

Triple Helix Relations in Innovation: Conflicts, Tensions, and Struggles in Rentier Regions

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Abstract: This study investigates academic entrepreneurship within a prism of the triple helix model of innovation relating university, industry, and government. The study adopts a sociological approach, defines academic entrepreneurship as a social game, and aims to unravel the mechanisms of relations within the triple helix that arise in oil-rich regions, using oil-rich Nigeria as case. In particular, it focuses on how socio-economic-political institutions of rentierism within these regions influence commercialization of findings of research.

The study argues that the structural powers that shape academic entrepreneurship in different environments are governed by the interdependencies between agency and socio-economic-political institutions. This is in line with the prevalent claim that institutions impose rules that constitute constraints and enablers of agency. This study however argues that agential actions are not mere rules-compliance, rather they are strategic calculations based on pragmatic contingent decisions about what works best within given institutional dynamics.

The study employs Bourdieu's sociology as the conceptual framework, underpinned by critical realist philosophy. It uses data from multiple sources to transcend the agency-structure divide, and unearths the various conflicts, tensions, struggles and negotiations between the three players in the triple helix in oil-rich environments.

Findings of the study offer new insights to academic researchers, industrialists, governments, and policy makers especially in knowledge-driven economies. It identifies and highlights the points of divergence of the key players in the fields of innovation and entrepreneurship. The findings are also of significance to innovation and regional development policy-makers as they offer insights into what works, what doesn't work and what may never work regarding policy; and illustrates that entrepreneurship and innovation policies that are effective in one clime may not necessarily be effective in another, thus highlighting the critical importance of institutional considerations in entrepreneurship and innovation policy-making.

Keywords: Academic entrepreneurship, Bourdieu, Rentier States, Agency-Structure, Social Space, Practice

Introduction:

Academic entrepreneurship stimulates economic growth (Audretsch, 2006). Natural resource-rich rentier states differ from production states, prevalently deriving its income from external rents from natural resources, in contrast to production that tax domestic economic activities for income (Beblawi & Luciani, 1987). This paper takes a sociological perspective and conceptualizes academic entrepreneurship as a game. Scharle (2002) defines 'gaming' *"as an activity involving more than one participant, where... the moves of the participants correspond to a pattern of complementary roles, the participants (either individuals or groups) have specific goals and driving strategies, the moves are motivated by the outcome of the game and by the pay-offs"*. Academic entrepreneurship is a *Social Game where opportunities for utilization of findings of academic research are discovered, evaluated, and exploited through actions of individuals who aim at advancing their social positions by the pursuit of the various forms of capital presented by the commercialization of findings of research.*

Impact of contextual institutions on academic entrepreneurship is discussed by Siegel (2006), and Jones-Evans (1998) argues that *"academic entrepreneurship is a phenomenon that exists in a range of different institutional and regional settings"* (p.103). Formal and informal institutions underpin social order and pivot the dialectic between entrepreneurs and their wider societies. This study therefore focuses on rentierism, a socio-economic construct that shapes institutional outlook of rentier regions, and investigates its impact on academic entrepreneurship.

In his triple helix model of innovation, Etzkowitz (2008) discusses universities, governments, and industries as the key players in Academic Entrepreneurship; he states: *"university, industry, and government enter into a reciprocal relationship with each other in which each attempts to enhance the performance of the other"* (p. 8). Academic entrepreneurship conceptualized as a game implies that the three agential groups in the triple helix are in a game-like (Dallas & Zapalska, 2006) relationship. This study therefore focuses on understanding the various position takings and game strategies (Bourdieu, 1996) by players in academic entrepreneurship game, with focus on the dialogues, negotiations, tensions and struggles (Bourdieu, 1990) between the three players,

and how these relate with the socio-economic structures of a rentier 'games arena', and how the position-takings, relations, strategies, rules, roles, and pay-offs shape academic entrepreneurship in these environments.

