A Framework Of Knowledge Management For Higher Education Business Incubation

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ABSTRACT:

This paper investigates the link between the management of knowledge in Higher Education incubation and the growth of the firm. The development of Higher Education Institute (HEI) incubation has become a popular policy in many parts of the world and is viewed as a tool for promoting entrepreneurship and economic growth. This paper adds to the research on Higher Education incubation by proposing a strategic approach to incubation firm growth. While new knowledge is developed by individuals, the new firm and the Higher Education Institute play a critical role in articulating and amplifying that knowledge. This paper reviews the role of Higher Education business incubation. It reviews Penrose's Theory of The Growth of the Firm. It then synthesises knowledge management literature and describes a strategic approach to designing knowledge initiatives to achieve an "impregnable base" for firm growth.

Keywords: *Higher education, Business incubation, Knowledge, Theory of the growth of the firm*

Introduction

Start-up firms face many difficulties in their initial years. While many start- ups may have an abundance of technical knowledge or product knowledge they lack managerial, market and administrative know-how. Firms compete in an extremely complex world where their ability to deal with this complexity to survive and grow is dependent on their ability to gain and use knowledge. One approach of protecting start-up firms from this lack of knowledge and the complexities of the business world is Higher education Incubation. The development of Higher Education Institute (HEI) incubation has become a popular policy in many parts of the world. Policy makers have come to view them as an important tool for promoting economic development. This paper adds to the research on HEI incubation by positing that incubation firm growth is a product of dynamic knowledge and that this knowledge must be managed in a structured model, and that while new knowledge is developed by individuals, the new firm and the HEI play a critical role in articulating and amplifying that knowledge. This paper reviews the role of HEI business incubation. Knowledge management is defined and a framework for strategically designing knowledge initiatives is synthesised from the review of the literature.

Business Incubation

Start-ups face many obstacles and experience high failure rates, previous research has summarised the reasons for this phenomenon in the concepts of 'liabilities of newness' and 'liabilities of smallness' (Hannan and Freeman, 1989). Examples of disadvantages of young firms are diseconomies of scales, missing legitimacy with potential stakeholders and lack of managerial experience (Baysinger et al. 1981, Sheperd et al. 2000, in Bohringer 2006). Most emerging firms are just not big enough to hire the many specialists needed for managing the founding and early growth of the firm (Penrose, 1995). Many entrepreneurs lack the managerial skills, marketing capability, or financial resources. Their inventions are frequently unrealistic, needing significant modification to be marketable. In addition, entrepreneurs frequently do not know how to interface with all the necessary entities, such as banks, suppliers, customers, venture capitalists, distributors and advertising agencies (Hisrich & Peters 1998, p. 16)

Curran, et al (2011) classify the knowledge needed by start-ups into the areas of "know-why, know-how and know-who" knowledge, and a fourth area of industry/business knowledge. "Know-why knowledge is an understanding of science and its applications. Know-how encompasses technical skills and know-who is the kind of networking and business knowledge that enables a firm to find venture funding, employees, and management staff" (Curran et al, 2011, p.5).

One approach to overcome these obstacles is the business incubator. The term incubation evokes the fragile period at the beginning of life. It is thought that the term comes from the Industrial Centre real estate development in Batavia, New York. Back in 1959 the Mancuso family bought the vacated buildings of a Massey Harris plant for the fabrication of farm machinery. Not finding a large tenant for the use of the buildings, they decided to let it to a number of small local companies which needed an understanding landlord, in order to grow their business. One of the first companies was a chicken firm, which prompted the name, conveying the idea of a nurturing place (Haour & Miéville, 2011). Kuratko and LaFollete (1987, p. 47) define the role of the business incubation centre in the following terms: "…the business incubator seeks to effectively link talent, technology, capital, and know-how in order to leverage entrepreneurial talent and to accelerate the development of new companies." Haour & Miéville (2011) describe that for incubators the crucial part is certainly not the real estate or the shared office services, what is crucial in an

incubator is for entrepreneurial teams to have access to relevant business knowledge and experience and to be relentlessly questioned 'for the good of the venture'.

