

## COOPERATIVE VENTURE CAPITAL MODEL: ENGINEERING AN INNOVATION PIPELINE

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### ABSTRACT

Overcoming the various “valleys of death” in the commercialisation process is one of the complex problems faced when supporting entrepreneurship and innovation. The creation of a pipeline of investable opportunities is needed by investors to diversify investing risks. Using a systems engineering approach, an alternative solution is found in the Cooperative Venture Capital Model (CVCM) that balances entrepreneurial support and mitigates risks to overcome these challenges to commercialisation. The CVCM creates an innovation pipeline that’s validated by enterprise engineering principles.

**Keywords:** Entrepreneurship; innovation; cooperatives; venture capital; enterprise engineering; commercialisation.

### INTRODUCTION

A model is introduced for the development of an innovation pipeline that aims to support and promote entrepreneurial teams in commercialising intellectual property and technology, in the research conducted. The commercialisation of intellectual property is a prominent theme within the fields of innovation and business management (Tidd & Bessant, 2009; Hayes, 2010), and there is a persistent need to improve the effectiveness of organisations, producing innovation output, in order to sustain a competitive advantage through fostering business growth (GII, 2013). Economic benefits of innovation and entrepreneurship include: a positive contribution to employment creation; trade and industry benefits; and a reduction of poverty (Herrington, et al., 2009).

The use of a systems engineering approach allows for a holistic conceptual model to be developed that supports entrepreneurship and innovation, and an enterprise engineering approach the model produced is verified. By reviewing and combining best practice models from literature, an inclusive solution is formulated namely, the Cooperative Venture Capital Model (CVCM). This paper concludes with the verification of the CVCM that represents the alternative “whole solution” and also provides recommendations for future research. The relevance of the CVCM to the scientific community is the use of a systems engineering approach to support entrepreneurship and innovation, as well as a method for exploiting innovation.

### Innovation Ecosystems (Problem Definition)

When reviewing the literature on innovation ecosystems, numerous models are found that attempt to explain the complex subject of macroeconomics and the benefits of socio-economic development (OECD, 1996; Etzkowitz & Leydesdorff, 2000; Reichelt, 2007; Wang, 2009; Jackson, 2011; Visser,

2011, GII, 2013; WIPO, 2013). According to various authors, (Etzkowitz & Leydesdorff, 2000; Jackson, 2011; Visser, 2011), the innovation ecosystem specifically develops an economy by combining knowledge and commercial capital to produce innovation, while Wang (2009) argues the supply and demand theory for innovation between networks and communities. Reichelt (2007) suggests that the national innovation system can be seen as the master-plan set by the government through legislation and policies. The master-plan consists out of actionable plans for the lower order innovation systems for each region, local community, particular technologies and sectors that encompass the innovation ecosystem.

There is an increase in the popularity of the movement towards open market economics, whereby regions and countries (e.g. Silicon Valley, Tel Aviv and Switzerland) thrive on entrepreneurship and innovation to sustain a competitive advantage (Marmer, *et al.*, 2012; GII, 2013). The Global Innovation Index (GII, 2013) provides a framework in further defining and measuring an innovation ecosystem through indicating a country's production of innovation (input), commercialisation of innovation (output) and innovation efficiency. Developing an innovation ecosystem that enables the triple helix and creates an innovation pipeline of investable entrepreneurial businesses is the essence as illustrated by GII and Open Market Economics.

It is traditionally thought that innovation ecosystems rely strongly on universities producing innovation and technology transfer offices disseminating the intellectual property of universities to the private sector and social markets (Debackere & Veugelers, 2005). However, the concept of traditional universities and technology transfer offices has come under question due to their ineffectiveness, and a new line of thinking has moved towards entrepreneurial universities (Organisation for Economic Co-operation and Development (OECD), 2012), entrepreneurial ecosystems (Isenberg, 2012; Vogel, 2013) and start-up ecosystems (Marmer, *et al.*, 2012).

The efficiency of innovation specifically relates to the innovation value chain of the country and addressing the "*valleys of death*" (Bendis & Byler, 2009; Jackson, 2011). Branscomb & Auerswald (2002), Wessner (2004), Hansen & Birkinshaw (2007), Roper, *et al.* (2008) and GII (2013) each suggest an innovation value chain model that involve sequential processes, each providing different stages in their value chains. Some focus more on inventions and research, while other on the commercialisation process. The essence is in understanding the commercial challenges and breaching of "*valleys of death*". Bendis & Byler (2009) and Smith, *et al.* (2011) argues that the "*valleys of death*" are predominantly funding gaps due to lack of capitalisation options because of the high risks associated with the commercialisation of innovative products and services. In emerging economies, multiple funding gaps often exist as a result of the lack of an innovation value chain (Bendis & Byler, 2009; Vogel, 2010; Jackson, 2011).

Overcoming the various "*valleys of death*" in the commercialisation process is one of the complex problems faced when supporting entrepreneurship and innovation. The creation of a pipeline of investable opportunities is needed by investors to diversify investing risks. In order to create an innovation pipeline, the balance between entrepreneurial support and risk mitigation is required to overcome the challenges in commercialisation.

