THE ROLE OF OPEN INNOVATION INTERMEDIARIES IN ENTREPRENEURIAL ECOSYSTEMS DESIGN

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ABSTRACT

Unemployment levels in South Africa have reached astronomical levels. This has spurred the government to fund entrepreneurship initiatives such as the Enterprise and Supplier Development programmes. Thus it is vital to enable and create entrepreneurial ecosystems that attract, cultivate, and sustain entrepreneurs. This paper explores how entrepreneurial firms use external actors for value creation in an entrepreneurial ecosystem through intermediaries. The focus is on how an intermediary organisation can facilitate value co-creation. The authors present the results and findings from a case study of the Oslo Cancer Cluster incubator in Norway, and relate these findings to ecosystems management and design.

OPSOMMING

Werkloosheidsvlakke in Suid-Afrika het astronomies verhoog. Dit het die regering aangespoor om entrepreneurskap inisiatiewe soos onderneming en verskaffer ontwikkelingsprogramme te finansier. Daarom is dit van kardinale belang om entrepreneurskap ekosisteme te skep wat entrepreneurs lok, kweek en ondersteun. Hierdie artikel ondersoek hoe entrepreneuriese maatskappye eksterne akteurs deur middel van tussengangers vir waardeskepping gebruik in 'n entrepreneuriese ekosisteem. Die fokus van die artikel is op hoe 'n tussenganger organisasie waarde mede-skepping kan fasiliteer. Die skrywers beskryf huidige resultate en bevindinge van 'n gevallestudie van die Oslo Kanker Samewerkingsgroep broeikas in Noorweë, en lei hieruit bevindinge vir ekosisteem bestuur en ontwerp af.

1 INTRODUCTION AND BACKGROUND

The impact of the operating environment on a firm's innovativeness and survival is a question that has been addressed in research for quite some time now. This has been explored through areas of inquiry such as cluster theory, agglomeration economies, and regional innovation studies [1], [2]. Studies in these areas address the role of proximity and location of firms within the same industry, and how they compete and cooperate. Other theories and frameworks such as causation, effectuation, and open innovation attempt to address causal firm behaviour that promotes innovativeness [3]–[5]. Although these streams have enhanced insight into the dynamics surrounding entrepreneurial activities and dynamics, it has been increasingly noted that the underlying forces and actors in regions of high entrepreneurial activity cannot be studied independently [6]–[9]. Therefore, the entrepreneurial ecosystem (EES) construct has become a useful framework for analysing the dynamics among systems actors.

Entrepreneurial ecosystems encompass the organisations, institutions, and individuals that, apart from the entrepreneur, either promote or inhibit entrepreneurship [10], [11]. Construction of these ecosystems is a costly process, as it requires the development of absorptive capacities in industries, firms, and government [12]. Policymakers have tried to replicate successful ecosystems such as Silicon Valley, but without the expected success. This can be attributed to the fact that ecosystem

design, construction, and implementation is not a one-size-fits-all process. Policy-makers need to understand the cultural dynamics and behavioural characteristics in order to create successful and mutually beneficial entrepreneurial ecosystems [7], [8], [13].

Because ecosystems research is mainly concerned with the definition of ecosystem boundaries and coordination, there is still a need to consider the relational aspects among the actors [6], [14], [15], and how these assist in the evolution of the ecosystem. Moreover, an in-depth understanding of how, when, and why different ecosystem actors interact with each other cultivates sustainable entrepreneurship. South Africa has seen the value of supporting entrepreneurial ecosystems, as shown by the influx of entrepreneurial start-up funds and platforms that promote collaboration between entrepreneurs and larger organisations. Examples of these platforms are the Open Innovation Exchange[1] in Gauteng and Connect and Solve[2] in East London. These initiatives are meant to aid in the creation of viable ecosystems; but for the initiatives to be successful, the value created by the actors in the ecosystem should be appropriated by the intended audience [6].