For the purposes of this paper we are interested in academic incubators which Hacket and Dilts (2004) describe as having the primary objectives of job creation and positive statement of entrepreneurial potential. These define the incubator not as an independent entity, but rather, as an organisation whose success largely depends on the degree of its integration with the community and in the case of the Higher Education incubator with the host institute. The institute offers the start-up a safer environment to grow in its initial years. Smilor (1987) cites Allen's (1985) report for the U.S Department of Commerce which indicated that almost twice as many firms succeed as fail when participating in an incubator. Smilor (1987) argues that the success rate is higher because of the ability of incubators to leverage resources and to provide a flexible structure for growth. In the UK, the Department of Trade and Industry has identified the process of business incubation as a powerful tool in overcoming the pitfalls of starting and growing businesses. As such, incubation is now viewed as a key component of regional and national economic development strategies, supporting and accelerating growth across all sectors (Voisey et al, 2006). While the concept of nurturing new and young businesses is described as appearing straightforward but in reality is complex in structure and execution (Voisey et al, 2006).

The HEI Incubator is now seen as an important tool for promoting entrepreneurship and economic growth. This growth is based on access to knowledge. The question now needs to be asked what form does this knowledge take and how is it created?

Knowledge And The Growth Of The Firm

David and Foray (2001) argue that knowledge has been at the heart of economic growth and social wellbeing since time immemorial. The ability to invent and innovate, that is to create new knowledge and new ideas that are then embodied in products, processes and organisations, has always served to fuel development. Knowledge includes everything we know about the world, from the basic laws of physics, to the blueprint for a microprocessor, to how to sew a shirt or paint a portrait (Cortright, 2001). This knowledge when it can be exploited through market opportunities is therefore a crucial corporate resource (Scarborough, 2009). Current thinking goes further than simply acknowledging it as a source of competitive advantage; it is argued that turning knowledge into value is the main reason for firms to exist (Grant, 1996). Van Winkelen & McKenzie (2011, p. 1) state: "In a rapidly changing world, current success and future survival depend on constantly learning to do things differently and better. Knowledge is both the raw material that is the foundation for learning and the output from it, offering new opportunities and new sources of revenue."

Despite variance in terminology for organisational knowledge (competencies, capabilities, routines, or innovations) there is growing agreement that it is what the organisation comes to know that explains its performance (Argote & Ingram, 2000). Penrose outlined that the resources of a firm and its productive services are functions of knowledge: "Surely extensive questionnaires are not required to convince us that able businessmen are well aware that the more they can learn about the resources with which they are working and about their business the greater will be the prospects of successful action" (Penrose 1995, p. 77).

While a great deal has been written about the importance of knowledge very little attention has been paid to how knowledge is created or used. Knowledge has attributes which make it a unique economic resource, unlike other resources it is not exhaustible, and it is cumulative in that new knowledge can create more knowledge and it is nonrivalous, it can theoretically be used by a million people at no extra cost. Scarborough (2009, p. 6) describes the paradoxical qualities of knowledge, where in one instance it can be a powerful agent of change and the next a significant barrier to change. "Recognition of these paradoxical qualities has obvious implications for policy and practice". Penrose (1995, p. 68): acknowledged its intangible nature has made a very difficult topic to study and understand: "Economists have, of course recognised the dominant role that increasingly knowledge plays in economic processes but have, for the most part, found the whole subject of knowledge too slippery to handle "

The theory of organisation has long been dominated by a paradigm that views the organisation as passive and static, that conceptualises the organisation as a system that inputs information from the environment processes it and produces output; 'information processing is viewed as a problem solving activity which centres on what is given to the organisation- without due consideration of what is created by it' (Nonaka, 1994, p.14).). In neoclassical theory the firm is characterised by its production and cost function. Subject to this restriction, it maximises its profits in which it has complete information concerning supply and demand, resulting in optimal product-market price. All firms have access to the same knowledge so the theory of the firm represents a theory of resource allocation but not a detailed model of the individual firm.

Penrose (1959) presented a different view of a dynamic firm which grows on its own path through utilising its resources and knowledge: "…as management tries to make the best use of resources available, a truly dynamic. interacting process occurs which encourages continuous growth but limits the rate of growth" (Penrose, 1995, p.5). Penrose undertook to try understand how firms grow and what limits their growth: "In undertaking an analysis of the

growth of firms in the 1950's the question I wanted to answer was whether there was something inherent in the very nature of any firm that both promoted its growth and necessarily limited its rate of growth" (Penrose, 1995, p. xi).