## Commercialisation Challenges

In the literature reviewed, a wide array of challenges and growth determinants in commercialisation were identified for entrepreneurial start-up businesses. However, growth is not regarded important to all businesses, which is why most small businesses start small and remain small until eventually perishing, as growth is not the norm (Davidsson, *et al.*, 2010). According to Aldrich (1999) and Storey (1994), entrepreneurial start-up businesses significantly lack growth trajectory. The majority of these small businesses just serve local markets, but are imitative of more mature and larger businesses (Aldrich, 1999; Amoros & Bosma, 2013). Davidsson, *et al.* (2010), categorise growth determinants mainly into internal and external determinants, while also considering the effect of growth barriers and enablers.

### *Internal Determinants*

Storey (1994) and Davidsson, *et al.* (2010) organised the range of different internal determinants into three main categories, namely: the entrepreneur(s) and manager(s); the business; and the business strategy. It is indicated in the research done by Storey (1994) that *education, functional skills, management experience, motivation, and number of founders* has a positive growth impact on small and start-up businesses. However, Davidsson, *et al.* (2010) argues that only the following internal determinants of growth relate to the entrepreneur(s) and manager(s):

- i. *Founders' Motivation & Aspiration:* Research has found that most founders have modest aspirations for growing their businesses.
- ii. *Experience & Education:* Business growth is a stimulus for subsequent business growth, as the entrepreneur develops their abilities.
- iii. *Managerial Functional Skills:* Managerial capacity should include aspects such as scaling of operations, accessing funding, developing and cultivating networks, and allocating resources.
- iv. *Entrepreneurial Team:* The advantages of entrepreneurial teams over "lone-wolf" entrepreneurs are: increased experience and knowledge base; stress distribution; and business expense distribution risks are mitigated for investors.

The research conducted by Storey (1994) and Davidsson, *et al.* (2010) found that the following structural characteristics of the business relate to the growth of the business:

- i. *Business Age:* Younger, small and start-up businesses can be more entrepreneurial thereby rendering them more flexible and less rigid. Numerous empirical studies show that the business age counts negatively to the growth of the business.
- ii. *Business Size:* The source of liability is a big debate between the business age and size. However, the distinct 'liability of size' in terms of funding capital, number of employees and other resources as compared to large businesses, is a clear disadvantage in terms of survival for small and start-up businesses.
- iii. *Business Legal Structure:* Different legal structures have different benefits and drawbacks in each country. The most important aspect is that some legal structures are geared towards enabling growth, while others are limited in this respect.

*When considering the growth determinants relating to business strategies, research evidence is far less conclusive (Davidsson, et al., 2010). Research studies by Storey (1994) found a positive effect in*

*growth for strategic variables including market positioning, technology complexity, and new product development and launching. The most evident reported finding is the strategic orientation of businesses, as well as the relationship between innovation and business growth (Phelps, et al., 2007; Wiklund, et al., 2007; Davidsson, et al., 2010).*

#### *External Determinants*

The external determinants that influence business growth can be summarised as the growth of the industry and the dynamics of the environment ('ecosystem') wherein the business operates (Davidsson, et al., 2010). Both of these external determinants have multiple factors influencing it, but due to lack of cohesion in literature, it is difficult to conclusively pinpoint what all those factors are. The growth of an industry can for example be influenced by different industry-specific factors, each with a different meaning to the different businesses within that industry (Hawawini, et al., 2003). Kangasharju (2000) suggests four main components influencing the small business growth within a specific industry, namely: the market demand for the business products and/or services; the industry competitors and their actions; manufacturing and production industry-specific factors; and the local business environment features.

The industry dynamism creates an increasingly difficult environment for small and start-up businesses to survive in, but survivalists are rewarded in the prospect of growing (Davidsson, et al., 2010). The difficulty in explaining cohesively the other environmental components, as they differ with different research studies, is because they are increasingly affected by specific contexts within each environment in which the business operates.

#### *Growth Barriers and Enablers*

The growth enablers and drivers for small and start-up business growth are usually the opposites of growth barriers (Davidsson, et al., 2010) and can be identified as the performance measurements of the ecosystem. Whereas Marmer, et al. (2012) measures funding, performance, mind-set, trendsetters, differentiators, support, talent and start-up output, the GII (2013) measures the human and knowledge capital, legal framework, organisations and process, and funding.

Davidsson, et al. (2010) argues that the specific growth barriers for different businesses vary by industry, space and time. For example, Orser, et al. (2000) argues that access to funding for high-tech businesses are more concerning than businesses in the service industry where transaction burdens (e.g. tax levels, exchange rates, etc.) are the main concern. In general, entrepreneurs of small and start-up businesses need to overcome growth barriers that include the following (Orser, et al., 2000; Smith, et al., 2011; Van Zyl, et al., 2013):

- |   |  |
|---|--|
| i. Small number of team members and poor management of team | ix. Lack of mentorship                                   |
| ii. Limited resources                                       | x. Lack of support services                              |
| iii. Competitive environment                                | xi. Short timeframe to make it work                      |
| iv. Lack of extensive networks                              | xii. Lack of access to funding                           |
| v. Bootstrapped infrastructure                              | xiii. Poor business model                                |
| vi. Focus on the product, not on customer                   | xiv. Lack of products and services                       |
| vii. Technical minds, but limited business skills           | xv. Lack of cash flow management                         |
|   | xvi. Funded by the three F's (friends, family and fools) |

- |  |   |
|--|---|
| viii. Lack of market access and customer acquisition | xvii. Extensive 'red tape' business environment |
|--|---|

Based on the work by Smith, et al. (2011) and Van Zyl, et al. (2013), a listed summary in Table 3 (refer to Appendix A) was compiled containing the generalised growth barriers for start-up businesses with their development actions, support options, necessities and decision making options. For the purpose of the conceptual model, the generalised growth barriers are considered to support multiple start-up business industries and environments.