Literature review

Strands of literature exist on how natural resources influence regional socio-economic and political topography, including how the rentier apparatus shapes government, economy, politics, and even behaviour. The Dutch disease thesis (Corden, 1984) for instance blames resource wealth for the comparatively slow economic growth in resource-rich countries. Collier & Hoeffler (2005) link mineral wealth with violent conflicts, Harford & Klein (2005) cited resource wealth as the determinant of institutions, while Karl (1997) argues that oil booms caused a destabilization of governance structures and national capacities. Yates (1996) posit that *"the conditioning factor of economic stagnation and political authoritarianism in oil-dependent states is the corrosive effect of external rent"*.

The effects of oil wealth on national institutions are well documented in African, Middle Eastern, American, Asian, as well as European oil-rich states; the European Oil-rich Russia is identified as a rentier. Xu (2015) states that *"mineral fuels take up a proportion of 70% in Russia's total export"* (p.47), while Algieri (2011), and Kalcheva & Oomes (2007) find oil wealth in Russia to have produced: relative de-industrialisation, contraction in non-oil exports, and a real wage growth; a trend associated with African, Asian, Middle-Eastern and South-American rentiers. This work investigates how the institutional dynamics of oil rentier states influence academic entrepreneurship. The study strengthens entrepreneurship and rentier state literature by adding to knowledge regarding influence of external rents on entrepreneurship.

Three perspectives dominate Academic entrepreneurship research: the individual, the process, and the context. Perspectives on the individual focus on the characteristics of agents (Mosey & Wright, 2007), or entrepreneurial teams (O'Shea, et al., 2005), and influence of agents' social capital or networks (Mosey & Wright, 2007), main argument being that some academics are better predisposed to commercialize their findings as a result of their personality, psychological characteristics, or possession of scarce knowledge that helps in creating, identifying, and seizing opportunities offered by research findings. Process-based studies address the courses of action that transform research outputs into economic values, seeking to understand the speeds, stages, typologies, and determinants of success (Knockaert, et al 2011). More recent works bring into account the impact of contextual situations; three levels of analysis emerge in this regard: individual, organizational, and regional levels. While they contextualized studies identify the geographies of their studies, they often fail to identify the institutional forces that govern action in these geographies.

Failure to identify and account for the contextual institutional dynamics at play in the contexts studied weakened several of these previous studies. This study therefore gains strength by identifying rentierism as the socio-economic predicator underlying institutions in oil-rich regions. Influence of natural resource abundance on academic entrepreneurship is rarely studied, and account at a multi-level is rarely given of the underlying socio-economic dynamics that govern academic entrepreneurship; these are gaps in knowledge this study fills.

Theoretical framework

Research Philosophy and Analytical Framework

Critical realism is the underpinning philosophy of this study. Critical realism as the underpinning philosophy requires that this study provides account not only of concrete structures that enable or constrain agential action, but also that objectively inaccessible subjective structures within agents, and underlying instigative powers and mechanisms of relations that generate, constrain, or shape agency in rentier states be brought into the analysis.

The analytical framework for this study is based on Bourdieu's (1977) theory of practice. Bourdieu's sociology serves for this study, as mediator of the tension between objectivism and subjectivism, enabling transcendence of the three levels of analysis (individual, organisational, and regional). It reconciles external social structures with subjective experience of agents thereby opening avenues for logical illustration of the social governance of academic entrepreneurship.

Bourdieu's theory of practice has its foundation on his thesis that choices and preferences of social agents in diverse domains of practice have basis on agential internal dispositions and their external social positions. Bourdieu refers to these dispositions as 'habitus', a product of the objective conditions that agents encountered and encounters; an embodiment within agents of the structural constraints and enablers within their

environment, that provide them with personally configured rules of their games; what Bourdieu termed “structuring structures” (Bourdieu, 1977, p.72).