As Foss (2002) outlines, in The Theory of The Growth of the Firm, Penrose was both critical and constructive; critical of the limitations of the neo-classical theory of the firm of her day, and clearly constructive by putting forward a new theory of the firm, based on knowledge, learning and cognition. Penrose wants to deal with the firm as a growing organisation, not as a price-and-output decision maker for given products (Mahoney 2005). "Firms are 'flesh and blood' real organisations, not points on a cost curve" (Pitelis, 2002, p. 3). Lockett and Thompson (2004) note that the Penrosian firm differed from its counterpart in neoclassical economic theory in two important aspects. First managers are not assumed to possess perfect foresight but instead have to make decisions based upon expectations about the environment. These expectations may or may not subsequently prove to have been correct. Penrose uses an open systems approach where there is continual interaction between the firms resources and its markets. Second, Penrose's central contribution is to recognise the path dependent nature of the evolution of each firm. That is, every firm confronts a different set of resources leading to different strategic decisions that, in turn, further modify the resource bundle. Lockett and Thompson (2004) state that Penrose's arguments set her apart from her contemporaries precisely by her recognition that strategy matters. The activities of identifying opportunities and threats in an uncertain environment and of identifying strengths and weaknesses internally are very important. Indeed it is this knowledge of the firm's resource base, embodied in its managers, that constitutes the ultimate constraint – the 'Penrose' effect – in her system (Lockett & Thompson, 2004). The firm's development is essentially an evolutionary and cumulative process of 'resource learning' (Mahoney, 1995), in which increased knowledge of the firms resources help both to create options for further expansion (Foss, 2002).

Edith Penrose's (1959) Theory of the Growth of the Firm has been a very influential in the development of the Resource Based View of the Firm (Peteraf, 1993, Garnsey, 1998, Barney, 1991, Barney et al, 2011) and subsequently the Knowledge Based View (Barney, 2011) of the firm. In developing her theory Penrose put knowledge at the centre of a firm's growth. Penrose's theory of the growth of firms if essentially an examination of the changing productive opportunity of firms. In 1960 Penrose further outlined her theory by using the Hercules Powder Company as a case study in *The Growth of the Firm*: "Growth is governed by a creative and dynamic interaction between a firm's productive resources and its market opportunities. Available resources limit expansion; used resources (including technological and entrepreneurial) stimulate and largely determine the direction of expansion" (Penrose 1960, 1). One of the primary assumptions of the theory of the growth of firms is that; '…growth is essentially an evolutionary process and based on the cumulative growth of collective knowledge…'(Penrose, 1995 p.xiii). The very performance of activities within firms creates new knowledge through specialisation, division of labour, teamwork and learning (Pitelis, 2002, p.3) Kor & Mahoney (2000) argue that Penrose offers durable principles governing the growth of firms and the rate at which firms can grow efficiently.

While Penrose's study was on growth of established firms, Garnsey (1998) uses Penrose's approach to provide an account of the origins and early growth of the firm. The Theory of the Growth of the Firm is very applicable to new firms as it stresses entrepreneurship and learning in a world characterised by change and uncertainty (Foss, 2002). Garnsey (2002) outlines that Penroses approach has numerous implications for strategy on new business development. Entrepreneurs can be helped to develop informed assessments of opportunities and difficulties ahead. Mentoring and the provision of resources at critical junctures in the growth process could make a difference to survival rates, drawing more firms from micro to medium size. "… the profitability, survival and growth of a firm does not depend so much on the efficiency with which it is able to organise the production of even a widely diversified range of products as it does on the ability of the firm to establish one or more wide and relatively impregnable 'bases' from which it can adapt and extend its operations in an uncertain, changing and competitive world" (Penrose, 1959, p.137).

Dynamic Knowledge Creation

Nonaka (1994) and Sveiby (2001) built on Penrose's work and proposed a dynamic theory of organisational knowledge creation where ideas are formed in the minds of individuals and contribute to the development of knowledge through interaction between individuals. Knowledge is defined as: "…dynamic, personal and distinctly different from data and information. Since the dynamic properties of knowledge are most important for managers, the notion individual competence can be used as a fair synonym to a capacity to act" (Sveiby, 2001, p. 344).