### **Venture Capital Models and Processes**

Venture capital (VC) is an independent organisation or company that provides valuable capital in exchange for equity stake to entrepreneurial start-up businesses which potentially can achieve global scaling and high growth returns (Herrington, *et al.*, 2009; Van Zyl, *et al.*, 2013). In general, VC supports the economy from a macroeconomic perspective in creating employment opportunities, industry competition and sophistication, etc. (Su, 2011). Gompers and Lerner (2001) argues from a microeconomic perspective that "VCs realize that they make money by identifying promising innovations early, investing capital to build the venture, and aiding the entrepreneur with his or her business".

Each VC model employs unique techniques to manage risk and nurture success as venture capitalists evaluates investment opportunities differently, but there are generic themes. The generic themes would include the typical organisation model and process, as well as their investment requirements such as: entrepreneur ('jockey'), management team, unique value proposition, intellectual property protection strategy, business model, competitive landscape and exit strategy (Van Zyl, *et al.*, 2013).

#### *Typical Venture Capital Organisation Model*

In literature the research conducted on VC typically focusses on portfolio investment and risk diversification strategies with limited research on the organisation structure model and processes of VCs. In Figure 2 below, the typical VC organisation model is illustrated with the following stakeholders (Tang, *et al.*, 2013; Van Zyl, *et al.*, 2013):

- i. *Limited Partners (LPs)*: Typically pension funds, endowments, and high net worth individuals. Seeking a high capital return using metrics such as Internal Rate of Return (IRR) and Return on Investment (ROI).
- ii. *General Partners (GPs)*: Partners who are entrusted to invest LPs capital and to return capital at a future point in time. Manage investment pool called Fund I, Fund II and Fund III etc.
- iii. *Portfolio of Companies/Businesses*: The GPs invest capital in a diverse group of unlisted high growth potential start-up businesses in different industries to mitigate risks. The wider the investment range, the more likely that some businesses will succeed. However, a wide range of portfolio investment strategies can be developed.

The typical VC model would allow innovative ways to search externally for new ideas, would incorporate executing teams that can take ideas to market, and would develop innovative business models specifically for a targeted market. A straightforward example behind the investment finances of a VC model is to invest \$10 million and expect a \$50 million return after 5 years as an exit. This relationship is seen as a marriage with a planned divorce, which resembles the exit (Tang, *et al.*, 2013; Van Zyl, *et al.*, 2013).

Some key aspects to understand regarding the typical VC organisational structure is that: it protects both its investors and its portfolio companies; it manages the investors investment and promises high rates of return, whereby the investor allows his or her 'money to work for itself', while the venture capitalist consistently provides professional and trustworthy services to the investor (Van Zyl, et al., 2013); and at the same time, the venture capitalist provides professional and secured investments to the entrepreneur. Other sources of funding could also include tax levies that the government provide in support of entrepreneurship, as well as other financial and resource support from the government in support of economic development.

### Evolution of the Venture Capital Model

The history and evolution of VC since its existence in 1930s as 'development capital' (private equity) in the World War I is discussed extensively by Rao & Scaruffi (2013) and in Figure 3 below, the evolution of the VC model is summarised by Griffith (2013). Notably during the evolution of VC, the VC investment deals were relatively low, but with the decrease in costs relating to technology start-ups and maturing start-up business ecosystems, investment deals increased rapidly which lead to the development of international VCs offering diverse portfolios.

Other types also formed such as groups of super angels forming large VC funds, earlier stage micro VCs, accelerator programmes run by VCs and even online platforms combining various types together. The modern movement is toward VC platforms whereby funding, direct and secondary investment opportunities, are provided for multiple investors and can also include crowdfunding platforms (Rao & Scaruffi, 2013). Other VC platforms incorporates additional support services typically seen in business incubators and accelerator programmes.

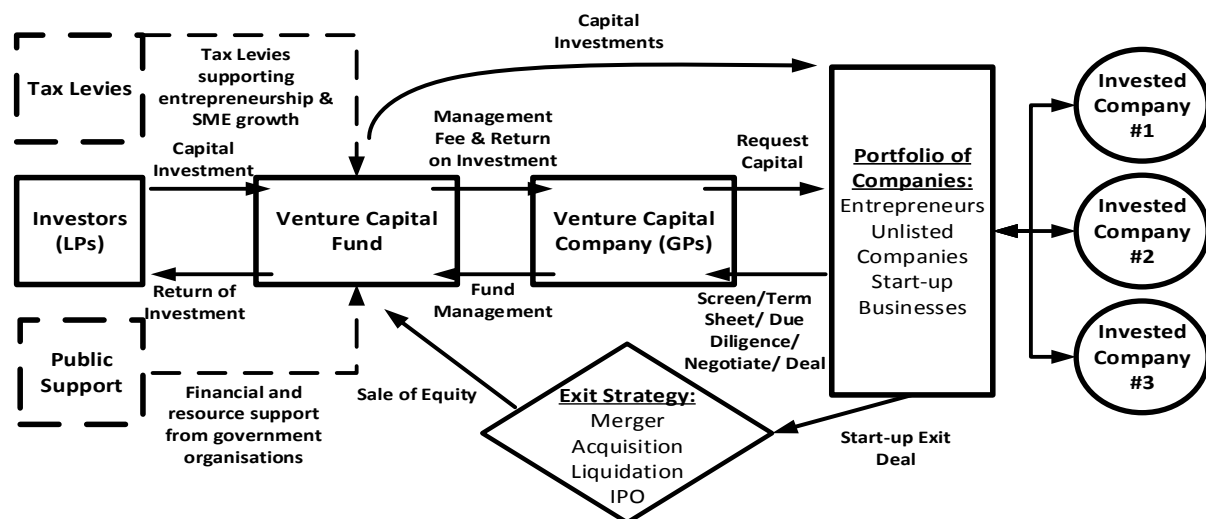


Figure 2: Venture Capital Organisational Structure adapted from Tang, et al. (2013).

