law curve. If the loops do not reinforce extensively, the population will remain in the ordered regime on the Ashby space (Boisot and McKelvey, 2011). Ashby space is defined by the variety of responses of the agents plotted against a variety of stimuli provided by the environment. The ordered regime is sustained when both the variety of stimuli and response match each other. When response exceeds stimuli, it remains in an ordered regime, and when response is below the variety of stimuli, the system transitions to a chaotic regime. In the case of public sector firm population, we find that the

firms are in an ordered regime. Consequently, we will likely see power law dynamics in tightly coupled for-profit population, not loosely coupled public sector population.

Proposition 1: *Under conditions of low coordination between firms, tight coupling arises at a population or sub-population level due to stronger isomorphic pressure, resulting in positive feedback loops, leading to power law dynamics.*

Proposition 2: *Under conditions of high coordination between firms, loose coupling arises at a population or sub-population level due to weaker isomorphic pressure, resulting in negative feedback loops, which do not give rise to power law dynamics.*

We test these propositions through four studies. In two of these studies we test both proposition 1 and 2 by comparing private sector with public sector population. In the other two studies we test proposition 2 on public sector firm population. The propositions are tested on banks, medical practitioners, post offices, and public health centers. Both propositions are tested in the former two studies. Only proposition 2 is tested in latter two studies. The choice of private and public sector is to align with the tight and loose coupling aspects of the theoretical model.

Methodology

Model:

The power law relation is as follows:

$$Y = b \cdot (X^a) \text{----- (1)}$$

b: scaling factor; a: power law exponent

In equation (1), X is the rank, and Y is the node count or number of branches or offices of a firm population in a location. We model the fit power law curve on the rank-ordered distribution of production nodes across districts of India. If the nodes in the production network are distributed according to the power law, we expect a district with a high number of offices to be rare and many districts to have a very low number of offices. The districts are ranked according to the number of nodes in the production network.

Data Analysis:

The first step was to test for fitment to a normal and log-normal distribution. We used the Shapiro-Wilk test to test the fitment with a normal and log-normal distribution. The following procedure was used to test fitment with power law. The rank-ordered data set was transformed into its natural logarithms. We estimated the slope and intercept of the straight line fitting the log-transformed data points using linear regression. The coefficients were converted to constants and exponents required for the appropriate power law equation. A new power law distribution was generated using these two parameters. Both distributions were subjected to 2 sample Kolmogorov-Smirnov tests to confirm fitment to power law.

Study 1: Private banks, public sector banks, and regional rural banks in India

Indian Banking System and Institutional Logic

Commercial banks in India account for the bulk of the banking assets. They are comprised of four types: public sector banks (PSB), private sector banks, foreign banks, and regional rural banks (RRB). They are governed by the Reserve Bank of India Act of 1934 (Comptroller and Auditor General of India, 2017). The Reserve Bank of India acts as the nation's central bank.

Public Sector Banks (PSB) dominate and account for >70 percent of deposits collected and loan advances made in India. They are also mandated to ensure credit access to a diverse set of economic sectors identified as priority sectors, disadvantaged sections of society, self-help groups, government programs, etc. (Comptroller and Auditor General of India, 2017).

Regional Rural Bank (RRB) was established through an Act of the Government, the Regional Rural Banks Act, 1976, having an amendment in 2015. The bank was established to " provide credit to small and marginal farmers, agricultural laborers, socio-economically weaker section of the population for development of agriculture, trade, commerce, small scale

industry and other productive activities in rural areas” (Department of Financial Services, 2023).

Based on the analysis of the objectives and priorities of the owners, we deduce that PSBs and RRBs are predominantly embedded in the institutional logic of inclusivity and social equity. In contrast, private sector banks are not constrained by their owners to ensure inclusivity or social equity but must demonstrate profit maximization and growth. Therefore, we deduce that private banks are embedded in the institutional logic characteristic of capital markets.

Commercial Banks and Branches

RBI has to approve opening a bank branch for any commercial banks, except regional rural banks, as per the provisions of banking regulations. RBI examines multiple parameters prior to approving the opening of a new branch. The parameters include the financial condition and history of the bank, the management character, capital adequacy and earning prospects, and service of public interest (RBI, 2009). Further, the branch authorization policy states that RBI recognizes the need to enhance competition in the banking sector in various locations and aims to liberalize and rationalize the policy.

