

STRONG STRUCTURATION THEORY APPLIED TO UNIVERSITY BUSINESS INCUBATORS AND A MULTI-LEVEL ANALYSIS USING INTEGRATIVE REVIEW

Research Paper

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Abstract

There has been an increasing development in understanding the role of University Business Incubators (UBIs) in developed and developing countries. Several scholars have posited the need for UBIs and the roles they play in regional economic development. Extant literatures of the UBI concept spans across several branches of studies: management, finance, innovation, education and social science. However, there is need to integrate empirical literatures and the UBI body of knowledge to understand the relative objects, components, agents, actors, important constructs and causal relationships on a multi-level analysis and within a dynamic network. Using an integrative review of UBI quantitative studies on a multi-level analysis this study creates a theoretical framework for further research agenda and a classification of constructs.

Using specific cases, Strong Structuration Theory (SST) is applied as a theoretical lens to show the impact of conditions of actions at the meso level within the UBI structure and how the agents and actors within the internal structure respond to changes. The SST is an update on the Giddens' Structuration theory which builds on structures and agents in a recursive relationship and position-practice i.e., subjects, objects and macro, human agency are reciprocally related. Based on a quadripartite, SST views a structure as human agents linked in a dynamic network of position practice and there are 4 categories according to SST: External structure, Internal structure, agents, actors and outcomes.

Keywords University Business Incubators, University Business Incubation, University Spin-off, (Strong)Structuration Theory.

1 Introduction

The Bayh Doyle act in the US and the Triple Helix re-constructed the University paradigm from a research-based institution to an entrepreneurship and incubation-based institution. This transition aided the formation of the knowledge space (creation of R&D activities), consensus space (ground where the regional actors deliberate on new ideas) and innovation space (where innovation mechanisms like incubators, technology transfer offices and research centres are created) within the University regional ecosystem. The UBI belongs to the Innovation space within the Triple Helix (Etzkowitz, 2002).

UBI serves as an avenue for incubation and commercialization of ideas, it's used in strengthening regional economies by increasing start-ups survival and failure rates in developing countries(Bathula et al., 2011; Iyortsuun, 2017). While UBIs have sprung up in most developed economies, little successes have been achieved in many developing countries due to the problems associated with a factor-based economy such as lack of infrastructure and low government support and there are few

empirical data available to justify the performance of these UBIs. The knowledge, strategies, capabilities and competencies needed to develop these UBIs in some developing countries are also not well documented and the investigation of how developing economies can adapt UBI models of developed economies needs to be investigated further (Miner et al., 2012; Wang et al., 2013).

While the characteristics of producing spin-offs or venturing process within a UBI might be known in developing economies, how such environment are established might be different regionally due to varying structures, objects and actors within the dynamic regional environment at the levels of analysis (Baraldi and Havenvid, 2016; McAdam et al., 2016; Rasmussen and Borch, 2010). There is a need to understand how the structure and agents or actors within the UBI interact and how they align and respond to impact or condition of actions (Cooper et al., 2012).

While several scholars have reviewed UBI studies systematically (Hackett and Dilts, 2004; McAdam et al., 2006; Nicholls-Nixon et al., 2021) lacking is an integrative review on a multi-level analysis that synthesizes and aggregates the constructs vis-à-vis causal relationships for UBI towards developing a theoretical framework. This study addresses this gap firstly by integrating selected quantitative papers in UBI and extracting the constructs and variables, thereafter, building a framework that aggregates all constructs or variables and their relationships on a multi-level analysis (meso, macro and micro) and taking into cognizance the regional economy ecosystem. Secondly, SST is applied using selected specific case studies on a multi-level of analysis. Application of SST increases the understanding of how UBIs structures can respond to impacts or tensions and make alignments and adjustments.

The remaining part of this working paper is structured as follows: the next section discusses SST and outlines the theoretical framework based on an integrative review. Thereafter the methodology is discussed.

1.1 Theoretical Framework, Methodology and Analysis

Several theoretical lenses and perspectives have been applied to the study of UBI: Resource Based View (RBV) (Pazos et al., 2012; Somsuk and Laosirihongthong, 2014), Real options theory (Hackett and Dilts, 2004), selection criteria (Wachira et al., 2017), social capital and networks theory (Cooper et al., 2012; McAdam et al., 2006; Redondo and Camarero, 2019; Wachira et al., 2016a). Few of these theories have been applied on a single level of analysis i.e., the individual level or incubator level. However, there seems to be a lack of conceptual theoretical lenses(s) such as when actions at a level of UBI multi-analysis occurs a 'position of observation' by the researcher or analyst could be viewed to understand the impact and outcomes on the UBI structure and to understand how the constituents of the elements within the UBI structure (human agents(actors), subjects, objects all respond to such actions. The SST could be a helpful lens or solution to this missing perspective within the UBI study ecosystem.

SST gives a perspective of understanding the UBI structural components, knowledgeability, agents, relative relationships and changes within the structure, how agents respond habitually and the impact and outcome of these changes on the level of analysis (Harris et al., 2016; Jack and Kholeif, 2007).

In addition to this, SST is applied using selected specific case studies on a multi-level analysis. This provides an overview of how SST aids in supplementing the organizational management scholarship or study on affect and effect of 'conditions of action' within and outside a UBI structure and the habitual and conjuncture responses (Greenhalgh and Stones, 2010; Hvidt et al., 2021; Jack and Kholeif, 2007).