This study stems from the view that, for substantial value to be created and appropriated in an ecosystem, the actors need to interact in various ways [15], [16]. It builds on the perspective that, in an ecosystem, collective value co-creation is not something that happens automatically, but needs to be facilitated [17]. This was achieved through an analysis of the roles an intermediary (such as an incubator) exhibits, and of the actors' interactions that promote co-creation in the ecosystem [18]. The approach used was to consider aspects of the open innovation paradigm to explore the types of interactions and entrepreneurial firm behaviours. The aim was to investigate how an intermediary assists entrepreneurial firms in their value-creation process through engaging with multiple stakeholders to substantiate the ecosystem and to ensure the competitiveness and survival of the firms.

In this study, 'value' is understood as all the actions that are aimed at increasing the worth of a firm; and 'value co-creation' is defined as the process that allows various actors to create value through interaction and the exchange of tangible and intangible resources[3].

To this end, the study considers this question:

How does an intermediary assist in the value creation process for start-ups in an entrepreneurial ecosystem?

These research sub-questions follow:

- *Is intermediation necessary in an entrepreneurial ecosystem?*
- *What intermediary role is of importance to the start-ups to promote value-creation in an entrepreneurial ecosystem?*
- *What interaction processes aid value-creation between actors and the intermediary in an entrepreneurial ecosystem?*

To address these questions, the authors will show how the literature themes of entrepreneurial ecosystems and innovation intermediaries assist in the value creation process of the firms. This is done in order to offer insight into how an entity such as the government can play an active role in entrepreneurship by offering intermediation platforms.

2 A BRIEF LITERATURE REVIEW

2.1 Open innovation intermediaries and entrepreneurial ecosystems

An entrepreneurial ecosystem (EES) "consists of a set of individual elements — such as leadership, culture, capital markets, and open-minded customers — that combine in complex ways" [11].

Through their analysis of ecosystems research, Autio and Thomas [6] pointed out that an ecosystem has a central hub, platform, or focal firm. Although their focus was particularly on innovation

[1] http://www.theinnovationhub.com/opportunities/openix-5
[2] http://connectandsolve.co.za/index.php?page=about
[3] http://www.businessdictionary.com/definition/value-creation.html#ixzz48ypoJAOD

ecosystems, the same structure can be applied to entrepreneurial ecosystems, as they are a subset of innovation ecosystems. Returning to the analogy of entrepreneurial ecosystems, which stems from a biological perspective, a few parallels can be drawn to strengthen the argument that it is necessary to understand value-creation. To create a symbiotic environment (ecosystem), firms need to be provided with the right 'nutrients' (tangible and intangible assets, and networking activities) through an authority structure (an intermediary) [6], [10], [19], [20].

Innovation intermediaries are actors who facilitate, configure, and broker opportunities and spaces for the creation and appropriation of products or services [21]. These three roles are the context for the analysis of the role of intermediaries in this study. An open innovation intermediary is an agent who disseminates the "the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively" [3]. The intermediary uses platforms to bridge the gap between solution seekers and solution providers, thus enhancing the successful appropriation of open innovation by actors in the ecosystem [18].

With entrepreneurship, open innovation is something that can enhance the assets that entrepreneurial firms lack to be innovative and to create a sustainable competitive advantage over time [22]. Intermediaries are important in highly unpredictable environments, as they may reduce uncertainty and asymmetry between industry actors [21], [23]. Thus an intermediary can assist in the successful implementation of open innovation by a firm in the ecosystem through minimising the level of risk that can be incurred during the process of obtaining, integrating, and commercialising external innovations between the firm and the collaborators in the ecosystem [24]. In this case, ecosystem failure or stagnation is attributed to a lack of coordination among participants [19], [25], as innovation is considered to be a collaborative process. Intermediations are no longer bilateral, and in fact are becoming even more complex, as they are now part of complex systems [23]. This implies that looking at the intermediation process in ecosystems also offers a holistic approach to the mediation literature. The content, context, and process of open innovation (OI) is still a major gap in the research; so understanding OI intermediaries reinforces that logic [4]. Therefore, in an entrepreneurial ecosystem, the questions arise: What functions does an open innovation intermediary offer? Why should organisations consider using open innovation intermediaries? And what challenges arise from using these intermediaries [17]?