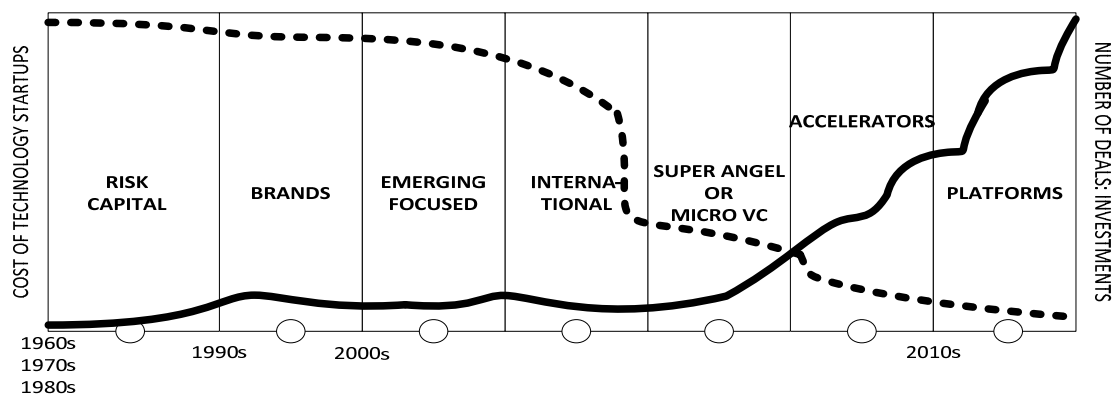


Figure 3: Evolution of VC Models adapted from Griffith (2013) and Rao & Scaruffi (2013).

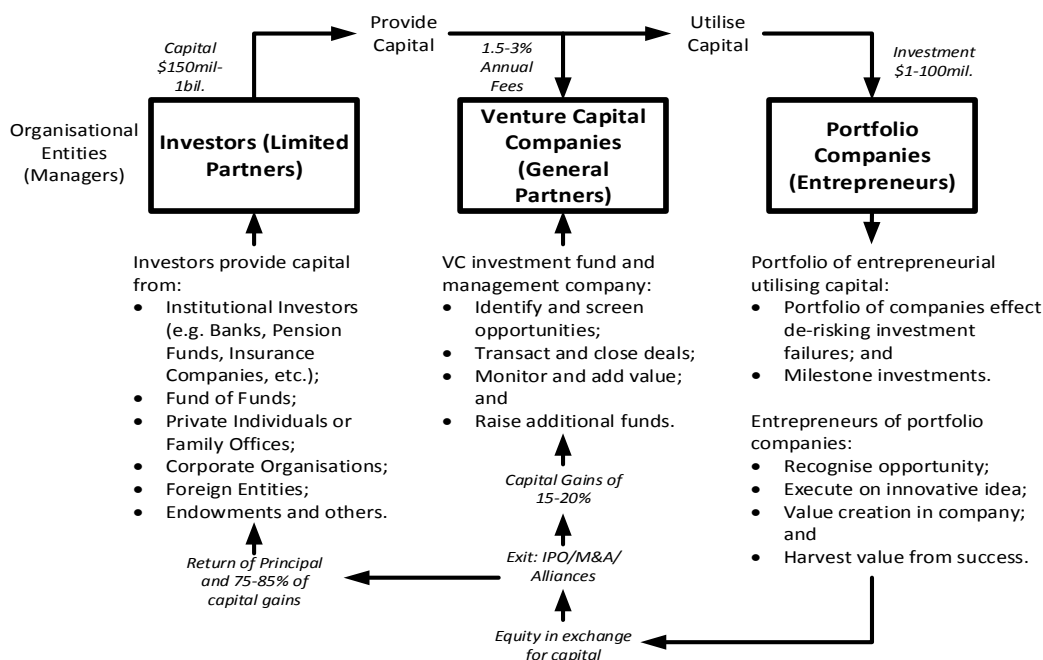


Figure 4: Typical Venture Capital Model Process Diagram adapted from Tang, et al. (2013).

### Typical Venture Capital Process

In Figure 4 above, the typical VC process is illustrated and shows the typical flow of capital investment between organisational entities and their respective managers. Venture capitalists (or GPs) raise the capital for the investment fund from investors and seek high growth entrepreneurial investment opportunities (Tang, et al., 2013). This investment fund uses annual fees to run the fund and establish a portfolio of high-growth potential start-up businesses, which receives a capital investment in return for equity stake<sup>1</sup> (Van Zyl, et al., 2013). The start-up businesses are then scaled with the investment and expertise support from the VCs to exit, whereby the capital gains from the exit are distributed according to pre-agreed percentages to the relevant stakeholders. The VC fund is

<sup>1</sup> In general, VCs take preferred shares in start-up businesses instead of ordinary shares which provides some form of protection during liquidation or exits under expected value. It allows for a liquidation preference as an investment clause whereby the business finances and assets, to a value of pre-determined percentages is regarded as the minimum return on investments, based on the principle rule 3-5-7.

expected to gain capital returns on multiple exits and mitigates the risk of failure through the portfolio effect, and funds usually exist for roughly seven to ten years.