Strong Structuration Theory

Drawing on the scholarly work of Stones an updated perspective of Giddens's Structuration theory, Giddens defines structure as 'rules and resources' recursively implicated in social interactions. SST builds on structures and agent (actors) in a recursive duality (i.e., made up of subjects, objects, macro and micro human agents that are reciprocally related within a dynamic network). SST is based on a quadripartite approach which considers: (a) an external structure: these are the condition of actions influenced by the meso level. This include the inter-organizational or transnational networks (b)

Internal structure i.e. the organization (which defines the conjecture-conceptually specific knowledge of external structures and the habitus (general disposition: what the agent draws on without thinking and this include: transposable skills, culture, speech connotation, recipe of actions) (c) Active agents (actants) within the structures and (d) outcomes-conditions or results of the interactions at all levels between human agents (actants) and objects (Greenhalgh and Stones, 2010; Gregor and Johnston, 2000; Jack and Kholeif, 2007).

Based on the SST the UBI structure can be conceptualized into the quadripartite structure and the interactions at these levels: external and internal structures and how human agents are influenced by external impacts and tensions can be observed (Greenhalgh and Stones, 2010; Stones, 2017). Figure 1 shows the adapted SST structure and dimensions.

Integrative Review

Investments in UBI has increased over the last decades due to the increased roles UBIs play in technology transfers, venturing, start-up formation and commercialization within the regional entrepreneurship eco-system establishments in both developed and developing countries have attracted scholarly interests. Typical studies have spanned across several branches of management, innovation, finance, education. Such studies have looked with interests into UBI as an organizational entity (Hisrich and Smilor, 1988; Mian, 1996, 1994; Rothaermel and Thursby, 2005), critical success factors (Buys and Mbewana, 2007; Gozali et al., 2018; Lee and Osteryoung, 2004), capabilities and resources (Pazos et al., 2012; Rasmussen and Borch, 2010). Other scholars have also examined UBI from a strategic view (Bruneel et al., 2012; Nicholls-Nixon et al., 2018; Rothaermel and Thursby, 2005), networks and capital (Cooper et al., 2012; Pellegrini and Johnson-Sheehan, 2021; Redondo and Camarero, 2019), decision making and entrepreneur selection (Redondo and Camarero, 2017; Wachira et al., 2016a). There have also been some UBI related systematic reviews in the last two decades (Ali et al., 2020; Hackett and Dilts, 2004; McAdam et al., 2006; Perdomo Charry et al., 2014) and an integrative review on UBI life cycle and entrepreneurial eco-system (Nicholls-Nixon et al., 2021). However, there remains a gap on integrating and synthesizing UBIs extant studies that captures and integrates constructs or variables of interest and provides a theoretical framework for a more structured yet elaborate view or a re-conceptualization of causal relationships of the UBI concept.

This study bridges this gap by conducting an integrative review using multi-level analysis on extant UBI quantitative literatures towards the development of a theoretical framework. This article answers questions such as: what gaps and further research agendas are required at each level of analyses? Are there less understudied areas in each level of analysis and are there new perspectives or theoretical view to some of the literatures?

An integrative review can be used to synthesize and critique selected literatures on a concept or topic in an integrated way leading to a theoretical framework, taxonomy, typology or a new model. Past empirical studies can be synthesized to provide a more comprehensive understanding of the concept in question (Whittemore and Knafl, 2005).

In conducting an integrative review, extant quantitative literatures will be reviewed through a 4 staged approach: (a) Conceptualization or problem identification: In this stage a guiding concept or theory will be defined to elucidate on why the integrative review is conducted e.g. variables or constructs aggregation and guiding concepts. For this review, selected articles would be on UBI organizational context (processes, rules, norms, policies, strategy, networks, actors, knowledge flows and absorptive capacities, dynamic capabilities and competencies, managerial decision making, selection criteria, performance evaluation etc.) as related to the SST quadripartite and a multi-level analysis perspective (Baraldi and Havenvid, 2016).

(b) Literature search (c) Data collection and Evaluation (d) Data analysis and (e) Discussion and Conclusion.

Methodology

For the Integrative review, comprehensive search was conducted to select quantitative literatures related to UBI studies from 1994 to 2022. 1994 is selected as the start date due to the article by Main S.A on UBI. This article gave a foundational background for subsequent studies in UBI. Databases such as EBSCO and Google Scholar were used to perform search on the keywords. To provide an extensive search, 'University spin-off' if conducted within a UBI was included in the keywords. Inclusion and exclusion criteria are defined based on search on relevant top ranked journals in management, innovation, entrepreneurship, education, social sciences and finance. The initial search resulted in 1430 publications. Further exclusion based on the level of analysis and related empirical studies resulted in 51 publications which were further filtered to 7 articles which are synthesized and aggregated into the framework as shown in Fig 2 and Table 1

For the SST analysis, specific case studies that includes terms such as impact of networks and organizational context on the UBI structure are selected and discussed below.