Forms of Capital

Bourdieu’s concept of capital is intended to extend account of society beyond Marxian economic models that limit analysis of society to concrete economic assets. Bourdieu’s concepts of capital “*extend economic calculation to all the goods, material and symbolic, without distinction, that present themselves as rare and worthy of being sought after in a particular social formation*” (Bourdieu, 1977, p.177). Capital is “*accumulated labour (in its materialised form or its “incorporated,” embodied form), which, when appropriated on a private, i.e., exclusive, basis by agents or groups of agents, enables them to appropriate social energy in the form of reified or living labour*” (Bourdieu, 1986, p. 241). To Bourdieu, the various resources available to agents becomes conceptualized as capital “*when they function as a 'social relation of power', that is, when they become objects of struggle as valued resources*” (Swartz, 1997 p.74).

Capital “*can present itself in three fundamental guises: as economic capital, which is immediately and directly convertible into money and may be institutionalized in the forms of property rights; as cultural capital, which is convertible, on certain conditions, into economic capital and may be institutionalized in the forms of educational qualifications; and as social capital, made up of social obligations ('connections'), which is convertible, in certain conditions, into economic capital...*” (Bourdieu, 1986 p.82).

Habitus

Every agent possesses a system of disposition emergent from their past history, present situation, and future expectations. Agents in proximate positions within the social space possess specific modes of thinking about the world, of interpreting the world, and of behaving in the world; Bourdieu terms these modes of apprehending the world as ‘habitus’ (Bourdieu, 1977). Bourdieu considers habitus a reflection or reproduction of the hierarchical social structures and positions existent within the agent’s environment. The concept of habitus is crucial in the analysis of the society, since it is through the same mechanisms that mental dispositions (habitus) reproduce 'images' of the existing social world that the ‘*rules of the game*’ within the fields of power are also reproduced (*ibid*). Implication is that decisions or choices, including choices of field strategies conform to the mental, or dispositional conditions characterising the agents’ existence, history, and personal trajectories (Bourdieu, 2000) since they are the conditioners of the agent’s habitus.

Methodology

This study followed a three-phase, seven-stage process; the process is set out in Table 1.

Phase	Stage	Description
Data Collection	Quantitative Data	Quantitative data on the forms, volumes and configurations of capital held by the agents under investigation is collected.
	Qualitative Data	Desk data and interview data that shed light on the mind dispositions, actions and practices of the agents is collected.
Data Analysis	Construction of the Social space	Quantitative data is used to spatially locate agents based on their volumes and configurations of capital.
	Separating the fields within the field of power	Once the social space has been constructed, the distinct fields are identifiable. Characteristics these fields are identified and specified.
	Identifying homologies in the fields	Identifying objects, events, dispositions, tendencies, etc. that are specific (or homologous) to the each of the identified fields.
Mapping Relations	Relating events, actions, habitus and fields	Relational stage, focuses on relating the various objects, events, dispositions, etc. identified in the earlier stage.
	Validation	Using existing theory and literature to validate the findings.

Table 1. Summary of the research process

Sources of Data

The research data consist of quantitative data on volumes and configurations of capital held by agents, qualitative data from desk research, and interview data that illustrate dispositions, choices, and actions of the agents. The survey involved self-reported closed questions involving twenty-one academic entrepreneurs. This was followed up with semi-structured interviews involving eleven (11) out of the twenty-one (21) agents; the data is applied to develop the social space of academic entrepreneurship.

Analysis of Data

Analysis of data starts with plotting the social space using the quantitative data. The forms, volumes and configuration of capital the respondents hold position them differentially on the social space. Within the resulting social space, the various proximate groups and specific properties of each field are identified, and analysis shifts focus to identifying the various homologies and oppositions between the various groups, in particular, their underlying categories of perception and thought (habitus), and distinctive practices. The final stage of the analysis is relational, where retroduction (Danermark, 2002) and logic is applied to establish the relational mechanisms between the forms of capital, agential habitus, action, and practice. This stage illustrates the various power struggles, position takings, inter-agential and inter-group tensions, struggles, negotiations, and their relations with wider societal structures; this is the mechanism of relating that governs academic entrepreneurship within the context studied.