2.2 Incubators as innovation intermediaries

Incubators have moved from being just places of collaboration to becoming service providers. Thus, instead of merely playing a passive role, incubators have become part of the value-creation process of their inhabitants through proactive interaction and providing relevant services [26]. As a high level of tacit knowledge is exchanged in and around the incubator, effectively managing such interactions is a process proposed by the concept of 'open innovation', which needs levels of openness [27]. Over and above success rates in occupancy rates, the incubator has to figure out ways to offer a customised service that not only enhances the survival of a firm, but also contributes to the evolution and growth of the ecosystem.

2.3 Interaction and the core pillars of entrepreneurial ecosystems

In this study, the interaction processes in the entrepreneurial ecosystem are mapped according to the open innovation model proposed by Chesbrough [27], and simplified by Dahlander and Gann in their critique of open innovation [28], [29]. The feasibility – or the very existence – of the model for entrepreneurial firms is tested, as they are the primary beneficiary of entrepreneurial ecosystems, and are on the lookout for much-needed resources.

The literature base for this study is summarised in Figure 1. It shows the different streams in the literature, starting from the various 'pillars' of an ecosystem described by Isenberg [11]. These are accessible markets, human capital, funding, supports, culture, and policy. We look at how these pillars are translated to the actors and firms in the ecosystem via the incubator, using the open innovation framework.

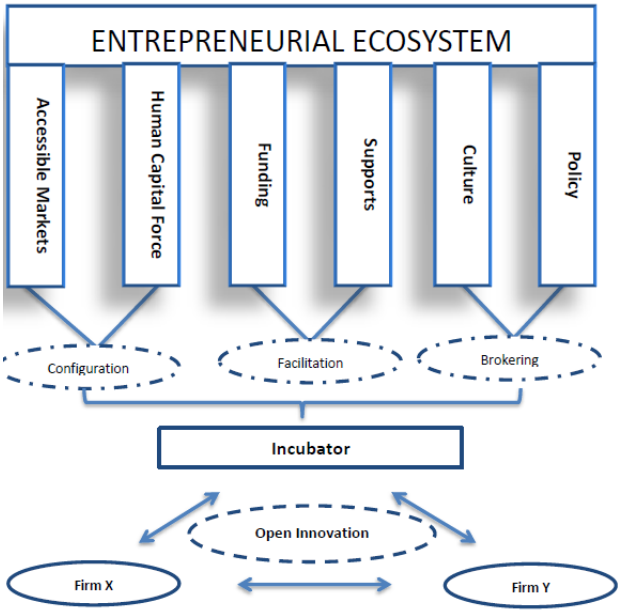

Figure 1: Literature frameworks and linkages

3 RESEARCH METHODOLOGY

3.1 Research approach

The study was undertaken as both an exploratory and a descriptive case study. Descriptive research explains an existing phenomenon; exploratory research aims seeks better insight into a topic [30]; and a case study offers a holistic approach to ascertaining why things occur in a certain way [31]. The concepts of 'intermediation' and 'open innovation', particularly with regard to entrepreneurial firms in an entrepreneurial ecosystem, need further exploration [6], [32]. Ten semi-structured in-depth interviews were conducted, using an interview guide based on Table 1. Data was collected to identify the role of the intermediary and the firm interactions using open innovation metrics to describe the activities of interaction with the firm.

Table 1: Interview guide categories

Interview guide sections	Sub-categories
Role of the incubator *(Incubator and value-creation)*	• Type of services/assistance offered (*mediation role*) • Interaction with the firms
Firm interaction *(Firm and value-creation)*	• Types of interactions undertaken by the firm (*open innovation context*) • Observation of the entrepreneurial ecosystem actors
Value addition to firms and incubator	• Value-adds to firms • Value-adds to incubator/cluster

The interviews were conducted with the entrepreneurial firms and incubator management profiled in Table 2.