UBI Multi-level Analysis

Several earlier UBI studies used a unit level of analysis e.g., the organization (Bathula et al., 2011; Gozali et al., 2018). These studies looked with great interest to UBI as an organization with resources, demand and supply perspectives, critical resource factors and provider of mentorship and support. However there has been calls for a multi-level analysis, that provides a broader and holistic view of UBI studies (Baraldi and Havensvid, 2016; McAdam et al., 2016). These scholars have investigated UBI from a multi-level perspective i.e. as an institution with a network or community of stakeholders and as an organization for a more holistic and broader view of UBI analysis, it has been suggested that an examination of UBI on three levels which include incubatee, incubator (organizational) and the regional community or networks or Institutional and inter-organizational and regional levels should be taken into account.

Scholars have also identified exploring university business incubation process within the regional settings, and this is still regarded as an underexplored area lacking a consistent theoretical foundation. Since incubation models could differ regionally, it is also important to identify and examine unique regional influences on university incubation models. Presently, few literatures have explored the effects of the organizational and institutional arrangements i.e., the meso environment on the incubation process in a region. The impact of situated university business incubators on a region has been explored, however, further research is needed to aid theory development and refinement on other UBIs regional contexts (McAdam, Miller and McAdam, 2016).

For this integrative review, literatures on these levels of analysis will be reviewed, criticized and variables of interests extracted, and causal relationships identified and synthesized for further research agenda. Figure 1.2 gives an aggregation of the extant literatures. These next sections of the literature will provide an insight into the review of quantitative studies on this level of analysis and provide a paradigm shift direction for further research agenda.

Literatures on Social Networks & Capital (Network Level of Analysis)

The UBI social network indicates the network of inter-relational systems with both individual social capital and incubator's social capital. The social capital is defined as the network of relationships which allows individuals to harness and share valuable resources and assets within the network (Redondo and Camarero, 2019). In a typical social network structure there could be a bonding or bridging social capital and this can be developed either individually (Wachira et al., 2016b) or collectively within the UBI network. There are few studies on this level of analysis: Social capital antecedents and dimensions (Redondo and Camarero, 2019), motivation and (Cooper et al., 2012), Role of Social Network in UBI (Wachira, Ngugi and Otieno, 2016a).

Some of the independent variables of interest at this level includes:

- (a) incubatee bonding social capital (refers to close ties and the closures that characterized relationships and enables exchange of collective actions. It is measured as the number of incubatee with which the incubatee maintains frequent and close contacts.
- (b) incubatee bridging relationships social capital (relationships that individuals establish with other external groups, characterized by weak ties yet allows them to access new ideas, opportunities or information. It is measured by means of an ad-hoc scale with two formative items (increased network of external relationship and development of networking abilities in the business world).
- (c) Incubator social capital (source of collective capital): This can be defined by the network dimensions (cognitive, relational and structural social capital). However, there was a limitation in the study as relational social capital could only be measured as a second order construct with dimension of trust, identity and reciprocity.

A major gap or lack of scholarly empirical studies exist on the social network level of analysis. Most of the studies are based on the use of social network analysis with the use of software like UCINET. While the audience can grasp the intended social network analysis and interactions within the UBIs and constructs such as strength of ties, network density, in-betweens, frequency of interactions and channels or tenor of communications can be deduced and aid an understanding of the internal and external social networks, the socio-relational and cognitive part of the social network lacks more empirical research. The sociological and behavioural perspective that causes these interactions needs to be understood. These aspects of a social network aid the network analysis, and this shouldn't be delimited in studies or research. The authors emphatically stated these limitations and several ad hoc measurements were created for empirical measurements. Another example is the measurement of the variable proactivity and entrepreneur university. There were no past empirical findings where both variables were measured-The proactivity was measured via the incubatee perceived manager's proactivity and for entrepreneur university and entrepreneur in incubators, there was no earlier measurements found and management efficiency was used for the measurement.

The control variables: academic experience, months spent in incubator, number of partners and the existence of a coach moderated the dependent variable Management efficiency. From the quantitative measurements, the incubatee bonding and bridging social capital enhances Management efficiency and the managers 'proactivity is an important variable which also directly influences management efficiency.

However, it should be noted that while these variables enhance management efficiency and performance, worth mentioning is the obstacles and motivations to communications within UBIs. Obstacles during the early life cycle stages could cause lack of trust and this would affect support given to entrepreneurs during this life cycle stage to combat this effect, it's advisable for the UBI to relinquish control to shorten the distance of communication between entrepreneurs. Incubator managers should also initiate networking events among entrepreneurs in residents(Cooper et al., 2012).

Literatures on Organizational and Incubator level of Analysis

Earlier studies existed with several discussions on the UBI as an institution or organization. These literatures discussed dimensions of the UBI such as: critical success factors and performance measurements, value adding perspectives of UBI, incubation models, resource and asset-based perspectives.

Several empirical lenses are also used such as fuzzy AHP logic for enabling factors prioritization, exploratory factor analysis, regression etc. Early 2000 shows a paradigm shift in UBI literatures from the organization resource and asset discussions to more strategic features this paved the way for advancements in UBI studies such as knowledge flow and absorptive capacity within UBIs, there is need for new studies in terms of resource-based perspective shift to a dynamic resource and dynamic capabilities perspective.

Resources and Dynamic Capabilities

Authors have used the RBV as theoretical lenses in their resource-based assessments. Resources(static) can be classified into organizational, technological, financial and human. This classification aids in determining the enabling factors for UBIs in Thailand and prioritizing these enabling factors by incubation policy makers (Somsuk et al., 2012; Somsuk and Laosirihongthong, 2014). In a related study, UBI resources in Spain were classified into institutional, human, financial and commercial resources with a causal relationship with university spin off activities as the dependent variable(Pazos et al., 2012).