Findings

The social space

The resulting social space show three distinct fields that constitute Etzkowitz's (2008) triple helix model: Government, Industry, and Academia (figure 1). The government field occupies the top right position, making it the dominant field (Bourdieu 1984). The academic field occupies the bottom left position being the dominated field, while the Industry field occupies an intermediate position between the government and the academic fields. The constructed social space is shown in figure. 1.

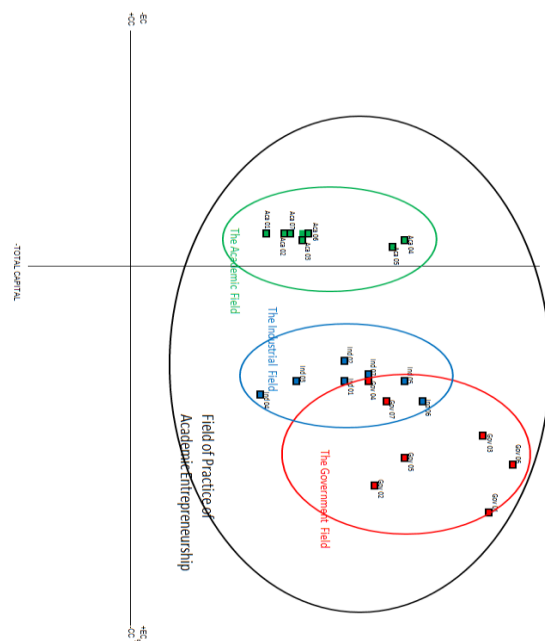


Figure.1. The social space

Field Properties

Data from desk research, literature, and inferences from the interviews are used to build up a qualitative description of the three distinct fields within the space. These, alongside 'field actions' are represented in 'the space of action' (Figure 3); and a comparison of the field properties is tabulated in table 2.

Field Property	Government Field	Industry Field	Academic Field
Access to rents	Direct (high)	Earned (low)	Indirect (intermediate)
Academic knowledge	Low	Intermediate	High
Technical power	Low	High	Intermediate
Business skills	Low	High	Intermediate
Rent-seeking	High	Low	Intermediate
Research skills	Low	Intermediate	High

Table 2. Comparison of properties across the three fields

Habitus in the three fields of academic entrepreneurship

Agents within the three fields possess different habitus conditioned by the life trajectories of its agents. Although no two individuals possess the same habitus, individuals with similar life trajectories may possess “*similarities in their habitus and lifestyle*” (Bourdieu, 1984, p. 93). Interview data was used to produce the resulting space of academic entrepreneurial dispositions (figure 2.)