3.2 Ecosystem case description

The Oslo Cancer Cluster (OCC) incubator is situated within the Oslo Cancer Cluster, which has more than 70 members that service the oncology value chain of both Norway and Northern Europe. The incubator is unique in that the main tenants are service providers for the start-up firms; the start-ups themselves are in the minority. This case was selected for its unique qualities [33], [34].

Table 2: Interviewees

Interviewee	Status
Entrepreneurial firm 1 , 2 and 3	Inside incubator
Entrepreneurial firm 4 and 5	Inside incubator
Entrepreneurial firm 6	Considering incubation
Investor firm	Inside incubator
Incubator manager	Inside incubator – focuses on incubator, engages with cluster
Cluster manager	Inside incubator – focuses on cluster, engages with incubator
Head of marketing of cluster	Inside incubator – works with both cluster and incubator

4 RESULTS AND ANALYSIS

The interviews reflected important aspects of ecosystem design. These have been arranged in to major categories: incubator management, and entrepreneurial firms. They are each discussed below.

4.1 Incubator management

The services that the incubator offers the entrepreneurs and the ecosystem are summarised in Table 3. Management mainly reflected on how the incubator was leaning towards a facilitation role as it fostered collaboration through services linked with office space, access to laboratories, and networking opportunities.

Table 3: Management overview of incubator and value-creation

Intermediary role	To firm	To ecosystem
Configuration role	• Offers follow-up activities • Competence management	• Part of national programmes on cluster excellence • Provides companies that are interested with international links
Facilitation role	• Offices • Meeting facilities, shared physical space • Easier access to funding • Laboratories • Special incubating seminars	• Access to cluster members • Invitations to exhibit at international conferences • Offers meeting space and interactions
Brokering role	• Invest in service providers that assist companies • Lobby for actors who aid start-ups • Assists companies to commercialise	• Provides links to certain themes and competencies in the cluster

With regard to interactions in the ecosystem, activities with which the incubator has assisted are summarised in Table 4. The interactions are of a more non-commercial nature, as the assumption is that collaboration is intense because firms are located close to one another, allowing negotiations and discussions to take place faster and to be less cumbersome. There is a generally high level of openness because the intellectual property rights of the technologies are in place, and because a technology transfer office and a legal entity are present among the service providers in the incubator.

4.2 Entrepreneurial firms

The tasks aligned with the intermediary roles that the incubator plays between the ecosystem and the firms are depicted in Table 5. The prominent services that the incubator offers focus on brokering and facilitation. This encompasses complementary assets, such as the use of facilities at a nominal cost, and connecting entrepreneurial firms with the ecosystem, mainly through networking activities. With the growth of the firms and the evolution of the ecosystem, the entrepreneurial firms were calling for more customised service-oriented and one-to-one interactions as a service that the incubator could offer.

Table 4: Management perspectives of firm and actor interaction in incubator

Open innovation processes	Inbound innovation	Outbound innovation
Commercial	**Acquiring:** Merging of companies	**Selling:** Licensing Patent protected (not much activity)
Non-commercial	**Sourcing:** Informal networking Merging of industries – e.g., EU collaboration project combining IT and biotech industries	**Revealing:** Company presentations Combination therapies

Table 5: Entrepreneurial firms' view of Incubator roles

Intermediary role	To firms	To ecosystem
Configuration role	• Access to legal team • Access to funding • Access to research base • Discounted services from service providers – e.g., patent search	• Grant-writers • Easier access to data and publications that are expensive • Access to other oncology companies
Facilitation role	• Offices and facilities • Allow companies to use facilities for free • Closer to oncology focal companies • Laboratory facilities • Coffee station meeting area • Facilitate interaction due to being at same location	• Interactions with other cluster members
Brokering role	• Assisted with contacts • Built credibility with potential investors • Build credibility with prospective employees • Close to research base, technology, and staff • Company presentation from service providers • Assistance in showcasing company	• Organise bio-conferences • Networking and knowledge meet-ups • Social football • Partnering meetings • Contact with companies that fit company portfolio • Offer marketing services

Though not formally acknowledging that they undertake activities related to open innovation, Table 6 shows that the firms do use the model in their interactions. They accept knowledge flows from external actors (inbound innovation), and share expertise or resources with external partners (outbound innovation).This is done commercially, where they make direct profits, or non-commercially, bringing intangible benefits to the firms. The incubator is seen to have enhanced and formalised their interactions.