While these RBV based studies paved way for an understanding of the static resources of UBIs, there is the call for the dynamic studies of capabilities and resources. RBV as one of the foundational theoretical lenses in strategic management has come under intense criticism due to its competitive equilibrium model perspective and static resource view which doesn't hold as the market environment is dynamic and keeps changing due to competing forces (Barney et al., 2001; Kraaijenbrink et al., 2010). In lieu of this, more UBI studies should be carried out on sustainable dynamic capabilities development within a regional UBI aided by understanding of earlier dynamic capabilities studies(Teece, 2017; Teece et al., 1997).

Knowledge Flows and Absorptive Capacity

Knowledge flows within universities to UBI and vice-versa is important to the absorptive capacity of the UBI. The absorptive capacity is defined as the ability of the firm to assimilate and absorb new knowledge for organizational transformation(Rothaermel and Thursby, 2005). It's important to understand how knowledge flows from universities to incubator firms and how the flows affect the performance of the technology firms within the UBI.

Knowledge flows can be through different mechanisms such as university licenses, patent backward citations to University research, academic journals, research by the incubators sponsoring University and research from other Universities than the sponsoring university. Knowledge flows tends to be mitigated by geographic distance and license endows the UBI with a resource and fulfils the VRIN attributes as its value allows the firms to exploit a technological opportunity. Patent Backward Citations which are bibliometric fossils that identify ideas on which incubator firm draws on when applying for patents are also an indicative of Universities' Incubator's absorptive capacity.

Some of the variables extracted from this study include: (Dependent variable)-Incubator firm performance, revenue, total funds raised, VC funding, failure, graduation and remain in incubation.

(Independent Variable) includes knowledge flows from University to incubator firm, local university license, backward citations to university research including real inventions, backward citations to academic journals, backward citations to local university research (in the study case GT-Georgia Tech)

Control variables: Firm size defined as the number of employees up to the year prior to which the outcome variable was assessed. This includes full-time and Part-time employees, Industry effect (this shows if the entrepreneurial firm is a Software, IT or Telco company as more focus is given to them due to easier scalability), time in Incubator: shows date of admittance to incubator and the last year the firm remained in the incubator.

Non -GT University link: Linkages to other Universities other than Georgia Tech(Rothaermel and Thursby, 2005).

In a related study on Absorptive capacity and its effect on University Technology Business Incubators (UTBI) in Philippines, it's suggested that absorptive capacity can be divided into two: potential absorptive capacity (acquisition and assimilation of new external knowledge) and realized absorptive capacity (ability to transform and exploit them). It is also relevant to mention that the dimension of absorptive capacity also includes organizational antecedents such as slack resources, willingness to cannibalize, tolerance for failure, external openness and these all directly influence the potential absorptive capacity. The degree to which the assimilated knowledge can be exploited determines the extent to which the organization can deliver value which depends on the realized absorptive capacity.

In essence, the realized absorptive capacity complements innovative outputs within the organization. From the study, among the organizational antecedents only external openness and tolerance to failure relatively enhanced potential absorptive capacity. Potential absorptive capacity also mediates the relationship between realized absorptive capacity and the organizational antecedents (Novino, 2022).

Network Capabilities (NC) and Entrepreneurial Orientation (EO)

NC defined as the abilities to initiate, maintain and utilize relationships with various external partners. The term 'network' in NC goes beyond managing relationships (i.e single partnership or alliances) and the capabilities in NC is due to dynamic processes and higher order resources. NC is defined as organization-wide characteristics with 4 dimensions: co-ordination, relational skills (social competence, communication ability, emotional stability and sense of justice) and internal communication (essential for responsiveness and openness, organized and structured information about a firm's suppliers, customers and competitors).

EO defined as strategic orientation that describes a firm's organizational autonomy, willingness to take risks, innovativeness and reactivity assertiveness, while EO it doesn't directly affect sales, growth and profit based on past empirical investigations, EO is still essential for organizations to sustain their competitive advantage.

Based on a study on the impact of network capabilities and entrepreneurial orientation on spin-offs performance, the impact of NC and EO on spin offs was examined on 149 spinoffs. NC enhances spin-off performance and EO doesn't directly affect spinoff performance (Walter et al., 2006). Performance variables such as sales, growth, sales/employee, profit attainment, perceived customer relationships quality, realized competitive advantages and long-term survival is influenced by NC. Some of the constructs and variables associated with this causal relationship include:

Independent Variable: Network Capabilities, Entrepreneurial Orientation

Dependent Variable: Spin off performance

Control Variable: Spin off age, spin off size

However, for future research, other moderating effects related to market and technology dynamics can be investigated. Since NC is an important factor for spin off performance within the USO and UBI, it's establishment in early stages of spin-off process could be measured from inception. Limitation of the particular study include the addition of strategy, structure and environmental as moderating variables.