### Cooperative Models

The most widely accepted definition of a cooperative, as defined by the International Cooperative Alliance (ICA, 2012), is “an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically controlled enterprise and operated on cooperative principles”. In general, cooperatives are legal entities based on set values and principles of collaboration. These values are democracy, equality, equity, self-help, self-responsibility and solidarity, while the ethical values aspire to have members believe in *caring for others, honesty, openness and social responsibility* (ICA, 2012).

Globally cooperatives, especially modern financing cooperatives, have inspired growth with an estimated market value of US\$ 2 trillion with over 1 billion members and accounting for 100 millions of jobs (ICA, 2013; DSPD, 2013). According to the United Nations (UN, 1995), cooperatives contribute to the economy, if fully developed, by reducing poverty, generating employment, integrating society and can have a global impact. Berube, *et al.* (2012b) found that cooperatives, in comparison to listed public companies, are globally competitive, especially with regards to market share, while also having increased in the number of industry sectors.

Traditionally cooperatives were highly active in agricultural sector which was due to the role and control of government, but in recent years cooperatives have become more hybridised and new generation cooperatives enable more versatile financing and control structures (Chaddad & Cook, 2004; van Bekkum & Bijman, 2006; Spear, 2011; Fici, 2012). Spear (2011) compares the different types of ‘*hybridisation*’ adaptations towards the ideal cooperative type, with the ‘*business cooperative*’ requiring a strong emphasis on business orientation, membership restriction, manager control and financial adaptations. According to Von Ravensburg (2009), as cooperatives mature, they should consider diversifying and creating more complex ownership and governance structures, while eventually also considering establishing financial investment networks and second tier structures.

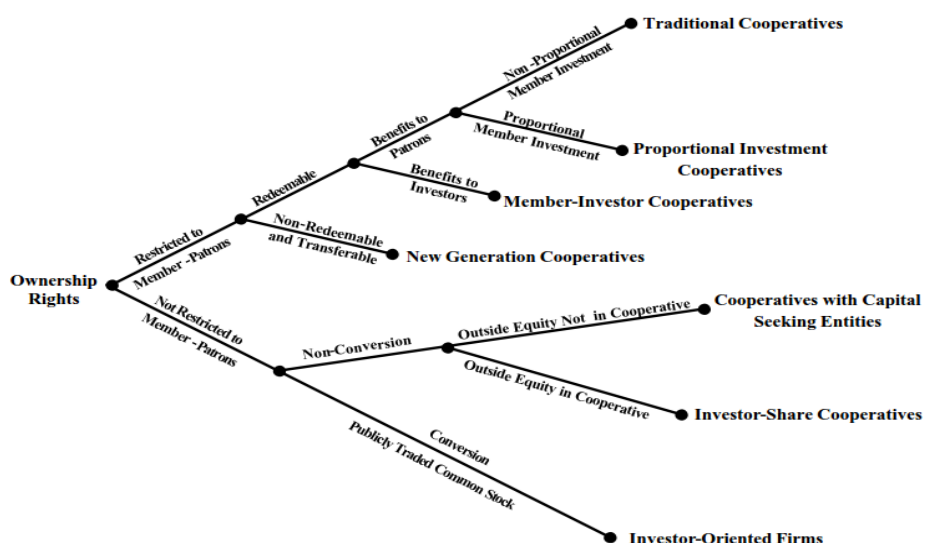


Figure 5: Alternative Cooperative Models adopted from Chaddad & Cook (2004).



Cooperatives usually struggle with acquiring the necessary risk capital to implement growth strategies and sustain a competitive advantage (Chaddad & Cook, 2004; Bekkum & Bijman, 2006; Lund, 2013). Lund (2013) further adds that cooperatives typically fund their ventures with a combination of debt and risk capital from members and uses different equity structures<sup>2</sup> for capitalisation and control. In Figure 5 above, Chaddad & Cook (2004) illustrates the evolution from traditional cooperatives towards new generation cooperatives and cooperatives that are not restricted to member investment. The ownership rights specifically relating to new generation cooperatives, cooperatives with capital seeking entities (e.g. strategic alliances, trust companies or subsidiaries), and investor-share cooperatives supports the movement towards an entrepreneurial cooperative.

Entrepreneurial cooperatives can also potentially generate transaction costs among members through building trust and interdependencies (*'social capital'*) (CEC, 2001). Additionally, cooperatives can lower information, knowledge and learning costs between member businesses and markets (Grosskopf, 1994). There are numerous featured services and advantages that the modern entrepreneurial cooperatives could offer to the market and its member (Von Ravensburg, 2009). However, the major challenges with cooperatives remain in agility in decision-making, pursuing new opportunities and financing, developing and sourcing talent, and managing the complexity with scaling (Berube, *et al.*, 2012a; Nixon, 2012).