Regional Rural Banks can open branches in Tier 2 to Tier 6 centers without direct permission from RBI, provided they fulfill the necessary conditions (RBI, 2013). RRBs eligible to open branches in Tier 2 to Tier 6 centers can directly approach the Regional Office of RBI for post-facto automatic issues of the licenses.

In the case of commercial banks, the activity of bank branch opening is regulated by the RBI; they are keen on increasing competition among banks and liberalizing the opening policy. In the case of Regional Rural Banks, the central bank provides liberal opening policies with the more significant restriction of focusing only on the country's tier 2 to tier 6 cities.

Hypothesis development

Based on the institutional logic deduced earlier, we predict that private banks are more likely to open branches in areas where economic activities are more prevalent than in areas with less. By their logic, they are not concerned with various markets remaining unbanked. Therefore according to the model in figure 2, the distribution of branches is likely to demonstrate power law distribution. However, PSBs and RRBs, guided by the logic of inclusivity and social equity, are more likely to focus on opening branches in as many areas as possible to ensure coverage and are not necessarily guided by the level of economic activity in those areas. In the initial years, they likely focused on opening branches in areas with relatively higher levels of economic activity. However, over the years, they are likely to have spread to all areas regardless of the level of economic activity prevalent in that area. The branch opening pattern is coordinated; therefore according to the model in figure 3, the branch count distribution is predicted not to follow the power law.

Hypothesis 1: *The distribution of the number of branches of Private Sector Banks will follow a power law.*

Hypothesis 2: *The distribution of the number of branches of Public Sector Banks and Regional Rural Banks will not follow power law.*

Data source

The data on bank branches was obtained from RBI's data warehouse, Database on Indian Economy (“DBIE-RBI: DATABASE OF INDIAN ECONOMY,” 2023). We used branch count data as of June 2023.

Results

The national level data for banks was split into six regions: north, west, south, east, northeast, and central. This classification aligns with RBI's classification scheme. The

summary of fitments observed is shown below. Findings from the national-level analysis are also included.

Table 1. Study 1 - Summary of results for three types of banks at regional and national levels

	Private banks			Public banks			Regional rural banks		
	Normal	Log-normal	Power-law	Normal	Log-normal	Power-law	Normal	Log-normal	Power-law
All India	na	na	na	na	na	na	na	na	na
South	na	yes	na	na	na	na	na	na	na
Central	na	na	na	na	yes	na	na	yes	na
East	na	yes	yes	na	yes	na	na	na	na
West	na	yes	yes	na	yes	na	na	na	na
North	na	na	yes	na	na	na	na	na	na
NE	na	na	na	na	yes	na	na	na	na

Hypothesis 1 is supported in the case of regions east, west, and north; the private bank branch distribution fitted the power law curve. Hypothesis 1 was not supported in regions south, central, northeast, and in the all-India data. Hypothesis 2 and 3 are supported in all regions and all India-level data. The bank branch distribution of public sector banks and regional rural banks did not fit the power law distribution. However, in many instances, it did fit log-normal distribution, which is also a type of fat-tailed distribution.

Study 2: Medical practitioners in the state of Karnataka, India

Hypothesis development

Medical practitioners are broadly classified into private and Government practitioners. Private practitioners are affiliated with private medical colleges or hospitals or run private practices. Government practitioners are affiliated with various government healthcare facilities like medical colleges, hospitals, or health centers.

The State of Karnataka governs its healthcare activities through State Health Policy. The state health policy is based on the specific needs of the State and factors that are specific to the needs of the State. Health expenditure is primarily met by the State budget, with 82% of public sector expenditure on health coming from the State Government of Karnataka and 18% of the budget from the Central Government of India (*Karnataka State Integrated Health Policy*, 2004). The State Health Policy emphasizes the process and implementation and is intended to be an instrument for optimal, people-oriented development of health services. The policy intends to move the State towards greater health and healthcare equity within a reasonable time frame. It also views health as a reasonable expectation of every citizen and works within a social justice framework. It also aims to facilitate private and voluntary health sector growth to augment healthcare services while maintaining professional and ethical standards and considering distributive justice.

The policy shows that it aims to ensure equitable access to healthcare for all citizens. Healthcare is delivered through sub-centers, primary health centers, primary health units, and hospitals. Private hospitals are intended to augment healthcare infrastructure. Therefore, we deduce that the public health infrastructure in Karnataka follows the logic of 'inclusivity and equity.' The policy does not explicitly place the burden of equitable access to healthcare on private sectors; there, we deduce that the private hospitals follow the logic of 'competitive capital markets.'

Hypothesis 3: The distribution of private medical practitioners to follow a power law distribution.