This process of knowledge growth for managers is transformative learning; "becoming critically aware of one's own tacit assumptions and of and expectations and those of others and assessing their relevance for making an interpretation"(Mezirow, 2000, p4). Nonaka (1994) describes as "…a dynamic human process of justifying personal beliefs as part of an aspiration for the 'truth'" (Nonaka, 1994, p.15). Sveiby (2001) describes an autopoietic epistemology where input into a system is data only, knowledge is private. An autopoietic system is both open and closed open to data, but closed to information and knowledge where both have to be interpreted inside the system. Penrose (1959) describes an 'mage' in the mind of the entrepreneur where knowledge is personal. This image provides the firm with what Penrose describes as its 'productive opportunity', "…which comprises all of the productive opportunities that its 'entrepreneurs' see and can take advantage of" (Penrose, 1995, p. 31). Studies have shown that entrepreneurial opportunities are not exogenously given but rather endogenously and systematically

created under certain conditions. They are the outcome of investments in new knowledge and ideas (Schumpeter, 1942) on the one hand, and the accumulation of knowledge in individuals (Shane 2000) and firms (Cohen and Levinthal, 1990) on the other (Garnsey, 2007).

Central to this Knowledge Based View is the differentiation of types of knowledge. Penrose (1959) described knowledge as objective (transmittable) or experience (hard to transmit). The most widely used categorisation of knowledge is between tacit and explicit, where tacit is personal knowledge that cannot be easily codified and articulated or transferred from the holder of the knowledge. Tacit knowledge is knowledge accumulated through years of experience and practice. Explicit knowledge is defined as codified, easily translated facts and information. Explicit knowledge for start-up firms takes the form of textbooks and industry and market research reports; it is captured in libraries and databases. Penrose (1995) sees no sharp distinction between these two forms because to a considerable extent the ability to use old knowledge is dependent on the acquisition of new knowledge. Spender (1996) notes that the boundary between the explicit and tacit types of knowledge is both porous and flexible, and there is constant dialogue between the domains. The firms provides the context in which this dialogue takes place and over time the quality of the interaction of the explicit and evolving implicit types of knowledge may lead to further and to superior firm performance. Nonaka (1994) describes a continual dialogue between tacit and explicit knowledge which drives the creation of new ideas and concepts. He terms four different modes of knowledge conversion: socialisation, combination, externalisation, and internalisation.

The key to the process of creating tacit knowledge is through shared experience - socialisation. Socialisation takes place through observation, imitation and practice. The second mode of knowledge conversion involves the use of social processes to combine different bodies of explicit knowledge held by individuals. Individuals exchange and combine knowledge through meetings and telephone conversations; this process of creating explicit knowledge from explicit knowledge is referred to as ‘combination’. The third and fourth modes of knowledge capture the idea that tacit and explicit knowledge are complementary and can expand over time through a process of mutual interaction. One is the conversion of tacit knowledge into explicit knowledge which is called ‘externalisation’, the other is the conversion of explicit knowledge into tacit knowledge ‘internalisation’.

Bohringer (2006) argues that this knowledge-based view offers a sound theoretical basis for the analysis of the existence and role of the incubator. An incubator may need physical resources and facilities but an important requirement for competitive advantage is knowledge. Bohringer (2006) argues that the business incubator forms a voluntaristic social community which provides a context for knowledge integration and transfer superior to the market and other network solutions. Sveiby’s (2001) Knowledge Based Theory describes outside partners becoming part of the family of the firm, where the importance is placed on how effective the value creation is in the whole system. For the HEI incubator this value can be achieved through the combination of spatial agglomeration, frequent and long term interaction, the level of common knowledge, goal congruence and identity.

A Structured Approach To Managing Knowledge

Knowledge management is a strategic process, which aims to differentiate a firm from competitors such that a sustainable competitive advantage is forged. The ability of organizations to create, transfer, assemble, integrate and leverage knowledge is fundamental to achieving this competitive advantage. Tiwana (2000) suggests that knowledge drives strategy and strategy drives knowledge management. Ismail & Ahmad (2011) outline that the first priority of an ideal knowledge management strategy which is that it should address people, processes, and technology.

Van Winkelen & McKenzie (2011) argue for a structured approach to managing knowledge, and outline that it is the piecemeal approach to knowledge which fails to help organisations make more meaningful and informed strategic choices. By understanding what knowledge makes a difference to organisational performance, the firm can focus their limited resources on the things that will generate most impact and value. “Even when you accept the importance of taking a knowledge perspective on the organisation, it is still a challenge to prioritise, time attention effort, and financial resources to improve the way knowledge delivers results” (Van Winkelen & McKenzie, 2011, p. 1). Van Winkelen & McKenzie (2011) building on the work of Sveiby (2001) propose a strategic approach to designing knowledge initiatives based on mapping critical knowledge and knowledge flows and determining strategic knowledge priorities in conjunction with key stakeholders. Van Winkelen & McKenzie (2011) contend that this strategic approach should be flexible and take account of the complexities of the business world that the firm is operating in, it should be used to shape rather than constrain thinking about knowledge priorities.