## RESEARCH METHODOLOGY

The research conducted is predominantly qualitative based because limited empirical data on the unique organisation structure in industry. Developing the qualitative procedure, an explorative research approach is needed. Using the constructivism theory as a foundation, guided by basic systematic problem-solving approach, new paradigms can be systematically explored. Guba & Lincoln (1994) argues that the nature of information and knowledge, being ontological and epistemological based, provides an important fusion and role in constructivism. The constructivism theory simply argues that human beings generate understanding and knowledge from interacting between their existing experience, knowledge and ideas. Below follows the quality criteria for the constructivism theory (Guba & Lincoln, 1994):

- i. *Trustworthiness*: Moral value regarded as value, i.e. is the research credible and dependable?
- ii. *Authenticity*: Quality of being authentic. In other words, is the research authentic and educative in contributing towards a new paradigm?
- iii. *Misapprehensions*: Refers to the misguided belief about or interpretation of something. In other words, is there a new paradigm formed.

The qualitative procedure is outlined by the systems engineering approach illustrated in Figure 1 below, and uses secondary data collected from literature to formulate the research argument based on the constructivism theory. The approach defines a complex problem in the literature on innovation ecosystems, and disseminated it into unit problems. Unit solutions are then found for

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<sup>2</sup> *Classes of stock, for example class of member stock or 'voting stock', which rarely pays a financial return but is instead valued in control rights.*

each unit problem, which are identified from the best practices reviewed in literature on venture capital and cooperative models. These unit solutions are then formulated into a model that represents the whole solution to the complex problem. In Figure 1 below, the systems engineering approach is related to the paper layout and includes:

- i. *Problem Definition and Research Methodology*: Problem is defined from the literature review and research methodology is described.
- ii. *Best Practice from the Literature Review*: Secondary data is collected from the literature review on best practice models of organisational structures and business entities that supports entrepreneurship and includes venture capital and cooperative models.
- iii. *Model Methodology*: Secondary data collected is formulated into design criteria for the development of a conceptual model acting as a solution to the complex problem.
- iv. *Verification*: The verification strategy uses validated secondary data from literature review to formulate design criteria from the best practice models and is externally verified by enterprise engineering structural components.
- v. *Research Conclusion*: The resultant findings and recommendations for future studies are concluded in this section.

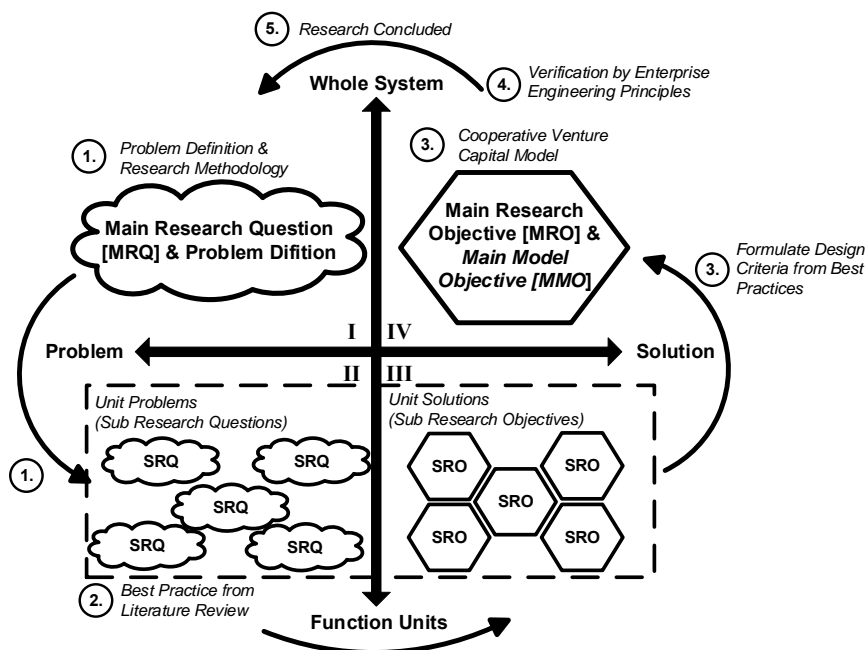


Figure 6: Systems Engineering Approach adapted from Kennon (2010, p. 21).

### Research Questions based on the Complex Problem

The main research question (MRQ) for this paper is formulated from the complex problem as follows:

[MRQ]: *What alternative solution can be developed that will support and promote an entrepreneurial and innovation pipeline that specifically focuses on the value chain of commercialisation?*

The sub-research questions (SRQ) from the literature reviewed are listed in Table 1 below. These questions were formulated from a pre-literature review on the complex problem in part, and from the dissemination of the MRQ in part.

### Research Objective from the Research Questions

The sub research objectives for the literature reviewed are listed in Table 1 below. The main research objective (MRO) is formulated from the SRQs and the MRQ. The MRO is as follows:

[MRO]: *Develop an alternative solution that will support and promote an entrepreneurship and innovation pipeline that will specifically focus on the value stream of commercialisation.*

Table 1: Synthesis of the SRQs and SROs for the Literature Review.