Hypothesis 4: The distribution of government medical practitioners not to follow a power law distribution.

Data source

The data on doctors in Karnataka was obtained from the Open Government Data Platform (NDAP, 2022).

Results

Table 2. Study 2 - Summary of results for medical doctors in the State of Karnataka

	Normal	Log-normal	Power-law
Number of Private Doctors	No	Yes	Yes
Number of Government Doctors	No	Yes	No

The results show that hypotheses 3 and 4 are supported. Private practitioners' distribution fits the power law curve, and the distribution of government practitioners does not fit the power law curve. The distribution of government practitioners fits log-normal distribution, which is a form of fat-tailed distribution.

Study 3: Indian Postal Department and the distribution of post offices

Hypothesis development

The Indian Postal Department is 150 years old. Its core activity is processing, transmitting, and delivering mail and money remittances nationwide (*India Post - Annual Report*, 2022). It also plays a crucial role in financial inclusion by providing banking and insurance services. Further, it acts as an agent to the Government of India by discharging various social security schemes like Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) wage disbursement, old age pension payments, and other direct benefit transfer schemes. Through India Post Payments Bank, the Government intends to take banking services to the doorsteps of unbanked or under-banked citizens, leveraging the vast network of the Indian Postal Department. Owing to its governing structures and policies, we deduce that India Post is embedded in the institutional logic of 'inclusivity and equity.' Therefore, we do not expect power law to characterize this organization's production network.

Hypothesis 5: The distribution of post offices not to follow a power law distribution.

Data source

The data on post office network was obtained from the Open Government Data Platform (NDAP, 2022).

Results

Table 3. Study 3 - Results for analysis of post office distribution in India

	Normal	Log-normal	Power-law
Post offices	No	Yes	No

The results support hypothesis 5: the post office network does not fit the power law curve. They fit the log-normal distribution.

Study 4: Government health centers (primary health centers and sub-centers) and its distribution

Hypothesis development

In India, public health policy is administered through a tiered system: Sub Health Centre (Rural), Primary Health Centre (PHC) (Urban and Rural), and Community Health Centre (Urban and Rural). The centers are established in areas according to population sizes. The norms for rural areas suggest a Sub Health Centre for a population of 5,000 (in plain) and 3000 (in hilly and tribal areas), a Primary Health Centre for a population of 30,000 (in plains), and 20,000 (in hilly and tribal areas) and Community Health Centre for a population of 1,20,000 (in plain) and 80,000 (in hilly and tribal area) ("Steps taken to Improve Rural Healthcare," 2023). In urban areas, an Urban Health Wellness Centre is recommended for an urban population of 15,000 to 20,000, one U-PHC for an urban population of 30,000 to 50,000, One U-CHC for every 2.5 lakh population in non-metro cities (above 5 lakh population) and one U-CHC for every 5 lakh population in the metro cities ("Steps taken to

Improve Rural Healthcare,” 2023). The country's national health mission emphasizes universal access without financial hardship.

We, therefore, deduce that the network of primary health centers and sub-centers is embedded in the institutional logic of 'inclusivity and equity.' Therefore, the distribution of facilities will not follow a power law distribution.

Hypothesis 6: *The distribution of PHCs and Sub Health Centers not to follow a power law distribution.*

Data Source

The data on health centers were obtained from the Open Government Data Platform (NDAP, 2022).

Results

Table 4. Study 4 - Results for analysis of government health centres in India

	Normal	Log-normal	Power-law
Sub centres	No	Yes	No
Primary health centres	No	Yes	No

The results support hypothesis 6, which is that the distribution of government health centers does not fit the power law curve. They fit the log-normal distribution.

Discussion and conclusion

Across the four studies, we find that the power law distribution was generated only by a population that followed the institutional logic of 'capital markets.' The institutional logic of capital markets resulted in the tight coupling of the population, which in turn led to positive feedback loops. This nonlinear interaction resulted in a power law distribution of production nodes. On the Ashby space (Boisot and McKelvey, 2011), such populations are located in the complex regime. We found power law curves in private banks and private medical practitioners' data. Therefore, institutional logic and isomorphic pressures play an important role in determining the firm's internal structure and the broader macro structure of the production network. Earlier literature has shown that isomorphism leads to the convergence of firm structures; our result shows that isomorphism also leads to similar network formation at a macro level.