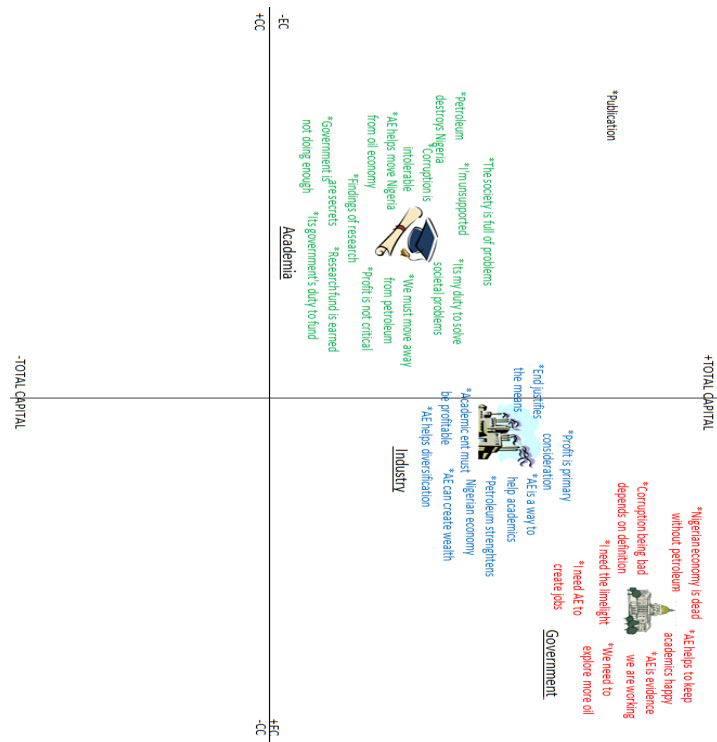


Figure 2. The space of dispositions

Action in the three fields of academic entrepreneurship

Agents and agential groups in the social space strategize and compete at various fronts, the ultimate being “*to maintain or enhance their positions in the social order*” (Swartz, 2012, p.210). The agents, consciously or unconsciously are 'aware' of their positions in the social order, aware of the resources within the social space, aware of the constraining and enabling properties of their particular fields, aware of the powers and limits of powers of their positions, and strategize to maintain or advance their positions in the social order by “*preserving, reinforcing, or transforming their stock of capital*” (*ibid*); or converting them to preferred new forms.

This study uncovered five entrepreneurial actions homologous to the three fields of academic entrepreneurship, these five typologies of entrepreneurial action define the practice of academic entrepreneurship in a rentier state (table 3).

Action	Description
Accessive	Actions of agents aimed at gaining access to the rentier capital. Accessive action pervade the entire social space and permeates all the three fields.
Assessive	Assessing commercialization proposals to determine their commercial values, market potentials and suitability. Assessive actions are homologous with industry field.
Mediative	Bridging the gap between demands of the society and supplies that satisfy the demands. Mediative actions are homologous with the industry field
Creative	Creation of new knowledge through research; homologous with the academic field.
Allocative	Distributing from coffers of the state, necessary resources for the execution of the academic entrepreneurial actions; this is homologous to the government field.

Table 3. Typologies of academic entrepreneurial action in a rentier state

Other entrepreneurial actions within the various fields are represented on the space of action (Figure 3).