Innovation strategies and Incubation support of tenant firms

UBIs are created in some regions of developing countries of the world to ease the rate of spin off failures and accelerate new venture growth. However, there is a quest for the right market and innovation strategy and the required support for a cumulative expected spin off performance. In the study of the impact of UBI support on innovation strategy by tenant firms, exploitation and exploration strategies coupled with the ambidextrous combination of market and technology strategies relatively affect the performance of spinoffs firms based on entrepreneurial and networking supports available to them. While networking support hinges on strong ties within the network and network size, its focus is on building networks and networking activities with the aim of creating value for resource acquisition or business growth, entrepreneurial support is based on mentoring, training and coaching. This support is intended to overcome obstacles related to the lack of entrepreneurial skills and knowledge (Soetanto and Jack, 2013).

Based on this study a technology and market exploitation strategy have a stronger and more positive effect on the performance of spin offs than a technology and market exploration strategy. Incubation support (networking and entrepreneurial support has positive effect on spin-off performance. The control variables are spin off ages, size and level of innovativeness, while networking support (measured as strength of ties and network size) and entrepreneurial support are the independent variables. The dependent variable is spin off performance.

However, for future research agenda, specific industry requires its own strategy. The quality of networking support is also questionable as the network size and ties are used as sources of

measurement. Additional insight is required in the measurement of quality of the relationship that facilitates networking support.

Thoughts and Reflections on Integrative Review

Some of the studies analysed in this review based on the multi-level analysis necessitates new perspective of study. An example is the prioritization of resources within UBIs and determination of enabling factors related to these resources. While resources are viewed in this state as static, it should be noted these resources are utilized in a dynamic environment and adaptation and re-configuration has to be made continuously to these resources. This understanding paves way for more concise and upcoming studies on dynamic capabilities (resources including competencies) within UBIs specific to regional entrepreneurial ecosystem.

Presently there seems to be scarcity of studies on knowledge flows and absorptive capacity within UBIs in developing countries. There is an opportunity for the academia in understanding UBI organizational culture perspective within knowledge flows in developing countries and how it affects the dynamic capabilities of UBIs in this region.

Applying SST to UBI

In section 1.1 a brief introduction to SST was discussed. In this section the application of SST to UBI structure will be examined. In applying this, a 3-step approach will be used. Firstly, a more detailed outlook of the SST will be provided, and Secondly the SST application framework will be explained and finally SST will be applied to specific UBI case studies.

Stone's SST although an adaptation from Giddens also takes development (Harris et al., 2016; Jack and Kholeif, 2007) from Cohen structuration theory which depicts the position practice which is a social position, identity and practice together with a network of social relations with recognised support. From this position of practice, the researcher can examine the network of relationships between clusters of agents of observation which could be an organization, government (regional, local or national) within the structure as depicted in Fig 1

For a more in-depth definition, the external structure constitutes acknowledged and unacknowledged conditions of action which can be constrained or enabled by the agent in focus (those closest to the cause of action). This condition of actions could be political, social, economic or legal. The Internal structure consist of the general dispositions as something agents draws on without thinking and so encompasses transposable skills and dispositions, generalized worldview and cultural schemas, people and networks etc. and the conjecturally specific which relates to role or position occupied by agents or cluster of agents (legitimation or norms) come into play here. The active dynamic moment of structuration is the active agency, and the outcomes are the results of active agency which may be preserved, changed or consequences may be intended or unintended and the agent maybe facilitated.

In applying the SST, the starting point should be the internal structures identifying the agents in focus and the general dispositions or conjecturally specific. Checks could be made if there are sets of schemes, channels, allocation of resources and norms of the agents in focus including their perception and constraints. The external structure and the position of authority or condition of actions are identified and what asset or resources are at their disposal and if the structure can be modified by the agent in focus or not. The actions of the agents and the outcomes are then analysed.

In applying SST to UBI, articles were selected from 1994 to 2022. The choice of the start date was due to the articles by Mian S A which provided a path for scholarly activities in UBI. Articles were searched from Google Scholar and EBSCO across several branches of studies. The keywords used were 'University Business Incubators' and 'University Business Incubation'. These searches generated 2060 articles which were screened as the interest was majorly case studies. Several publications were left out as they didn't match the keywords. For more ingrained exclusion, focus was on articles based on multi-level analysis, institutional and organizational context, organizational capabilities and

resources, impact of Business incubation or regional ecosystem on UBI resources. With this criteria, 28 articles were left of which 8 were finally selected due to the richness and depth of the cases, data collected and application to organizational structure and processes, actors, stakeholder's perspective, meso and macro levels applications (Harris et al., 2016).

For the detailed SST analysis, the initial research questions were assessed, and the theoretical lens examined. For the journal and conference presentation, SST will be applied on (McAdam et al., 2016) 'Situating Regional University Incubation: A Multi-level Stakeholder Perspective'.

SST Analysis of McAdam et al (2016)

This study addresses the gap in meso level impact on the regional incubation models of universities using a multi-level and stakeholder perspective. The two research questions were finding out the key university-stakeholder relationships, consistent with the stakeholder-based quadruple helix model in relation to incubation processes within a peripheral region and to examine the impact of organisational and institutional arrangements, namely the meso environment on university incubation models. Two Universities UBI in the UK peripheral regions were used as the case study: Case 1 university is more researched based while case 2 is academic, teaching and research-based University.

Funding for research purpose is purely based on the regional and governmental supports and engagement with the quadruple helix stakeholders. This had a direct impact on the incubation model of the two Universities. As a point to commence the analysis, the condition of action that creates an influence or impact can be identified as regional research funding and support. The external agents were the regional government funding agents and the Quadruple Helix stakeholders.