The organizations that followed the logic of 'inclusivity and equity' did not fit the power law curve. However, in multiple instances, the latter networks were a good fit for the log-normal distribution, which is also a fat-tailed distribution. We had theorized that a population of firms following the logic of inclusivity and equity would form a loosely coupled population. Loose coupling leads to weaker isomorphic pressures, resulting in negative feedback loops. We hypothesized that in the case of public firms, therefore, power law curves will be absent, and our results support this hypothesis. Note that log-normal distribution is also a fat-tailed distribution, evidence of complex nonlinear dynamics. The absence of power law implies that the interaction is in the zone between the ordered regime and the complex regime (Boisot and McKelvey, 2011). Power law curves characterize the dynamics between complex regime and chaos on the Ashby space.

Except for the regional rural banks, all other public sector data fit the log-normal distribution. This result shows that these sectors are experiencing different levels of loose coupling or negative feedback loops. Among all the public sector data, the regional rural banks have the highest level of loose coupling. In contrast, public sector banks, medical practitioners, and post offices are on the lower end of the loose coupling spectrum.

The observed distribution can be attributed to an interplay between the approval role of the Reserve Bank of India, population distribution across the districts, and the banking potential across the districts. Past studies have established that the size of nations in terms of their population follows power law distribution (Martínez, 2016; Rozenfeld et al., 2011). The

population in various districts of India may follow a power law distribution. If banks were basing their decision to open branches by the population size of districts, then it is likely that we would observe power law distribution for branch count. Similarly, a past study has established that GDP follows power law distribution (Cristelli et al., 2012). The district-level GDP in India may follow a power law distribution. Suppose banks were basing their decision to open branches by the GDP of districts, which is a proxy for economic activity level. In that case, we would also observe power law distribution in this instance. Our findings show that private banks base their decision on the banking potential compared to public sector and regional rural banks. It is to be noted that public sector banks and regional rural banks factor in the population size and business potential in a location before opening a branch. This criterion explains the fitment of the log-normal curve in multiple instances. Since they are not exclusively focused on financial returns, the dynamics do not enter the complex regime, and the branch distribution does not tend toward the power law curves. The regulatory role played by RBI also ensures that the bank branches are distributed geographically and not concentrated only in attractive markets, such as public sector banks and regional rural banks. The analysis of medical practitioners in the State of Karnataka supports hypotheses 3 and 4. The distribution of private practitioners fits the power law curve, and the distribution of government practitioners does not fit the power law curve. The study indicates that private practitioners are concentrated in fewer markets, and government practitioners are more equitably distributed when compared to private practitioners. Private practitioners are keen on locating themselves in specific markets where demand for their services is perceived to be high. The Government appoints public practitioners, and they are allocated in a manner that ensures availability in all districts. Private practitioners are a tightly coupled group that responds to changes in the market or competitor actions. Public medical practitioners react only to government decisions (except personal reasons), which will be at a rate lower than that of the private sector. Yet again, it supports the view that organizations following the logic of capital markets are tightly coupled, and this makes the industry dynamics complex, resulting in the generation of power-law curves in their production network.

Analysis 3 and 4 focused on two forms of government organizations. Both analyses supported hypotheses 5 and 6. Since both forms of organizations are embedded in the institutional logic of 'inclusivity and equity,' the distribution of their office network did not fit the power law curve. However, both fit the log-normal distribution, which is also fat-tailed. In the case of government health centers, the policy guidelines dictate that new centers be opened in areas that meet defined population thresholds. As a result, we observe a fat-tailed distribution, in this case, log-normal distribution. A similar explanation applies to the observed log-normal distribution of the post office branch network.

We make the following theoretical contributions. First we show that institutional logic and isomorphism shapes not just internal structure and practices, but also geographical distribution of organizations. Using four studies, we show that organizations pursuing distinct institutional logics (capital markets vs. equity oriented) generates distinct spatial pattern of branch network. Alternatively, in all four studies firms that pursued similar logics, generated similar branch network structures. Second, we theorize and explain that tight coupling and isomorphic pressure leads to spatial concentration of branches in capital-market oriented firms and loose coupling leads to less concentrated spatial distribution in public sector firms. It shows that repeated decisions guided by institutional logic, aggregate to form patterns at firm-population level. We demonstrate how individual actions result in macro level structures. Third, we extend the concept of organizational coupling and shows that it can amplify or weaken isomorphic pressure resulting in positive or negative feedback loops. This explains how institutions impact firms and how firm responses impact the strengthening or weakening of institutions. Fourth, we demonstrate that the geographical distribution of

organizations is an outcome of institutional alignment. This is a novel measure for institutional researchers to consider.

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