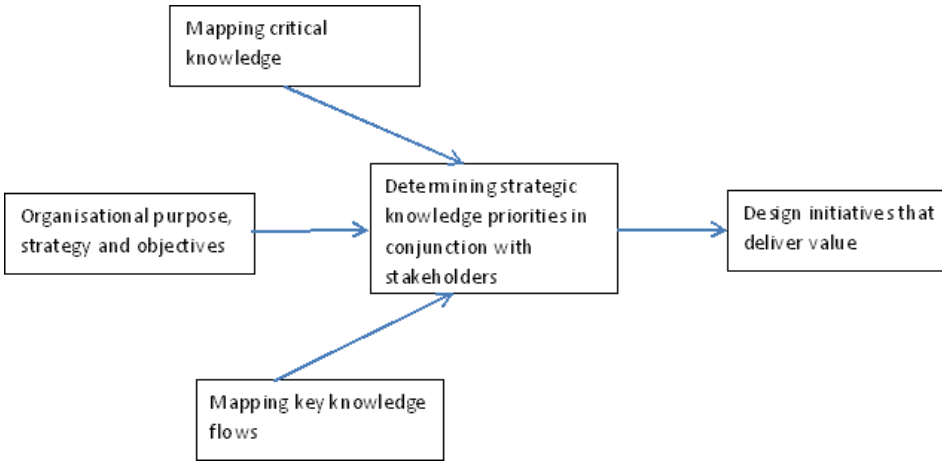


Figure 1: A Strategic Approach To Designing Knowledge Initiatives (Van Winkelen & Mckenzie, 2011, p. 3)

Mapping Critical Knowledge

The objective of this stage of the process is to map the domains of knowledge that are important to the business. Without this mapping exercise, critical knowledge resources for the business may be missed. The knowledge map is not an organisational chart or process map. It is a representation of the key areas of knowledge that are core to the business over time.

To identify valuable knowledge resources, there are some trigger questions that can be asked about the organisation:

- What differentiates us in the marketplace?
- What do we consider as meaningful results for the organisation?
- Who are our customers?
- Who are our competitors?
- What are their values and behaviours?
- What are our important markets?
- What are our core competencies?
- Mapping key knowledge flows

Productive knowledge flows increase the potential for value generation. When knowledge is transferred quickly and easily from where it is generated to where it is needed it has more opportunity to make both a short and a longer term difference to something that matters in the organisation. People in an organisation can use their competence to create value in mainly two directions: externally or internally. If the managers of an organisation direct the efforts of their people internally, they may create tangible structures such as machinery and intangible structures such as better processes, when they direct their attention outwards, they can create in addition to tangible things, intangible structures such as customer relationships and new experiences (Sveiby 2001).

Sveiby (2001) identifies three families of intangible assets built on relationships which can convert and transfer knowledge; the external structure, the internal structure and individual competence. The knowledge value generated depends on how well connected the organisation is within these relationships and how effectively critical knowledge flows work together to influence the firms performance. Van Winkelen & McKenzie (2011) identify nine critical knowledge flows that influence a firm's performance based on Sveiby's (2001) three families of intangible assets. These flows enable activities that form the backbone of a knowledge strategy:

I. Between individuals

II. From individuals to external structure

III. From external structure to individuals

IV. From individual competence into internal structure

V. From internal structure to individual competence

VI. Within the external structure

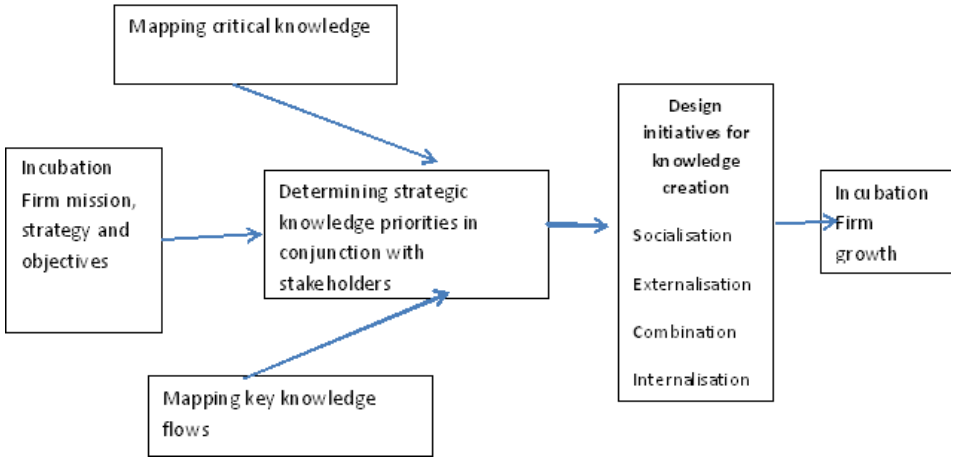
VII. From external to internal structure

VIII. From internal to external structure and

IX. Within internal structure

These nine knowledge flows exist in most organisations. However they tend not to be coordinated in a coherent strategy, because management lack the full perspective that a knowledge based theory may give them. Most organisations also have legacy systems and cultures that block the transfers (Sveiby 2001).

What knowledge should be central to this mapping, flow and knowledge initiatives? This paper proposes that knowledge flow between the HEI, the firm and its environment to build the resources of a firm and their productive services should be central to these knowledge processes. For the incubation process to work to its full potential the HEI and Incubation companies must develop a system of knowledge creation or spiral of knowledge, where learning takes place within the structure of the firm's mission and strategy to support the growth and long-term survival of the incubation firm.



Framework For HE Incubation Knowledge.

This paper proposes that this is a valid framework to design knowledge initiatives between the HEI and an incubation firm. To facilitate this process and to locate blockages or gaps in knowledge the incubation firm maps critical knowledge and knowledge flows. The firm then maps their strategic knowledge priorities. The HE and the Start-up then jointly design knowledge initiatives to improve the firm's knowledge and knowledge flows. The host institute and the incubation firm should work together to create a 'spiral of knowledge' (Nonaka 1994). The HE and incubation firm can transfer tacit knowledge through sharing experiences, observation, and imitation and practice (socialisation). They can exchange and combine explicit knowledge through meetings and telephone calls (combination), and through mutual interaction they can convert tacit to explicit knowledge (externalisation) and explicit to tacit knowledge (internalisation). Externalisation and internalisation can be facilitated through the building of a strong relationship between the HE and the incubation firm.

Start-up companies need information quickly as a good idea or potential market today could be gone tomorrow, so this knowledge flow and creation needs to work efficiently. Any barriers to this process should be identified and eliminated. The host institute and the incubation firm should have appropriate leadership, problem solving behaviour, support structures and absorptive and retentive capacity (Goh, 2002) to facilitate the design and management of these knowledge initiatives. This effective knowledge management will allow small companies to build an impregnable base before leaving the protective environment of the incubation centre.

Conclusions

This paper posits that for the incubation process to work to its full potential, the HEI and Incubation companies must develop a system of knowledge creation or spiral of knowledge, where learning takes place within the structure of the firm's mission and strategy to support the growth and long-term survival of the incubation firm.

Entrepreneurs are not risk-takers and they need risk to be minimised. No entrepreneur can obtain an instant market or productivity, resources must be obtained from their environment and internally and skilfully combined to give rise to productive activity, and this requires a period of intensive collective learning (Garnsey, 2002). Start-up companies within Incubation Centres are in the perfect environment to learn, minimise risk and build an impregnable base to sustain success. However just because investments in knowledge are made through Higher Education and you place start-ups in close proximity does not guarantee success. The investment will go to waste unless the relevant knowledge for the start-up is created between the HEI, the environment and the start-up firm. This creation of knowledge will allow: "…the firm to establish one or more wide and relatively impregnable 'bases' from which it can adapt and extend its operations in an uncertain, changing and competitive world" (Penrose, 1959, p.137).

Van Winkelen & McKenzie (2011) argue for a structured approach to managing knowledge and propose a strategic approach to designing knowledge initiatives based on mapping critical knowledge and knowledge flows. This paper builds on Penrose's (1959) Theory of the Growth of the Firm and applies Nonaka's (1994) dynamic theory of organisational knowledge creation to build a structured framework of Knowledge Management for Higher Education business Incubation

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