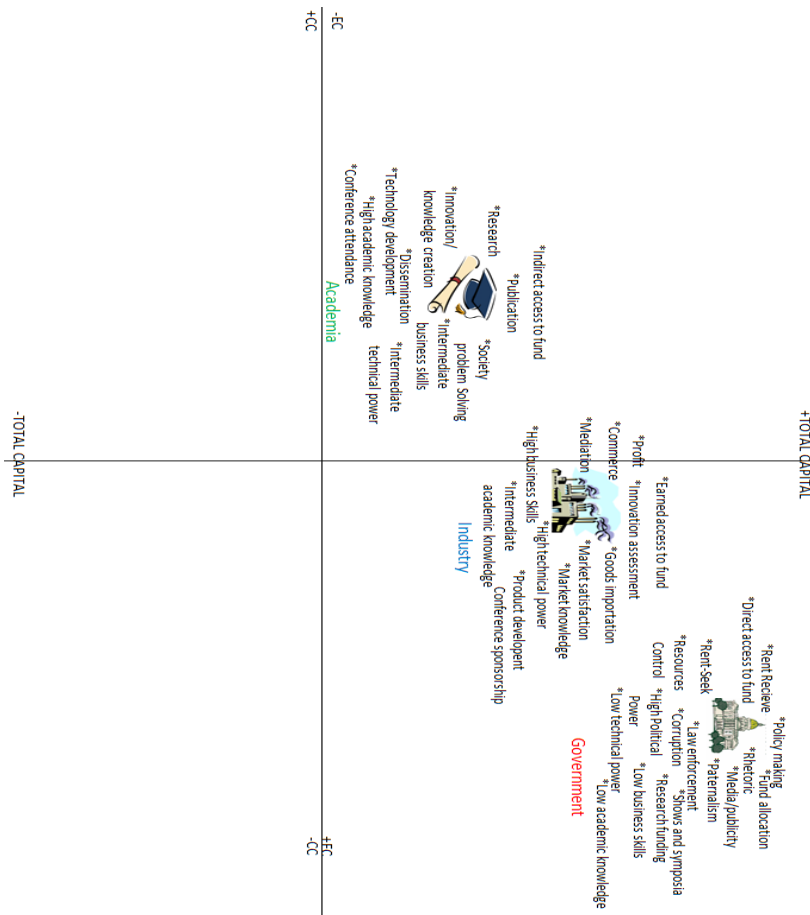


Figure 3. The space of action

Discussion

Symbolic Violence within the fields

Agents within the three fields capitalize on resources available and opportunities presented by their fields to further enhance incomes accessible to them, they develop accessive strategies that enable legitimate or illegitimate access to the rentier capital. The dominant position of the government field and the dominated position of the academic field polarizes the main struggles between these two fields, each striving to access maximum possible capital from the circuit. The industry field is neutral in these struggles, its neutral position being homologous with the intermediate position it occupies on the social space. The field has no access to the rentier circuit, therefore focuses on maximizing the profitability of its activities, refusing to be involved in commercialization activities when its profitability is not demonstrable.

Employment serves as a primary channel for converting cultural capital into economic capital (Weis, 2009). Cultural capital in this regards relate mostly to education, experience and skills acquired over time and embodied within agents. In any given society there are different categories of employment and different salary levels, agents are consciously or unconsciously aware of their social positions and will seek employment, and negotiate a salary that corresponds to their positions. When government is the employer, agents negotiate their rewards not as mere reflection of work, but as reflection of their social positions, and reflection of rents accruing to the state. Government agents deploy the power and control they retain over the rents from petroleum to enhance and maintain their dominant position over other fields in the social space. Even in the face of possible illegality of such actions, the government field utilizes the political power at its disposal to justify and legitimize approvals of enormously high levels of salaries for their field, in this way widens the social gap and power distances between the field and the other two fields. This is the strategy of symbolic violence (Bourdieu & Thompson, 1991).

There is also an apprehension of instability of the field and its vulnerability to destabilization by the elites. The government field guards against this by seeking the support of the elites by funding their interests. *"oil rents accrue directly in the hands of the state, and loyalty to the state is gained through patron-client networks which help increase political stability, giving the government a certain measure of legitimacy"* (Franke, Gawrich, & Alakbarov, 2009, p. 112). This works in favour of the academic field, as the government invests in research and commercialization of its findings, not out of genuine desire to encourage wealth-creation through commercializing findings, rather aimed at maintaining and consolidating their positions in the field by appeasing the elitist academic field. *"Instead of attending to the task of expediting the basic socio-economic transformations, they devote the greater part of their resources to guarding the status quo"* (Cook, 1970, p.443).

The academic field is the dominated field, agents in this field access the rentier capital primarily through salaried employment, as the field lacks direct access to the rentier circuit, and lacks the political power and structure required to set the dynamism of the social space in its favour in contrast to the government field. As a result the salary levels in the academic field more than those of the government field follow the work-reward causation, while those of the government field follow the tides of the state's income from petroleum, rising when petro-income rises and reluctantly downwardly adjusted when income dwindles.

To enhance income levels of the field, the academic field resorts to a strategy of undermining the state structure, thereby threatening stability of the government field. This is often in form of strikes, industrial action, public criticism and activism. Agents in this field are aware of their stock of cultural capital which is acquired over long periods of time, rendering their positions rare and inimitable. Having acquired legitimacy, credibility and trust of the general population above the government field as a result of its social disposition, the wider population are more inclined to listen to the voice from academia over that from the government field, government field being apprehended by the population as untrustworthy, deceitful and kleptomaniac. Aware that government cannot afford a substitute to their rare skills, knowledge, and experience, the academic field deploys the symbolism of their rare position in the social space as tools of symbolic violence to rattle the government. The government field responds by enhancing funding made available to the field to fund their research and its commercialization.

These funds are however often misapprehended by the academics as earned income, thus misappropriated, but justified with basic research that has little or no potential for commercialization; hence the commercialization effort fails. Funding being provided through this mechanism explains why the government's expenditure on the projects are rarely monitored; it serves to purchase the indulgence of the academic field.