4.3 Value co-creation aspects for the entrepreneurs

The value created by being a formal member of the incubator and ecosystem has come in various shapes and forms for the inhabitants. First, being part of the ecosystem has increased the firms' credibility in the eyes of investors, and increased their attractiveness to potential employees. Entrepreneurial firms typically find it difficult to attract experienced professionals; but this is eased when the firm shows its interconnectedness. Second, ease of access to elements such as clinical trial data or potential collaborators is an intangible asset that drastically reduces the development time of potential solutions and the costs for entrepreneurs. Due to the constant interaction between companies in the ecosystem, challenges facing companies tend to affect the whole ecosystem; so the firms and actors quickly discuss how to tackle the challenges together. Such an arrangement has also enabled the firms to take an active role in policy formulation, amendment, and regulation. Figure 2 highlights the key aspects that the firms currently require from the incubator and the ecosystem.

Table 6: Entrepreneurial firms' perspectives of firm and actor interaction in incubator

Open innovation processes	Inbound innovation	Outbound innovation
Commercial	**Acquiring:** • Joint venture activities • Spin-offs • Participation in collaborative calls • HR interchange	**Selling:** • Licensing • Assistance with technological legal issues
Non-commercial	**Sourcing:** • Informal networking – e.g., lunches • Workshops with service providers • Sourcing information from technology transfer offices, R&D	**Revealing:** • CEO five-minute pitches • Company presentations • Bio-conferences • Combination therapies • Participation in preferences for incubator environment • Sharing laboratory

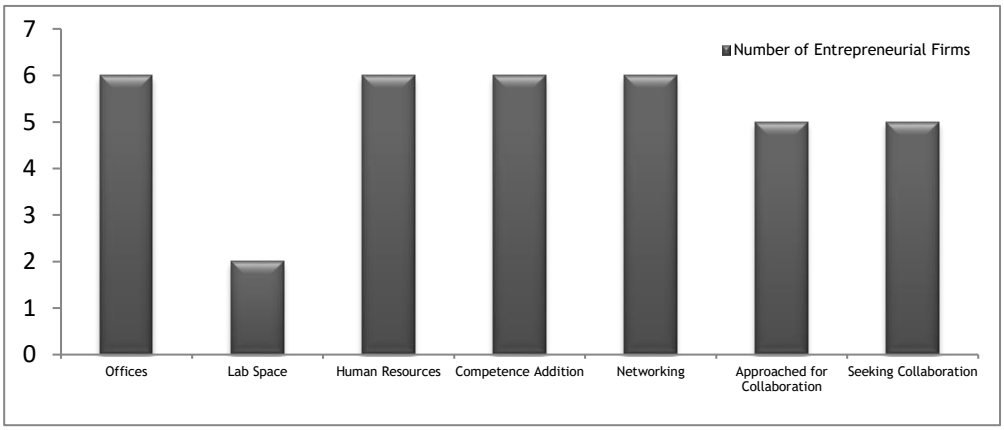

Figure 2: Summary of incubator resources required by firms

5 DISCUSSION OF FINDINGS

This section will interpret the results obtained from the entrepreneurs. It aims to provide relevant answers to the questions posed in the introductory section of the paper.

***Sub-question 1**: Is intermediation necessary in an entrepreneurial ecosystem?*

The lack of any mention of 'intermediation' in most EES studies tends to suggest that, just by being part of the ecosystem, firms will automatically interact. This has been found not to be the case in this study. The incubator provides a forum to foster discussions and collaborations at a faster pace, aligning with the perception that value co-creation is more likely to occur when an authoritative structure is in place in the ecosystem [6], [15]. Furthermore, the success and value created for the individual firms translates into value for the incubator and the ecosystem. Through the incubator's successful intermediation, the firms survive and produce more tangible results; and these are relayed as a value proposition to any potential entrepreneurial firms that would like to join the ecosystem. This shows that there is a need for an intermediary to undertake task coordination and membership in line with the strategic direction of the ecosystem's evolution.