Section	Ref.	Sub-Research Questions (SRQs)	Sub-Research Objectives (SROs)
<b>Innovation Ecosystem (Problem Definition)</b>	SRQ1.1	<i>What are the dynamics of the innovation ecosystem, innovation value chain and lifecycles?</i>	<i>Define the complex problem and challenges in commercialising intellectual property or technology in the innovation ecosystem.</i>
	SRQ1.2	<i>What are the challenges and “valleys of death” in an innovation ecosystem?</i>	
	SRQ1.3	<i>What is the direction of thought in the innovation ecosystem?</i>	
<b>Entrepreneurial Challenges</b>	SRQ2.1	<i>What are the barriers and inhibitors of start-up business development?</i>	<i>Determine the growth determinants, barriers and enablers that entrepreneurial businesses face.</i>
	SRQ2.2	<i>What are the enabling components of business growth?</i>	
	SRQ2.3	<i>What are the internal and external determinants to business growth?</i>	
<b>Venture Capital Models</b>	SRQ3.1	<i>What is the role and importance of venture capital?</i>	<i>Determine the best practices venture capital models.</i>
	SRQ3.2	<i>What are the dynamics of venture capital model(s) and processes?</i>	
	SRQ3.3	<i>What are the principles and best practice of venture capitals?</i>	
<b>Cooperative Models</b>	SRQ4.1	<i>What are the different types of cooperative models and best practice?</i>	<i>Determine the best practices of cooperative models.</i>
	SRQ4.2	<i>What are the growth challenges of cooperatives?</i>	

### DEVELOPING THE COOPERATIVE VENTURE CAPITAL MODEL

In the research methodology a conceptual model is used to represent the whole solution of the complex problem (refer to Figure 1). Therefore, the Main Model Objective (MMO) for developing the CVCM is required to be aligned with the MRO and MRQ, and is as follows:

[MMO]: *Develop an innovation pipeline for an organisation, region or cluster that supports entrepreneurial teams to commercialise their intellectual property or technology.*

The literature reviewed on the various SRQs and SROs (refer to Table 1) was compiled and formulated into design criteria for the development of the CVCM and are summarised in Table 2 below.

Table 2: The Design Criteria for the Development of the CVCM.

Ref.	Framework Design Criteria	Section	Notes
DC 1.1	A model supporting the innovation value chain and acting as a key enabler with its specific innovation process.	Innovation Ecosystems	<i>Supporting the innovation value chain is essential and contributes positively towards establishing an innovation pipeline.</i>
DC 1.2	A model enabling the reduction in innovation capital gaps to support and further enable the innovation value chain.	Innovation Ecosystems	<i>The "valley of death" is a global occurrence and certain industries seem to suffer from multiple innovation capital gaps that limits the innovation pipeline.</i>
DC 2.1	A model that mitigates numerous start-up business growth challenges, both internal and external.	Commercialisation Challenges	<i>The challenges facing entrepreneurs and start-up businesses are either seen as internal or external detriments which need to be mitigated or addressed through support.</i>
DC 2.2	A model which innovation process includes entrepreneurial teams, not individuals and also includes management practices of the innovation process.	Commercialisation Challenges	<i>The entrepreneurial team has consistently been indicated as more successful than individual entrepreneurial ventures.</i>
DC 3.1	The funding process of the venture capital model has to be considered in supporting entrepreneurship and cooperatives.	Venture Capital Models and Processes	<i>Access to funding is important to both entrepreneurship and cooperatives.</i>
DC 3.2	The venture capital model's fund management and risk mitigation properties are required in the developing the model.	Venture Capital Models and Processes	<i>The organisational structure manages both financing, wealth creation and risk mitigation which can be considered as important.</i>
DC 4.1	A model which considers the different types of cooperative principles and models.	Cooperative Models	<i>Cooperatives supports entrepreneurship and innovation.</i>
DC 4.2	The organisational structure and enterprise innovation process are required to mitigate risks through addressing the challenges faced with cooperative structures.	Cooperative Models	<i>There are numerous challenges that are associated to cooperatives, especially with the increase in complexity and managing risks.</i>

### COOPERATIVE VENTURE CAPITAL MODEL (FINDINGS)

The conceptual model was developed by combining a cooperative and venture capital model together, and called the Cooperative Venture Capital Model (CVCM). The reasoning behind the CVCM as an organisational structure is based on the following considerations and similarities:

- i. The VC and financing cooperative models are funding instruments that supports entrepreneurship;
- ii. The movement in VC models is toward platforms to further support entrepreneurs, not just with funding;

- iii. The movement in cooperative models is toward capital seeking and investor friendly entities, as well as hybrid flexibility; and
- iv. Both the VC and cooperative models have similar socio-economic impact and benefits, mainly due to their support to entrepreneurship.

This section first discusses the basics of the CVCM organisational structure followed by the CVCM organisation structure fit that details the conceptual model. The design criteria for the development of the CVCM are satisfied and discussed in detail below (refer to Table 2 above).

### **Basic CVCM Organisational Structure**

The basic formulation of the CVCM organisation structure considers the typical VC model (refer to Figure 2) and the typical cooperative models described by Chaddad & Cook (2004), refer to Figure 5. The typical VC model is changed by using secondary and primary cooperative legal entities instead of private companies, as formulated in Figure 6 below. In this way the CVCM allows for a capital seeking secondary cooperative ('portfolio') to manage the venture capital fund, while primary hybrid cooperatives are used to form entrepreneurial teams (*satisfying DC3.1 & DC4.1*).