Although some of these practices are ordinarily identified as 'corrupt', they form part of the power struggles in a rentier state. In the European rentier state of Russia for example, Lane (1999) reports that corrupt activities form *"part of the politics of confrontation"*, and are better understood *"as an indication of power struggles between Russias's political and economic elites"* (p. 97), and that the Russian oil and gas wealth has resulted in *"the triumph of rent-seeking over profit-seeking"* (p.181). Osipian (2012) argues that the widespread corruption in Russian universities results from the quest by the state to *"derive its rent not in money but in loyalty to the regime"* (p.153). These findings even in European Rentier states illustrate the rentier institutional dynamics that produce the unfavourable commercialization outcomes identified in this study.

The Russian science-technological complex founded in 2010 was aimed at commercializing new Russian technologies, but academics (eg. Dezhina, 2010) criticize the project as being hijacked by the dominant "*narrow circle of government officials*" (p.108) to the detriment of innovation firms and researchers, and was administered through political rather than scientific considerations, and decision about its location politically motivated (*ibid*). Liuhto (2010) argues that these government projects, although Russia's best innovation promotion measures, but the state is too involved for them to "*form an effective, flexible, and sustainable innovation system*" (p.99).

Conclusion

Access to the external rents- driver of action

This study finds that the major driver of action in rentier states is access to the rentier circuits. Earlier studies eg. Grant (2014) finds in rentier states, favouristic employment and political appointments as classic means of gaining access to the rents, "*jobs and contracts and licences are given as an expression of patronage and clientelism rather than as reflection of sound economic rationale*" (Grant,2014). In Russia Satarov (2000) found that the competition that exists in Russia "*is principally that of competition for rents*" (p.113). Social position and clientelism rather than suitability for the role determines who gets employed or appointed to positions, hence efficiency of academic entrepreneurship efforts are hindered. When unqualified and uncommitted persons, given such roles merely as means for them to access rentier capital via employment occupy strategic job positions that deal with commercialization, misappropriation of funds follow, and the agents most likely lack the relevant skills, knowledge and drive to carry the role through. This gets further complicated by the shift in the focus of the government agents from how to achieve successful commercialization projects, to how to illegitimately gain access to the rentier circuits through the opportunities offered by the commercialization process. This explains why investments made towards commercialization produce mismatched outcomes.

The dynamics of the triple helix in a rentier state

Further, this study finds that the triple helix model works differently in rentier regions. Etzkowitz (2008) states that triple helix relations in knowledge-based societies result when "*university, industry, and government enter into a reciprocal relationship with each other in which each attempts to enhance the performance of the other*"(p. 8). Similarly Fetterman & Wandersman (2005) states that "*the three partners in the relationship work together to build upon one another's strengths to achieve results*. But this study finds contrast in the structure and dynamism of this relationship in rentier regions. In rentier states the three partners support each other only to fulfil their obligations, rather than to enhance performance; and to ingratiate self both the public and the others if it such ingratiation supports their cause. The three partners rather strive to advance themselves and gain advantage even to the detriment of one another.

This study finds that the triple helix of innovation in a rentier state involve intra-relational struggles and tensions that hinder its effectiveness. Among the major functions of the government within the relationship is making policy initiatives and providing enabling environment such as intellectual property regimes and law enforcement. But the institutional dynamics of rentier states however dictate that it is in the interest of the government that these institutions remain weak, as Bratton & Van de Walle (1997) explains "*In most rentier states, the ruling elite often undermine institutional integrity to protect their own rent-seeking interests*" (p.19). Sound legal system is required for academic entrepreneurship to flourish, but the rentier government rather supports the *status quo* of weak institutions; this in the overall works against intellectual property ownership, and stifles academic entrepreneurship.

Owing to the peculiarity of academic entrepreneurship in rentier regions, it is recommended that governments and policy-makers before borrowing policy initiatives from other regions should first scrutinize them under the prism of their peculiar institutional outlook. Especially for natural-resource rich regions, an evidence that such policy initiatives worked in one region does not guarantee that it would work in others.

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