Based on the structure of analysis depicted in the last section, the first starting point would be identifying the Internal structure of the SST i.e., the habitus (general disposition) and the conjecture. These are defined by the Universities' culture, mission, strategies, resources, skills and knowledge which directly impacted on the response of the agents due to the influence or condition of action created from the meso level (regional funding/support). The initial agents in focus were the RDA-regional development agency (a core stakeholder) that determined the mode of financing which wasn't easily accessible by the two Universities and the outcome was several technology and product development failures and 'vicious circle' of inaccessibility to funding.

However, the RDA was replaced by the local enterprise partnerships that followed a different funding model which benefited both Universities due to easier access to funding and this changed the response of the agents in context (channels through which other agents understand structures i.e., action informing)- which are Incubational staff operational staff member and the Research and Enterprise strategic staff members. It is pertinent to also understand the government's exertion of power and authority on the structure, activities and incubation model of the UBIs as funds could be withheld or conditions to the funding also attached. This showed a level of significance, domination and legitimation on the internal structure as depicted by Giddens and Strong in the SST. However, with the new funding and support model, the internal structure of the UBI was modified. This made Case 2 University shifted from the traditional incubation model to virtual incubation model and the agents in context reacted by engaging more with end users, industry and business stakeholders in the Quadruple Helix. This correlated into a positive outcome for Case 2 University which is more academic based as academic enterprise and commercialization were ingrained and adopted into the promotional mechanism of the institution which included more involvement in publication and research which paved way for constant interactions with the industry and end users.

Contribution to Literature

In recent times, there has been a growing interest in extending the SST for theorizing organizational and management research. Firstly, this study contributes to management research by applying SST to UBI case studies and more specifically, it indicates how SST can facilitate the know-how on the impact or change of actions at the meso or macro level within a UBI structure and how agents-in-focus and agents in context would react based on the changes in action. As seen in the analysed case SST

gives a new theoretical lens or perspective into how case studies could also be conducted if SST is applied early enough in the research design(Harris *et al.*, 2016).

Applying SST in UBI studies aids UBI researchers and analysts to have an observatory view or as called by SST 'position practice' on meso and macro levels. SST also helps policy makers to understand the roles of active agents within the UBI ecosystem or structure and the impact and outcomes of decision making within the UBI context and how the objects and actors could align and adjust to these changes.

Secondly, the theoretical framework that created through the integrative framework could be used for further research agenda by scholars in adopting and formulating specific region based UBI studies.