***Sub-question 2**: What intermediary role is of importance to the start-ups to promote value-creation in an entrepreneurial ecosystem?*

As the ecosystem evolves and entrepreneurial firms grow, different mediation roles are required for effective value-creation. In their infancy, the firms favour a facilitation role – such as working spaces – in order to cut costs. However, during the growth stage, the need is to employ more staff, to build

a culture, or even to extend the product line [7]. This stage requires the intermediary to configure and broker services and to be more proactive. Because the firms will be at different levels of growth, proactively customising service will be important.

Interestingly, intermediary roles are affected by the industry with which the firm is aligned. Even though entrepreneurial ecosystems are not mainly aligned with an industry's particular focus, but are more interested in the constraints that entrepreneurial firms face in the process of creating value [7], this study offers a different perspective. The industry of which the firm is part plays an integral role in how mediation occurs. In this study, having a large addressable market and sound intellectual property rights makes open innovation processes much easier to integrate, thus affecting the services required from the intermediary.

Sub-question 3: *What interaction processes aid value-creation between actors and the intermediary in an entrepreneurial ecosystem?*

The OCC is currently in its infancy, so it is still looking at how to tailor-make services; its main focus at the moment is on space. Nevertheless, in the process of conceptualising the incubator, there was a constant interaction with ecosystem actors. This has built a sense of loyalty to the incubator; and this level of trust promotes more openness in the ecosystem, which is essential for value to be created [35]. In this case, due to a shared space, firms find it easy to share ideas and advice [35], [36].

6 IMPLICATIONS OF THE RESEARCH

This study raises a number of implications for entrepreneurial firms in resource-constrained areas.

Ecosystems management: Employing open innovation in ecosystems development opens up the boundaries of the ecosystem. By offering consultative forums to current and prospective entrepreneurs and potential stakeholders, it makes trust, loyalty, and resource management relatively easier. It is of paramount importance to understand the industry dynamics in order to serve the ecosystem better. Moreover, with firms now more geared towards service provision [37], cross-industry collaborations are more common. So ecosystem management has to consider that – and how the ecosystem can link up with other systems, regionally and globally. The government can play a central role by being a driver of intermediary organisations that enhance the livelihood and mandate of sound service delivery for citizens. This could facilitate a situation where the focal point of ecosystems might not only be about the number of firms making profits, but also about how the ecosystem can contribute to sustainable developmental goals and service delivery in the country.

Intermediaries (Incubators): For intermediaries to contribute effectively to the ecosystem, being proactive is important, as the ecosystem becomes more complex over time [8], [19], [38]. It is important to have open forms of communication with the ecosystem actors. Intermediaries need to be proactive in ensuring that they offer relevant services. Additionally, as intermediaries can be any focal agent or body, it is not essential to invest in building a physical space in the name of having an intermediary (incubator). As noted before, close proximity does not guarantee that firms will collaborate. Instead of building new intermediaries, use can be made of existing institutions such as universities or research organisations that work with ideas and entrepreneurial development.

Entrepreneurial firms: The full benefits of ecosystem engagement and value-creation for a firm only occurs when it decides to build a culture of collaboration and information-sharing. Although such actions start off as non-commercial and are unlikely to be monetised, they eventually translate into commercial benefits as tangible resources. Firms should embrace the concept of affordable loss – that is, being willing to accommodate risk and share their innovations with the ecosystem, as this could result in unexpected and favourable results **[39]**.

6.1 Limitations of the research

This study was undertaken in Norway, and focused on the oncology industry. It is expected that the findings will be slightly different in different regional and industry contexts. Future work could include a longitudinal study that assesses how the intermediary role mutates as the ecosystems evolve and support the growth of entrepreneurial firms.

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