1.2 Figure

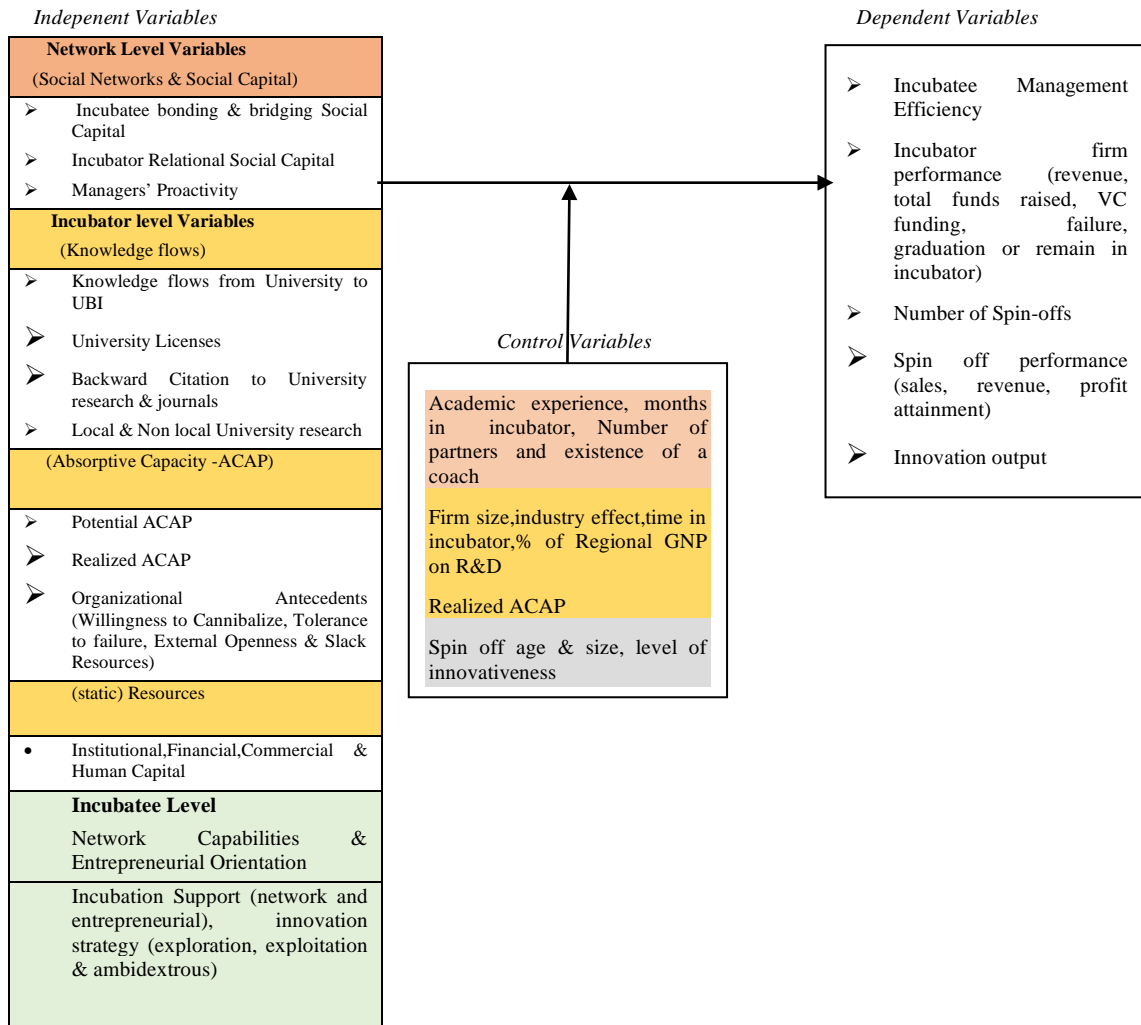


Figure 2 theoretical framework via aggregated constructs & variables.

1.3 Table

Articles	Description	Hypothesis/Research Questions	Findings, Limitations, critiques & Further Research
Literatures on Network Level			
<p>*1. Social Capital in University Business Incubators: dimensions, antecedents and outcomes. Int. Entrep. Manag. J. 15, 599–624 Redondo, M., Camarero, C., 2019a</p> <p>*analysis was done on both network and incubatee levels</p>	<p>Empirical study is based on survey data collected from incubatee on Spanish and Dutch UBIs</p> <p>Independent Variables: Incubatees bonding & bridging capital, incubator relational social capital, manager’s proactivity</p> <p>Dependent Variables: Incubatee’s management efficiency</p> <p>Control variables: academic experience, months spent in incubator, number of partners and the existence of a coach</p>	<p>1.Incubatees’ bonding social capital–H1a– and bridging social capital –H1b– have a positive influence on management efficiency.</p> <p>2.Incubatees’ bonding social capital has a positive influence on bridging social capital.</p> <p>3.The incubator’s relational social capital has a positive influence on incubatee’ management efficiency</p>	<p>Findings: the incubator’s relational social capital helps to shape incubatee’ social capital.</p> <p>Critiques: The sociological and behavioural perspective that causes these interactions needs to be understood. These aspects of a social network aids the network analysis and this shouldn’t be delimited in studies or research. Most of the studies are based on the use of Social network analysis with the use of software like UCINET.</p>
<p>2. Motivations and obstacles to networking in a university business incubator. Christine E. Cooper • Stephanie A. Hamel Stacey L. Connaught on J Technol Transf (2012) 37:433–453 DOI 10.1007/s10961-010-9189-0</p>	<p>The case study reveals the nature of communication in the internal network of 18 resident companies and the incubator administrators.</p> <p>Important constructs: Network Distance, network density</p>	<p>1.What are the characteristics of the communication network structure among organizations at the Incubator?</p> <p>2.What are the characteristics of the communication among organizations at the Incubator?</p> <p>3. What are Incubator residents’ motivations for networking within the incubator?</p> <p>4. What obstacles do Incubator residents face to creating and sustaining successful networking in the incubator?</p>	<p>Findings: Member organizations must balance a primary tension between independence and connectedness. Independence is required to maintain focus on company goals, protect proprietary information</p> <p>Obstacles during the early life cycle stages could cause lack of trust and this would affect support given to entrepreneurs</p> <p>It’s advisable for the UBI to relinquish control to shorten the distance of communication. Incubator managers should initiate networking events among entrepreneurs in residents</p> <p>Critiques/Future research agenda: While this was a case study it would be novel to conduct a similar quantitative study in different region to determine the degree of obstacles or motivation of incubatee and how it differs from one region to the other.</p> <p>Incubator’s residents ‘perception of communication networks at various stages and the social network mechanisms in networked organizations can also be explored.</p>
Literatures on Organizational/Incubator Level			
<p>3. University–incubator firm knowledge flows: assessing their impact on incubator firm performance Frank T. Rothaermel,, Marie Thursby Research Policy</p>	<p>Longitudinal and fine-grained firm-level data of 79 technology ventures incubated between 1998 and 2003 at the Advanced Technology Development Centre, a technology incubator sponsored by the Georgia Institute of Technology</p>	<p>1.How knowledge flows from universities to incubator firms</p> <p>2. how these flows affect the performance of new technology ventures</p>	<p>Findings: exclusive knowledge flows in terms of a university license can endow the start-up with a unique resource, which can lead to a competitive advantage.</p> <p>University backward patent</p>

<p>34 (2005) 305–320</p>	<p>Dependent Variable: Incubator firm performance, Revenue, Total funds raised, VC funding, Failure, graduation, and remain in incubator</p> <p>Independent variable: Knowledge flows from university to incubator firm, GT(GeorgiaTech)or local university license, Backward citations to university research, journals and GT (Georgia Tech) & non-GT research</p> <p>Control Variable: Firm size, industry effect, time in incubator, on GT university links</p>		<p>citations are indicative of a start-up’s absorptive capacity that enables it to recognize public knowledge flows emanating from a university, assimilate them internally, and then to apply them to commercial ends.</p> <p>A new venture’s absorptive capacity is hypothesized to positively affect its performance.</p> <p>Future Research Agenda/Critiques:</p> <p>Alternate metrics that capture knowledge flows more effectively.</p> <p>Different absorptive capacities of UBIs can be measured to see if this result or findings can be generalized.</p>
<p>4.The mediating role of absorptive capacity on innovation among technology business incubators in the Philippines.(Marlo Novino College of Economics, Business, and Accountancy, Mindanao State University–Iligan Institute of Technology, Iligan City, Philippines) Rajagiri Management Journal Emerald Publishing Limited e-ISSN: 2633-0091 p-ISSN: 0972-9968 DOI 10.1108/RAMJ-11-2021-0084</p>	<p>To explore the knowledge management and innovative outputs (IO) of university based technology business incubators (TBIs) funded by Department of Science and Technology (DOST) in the Philippines.</p> <p>The respondents, which include heads, managers, coordinators, and staff, were reached out via email using a database. The instrument was generally adopted from various related studies in the literature. Data were analysed quantitatively using partial least squares – structural equations modelling (PLS-SEM)</p> <p>Independent Variables</p> <p>Potential absorptive capacity, realized absorptive capacity, (Organizational antecedents): Willingness to cannibalize, tolerance for failure, slack resources, external openness</p> <p>Dependent Variables:</p> <p>Innovation Output</p>	<p>Hypothesis</p> <p>1.Organizational antecedents (Willingness to cannibalize, tolerance for failure, slack resources, external openness influences Personalized Absorptive capacity.</p> <p>2. Personalized Absorptive capacity mediates the relationship between organizational antecedents (Willingness to cannibalize, tolerance for failure, slack resources, external openness) mediates Realized Absorptive capacity.</p>	<p>Findings: Among the organizational antecedents, it’s only Slack Resources and Willingness to cannibalize had no relational effect on personalized absorptive capacity. However, Tolerance to failure and external openness had predicted personalized absorptive capacity.</p> <p>Future research can conduct more matured longitudinal assessments of UTBIs.</p> <p>Other explanatory variables such as leadership and organizational culture can be included in the causal relationships.</p>
<p>5. A resource-based view of university spin-off activity: New evidence from the Spanish case. Pazos, D.R., López, S.F., González, L.O., Sandiás, A.R., 2012</p>	<p>The objective was to understand why some Spanish universities are more successful in creating spinoffs than others. A balanced panel of 47 Spanish public Universities isning biannually information between 2002 and 2006 was used.</p> <p>RBV was used as the theoretical lens and based on a Multivariate analysis, the degree to which USOs activity is affected by different sets of resources a binomial model is used</p> <p>Dependent Variables: Number of University Spinoffs,</p> <p>Independent Variables: Institutional, Human Capital, Financial & Commercial Resources</p> <p>Control Variable: % of regional GNP spent on R&D</p>	<p>Hypothesis:</p> <p>H1- There is positive relationship between the tradiotn and thistory of the USO activity and the creation of unveristy spin-offs.</p> <p>H2.There is a positive relationship between disciplines with a greater market orientation,namely life sciences and engineering,and the creation of university spin-offs.</p> <p>H3-Thre is a positive relationship between te research quality aof the academic staff and the ccreation of USOs.</p> <p>H4-There is a positive relationship between the amount of the university’s total research funding and the creation of USOs.</p> <p>H5-There is a positive relationship between the amount of industry-funded research and the creation of</p>	<p>Tradition of the spin off activities and past knowledge accumulation activities positively influences university entrepreneurship. The presence of incubation services and internal funds in a university also increases spin offs activity.</p> <p>Further research should analyse the USO creation and compare results with other entrepreneurship activities(e.g. patenting,licensing,venturing)</p>

		USOs. (static) resources classification into: Institutional,Financial,human capital and Commercial resources	
Literatures on Incubatee level			
<p>6 Impact of network capabilities and entrepreneurial orientation on spin-offs performance (AchimWalter, Michael Auerb, Thomas Ritter) Journal of Business Venturing 21 (2006) 541 – 567</p>	<p>Drawing on a database of 149 university spin-offs, we investigated the impact of network capability and Entrepreneurship Orientation on organizational performance</p>	<p>Independent variable: Network capability, Entrepreneurial orientation Dependent variable: Spin-off performances (sales growth, revenue, profit attainment) Control variable: Spin-off age and size</p>	<p>NC has direct effect on organizational performances while EO doesn't have direct effect on organizational performance however it's essential for attaining competitive advantage.</p>
<p>7. The impact of university-based incubation support on the innovation strategy of academic spin-offs. Technovation 50, 25–40.</p>	<p>Drawing on a study of spinoffs in UK,Norway and the Netherlands,the moderating effect of incubation support on innovation strategy effectiveness is examined.</p>	<p>Independent Variable: Incubation support (Networking & Entrepreneurial support),innovation strategy(exploitation & exploration),ambidexterous technology & market strategy Dependent Variable: Spin off performance Control variable: spin off age,size and level of innovativeness</p>	<p>NC strengthens the relationship between corporate EO and spin-off performance and EO doesn't have direct significant on sales growth,profit and spin off performance.</p>

Table 1. Extracts of scholarly studies on each level for integrative review.

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