The rationale for utilising the cooperative and venture capital structure, as well as the typology of the cooperative model, are (*further satisfying DC4.1 & DC3.2*):

- i. Fully-fledged cooperatives are legally registered within a specific country and usually are actively promoting the principles of cooperatives as established and governed by the specific country's legislation (refer to the research by Bekkum & Bijman (2006) and Lund (2013)).
- ii. Hybrid or multipurpose type of cooperatives combines two or more types of cooperative models with different business activities whereby its members have a common interests and purpose.
- iii. Hierarchy levels and ownership rights structuring:
  - a. *Primary hybrid cooperative (more detail below)*: Formed with entrepreneurial teams (requires five members usually) as an invest share cooperative (outside equity in cooperative) depending on country's cooperative legislation.
  - b. *Secondary portfolio cooperative*: Management forms secondary cooperative with two primary cooperatives and a capital seeking entity (e.g. investment fund or trust) to raise capital and provide investors a return on investment though a portfolio.
  - c. *Tertiary cooperative*: Executive management can consider tertiary cooperative level once multiple secondary portfolio cooperatives are in operation. The strategic decision will be to provide additional investment options and diversifying of investment risks through developing an investor-orientated cooperative (public traded common stock) model. A public traded common stock system can provide a more flexible capitalisation mechanism, but is restricted by the prospectus each portfolio fund investment in which adds to the complexity<sup>3</sup>.

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<sup>3</sup> The complexity is increased by the prospectus which requires additional legal auditing and costs in order to avoid illegal solicitation of funds from the public.

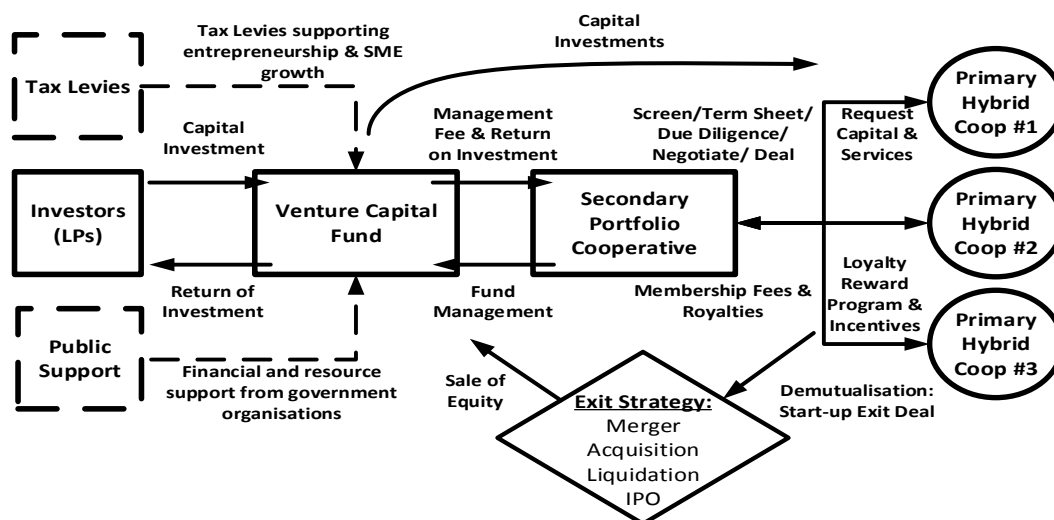


Figure 7: Basis of the Cooperative Venture Capital Model.

When starting a new business from research or an idea, the next step would be to put the entrepreneurial team together, develop a business case, then build the prototype and test it in the market which serves as an indication of risks and/or failure. In the book by Moyer (2012), the first challenge and risk clearly comes ups in distributing ownership of the business. Moyer describes the inherent risk of slicing the pie (business ownership) as follows: "You and a friend go 50/50 on a new business. You do all the work. He still owns 50% for doing nothing. Now what?"

Entrepreneurial teams forming the primary cooperatives are recommended<sup>4</sup> to form an invest share cooperative (outside equity in cooperatives) whereby the shareholding is structured for value add and specifically the investments made by the secondary cooperative. However, no equity is exchanged initially until the entrepreneurial teams have created value, but this will be structured in a term sheet agreement as the primary cooperative is established whereby expectations and different roles for prescribed shareholding are defined (*satisfying DC2.2 & DC4.2*). The primary cooperative is also a 'hybrid' or multipurpose meaning that it can serve numerous industry sectors and at a later stage, it can be demutualised into a private company. Note that the governance of the legal agreement should be facilitated by the general management protecting the value created.

In the case where members decide to revoke their role in the start-up business (primary cooperative), the member can go into a shadow cooperative (deregistration of member) with the value he has produced evaluated at that stage of the start-up business. In the case of the entire start-up business failing, the entire entrepreneurial team goes into a shadow cooperative (deregistration of cooperative) whereby the secondary cooperative retains a 'liquidation preference' to recover a minimum salvage value from the start-up business, if any (*satisfying DC3.2*).

The last scenario to discuss in forming a primary cooperative, is when a start-up business with assigned equity stakes want to join the secondary cooperative. In this case, a partnership agreement similar to a joint venture can be drawn up between the start-up business and the primary cooperative whereby the equity structure is pre-agreed upon. However, all primary cooperatives will comply with the governance of the CVCM. In this way, the start-up business gains access to the

<sup>4</sup> Some countries do not legally allow such cooperative structuring, requiring a legal constitution specific for the CVCM or minor adjustments to the operations.

support of the CVCM while the CVCM can enforce its business model to protect its investments (*satisfying DC2.1 & 3.2*).

### **CVCM Organisation Structure Fit Matrix**

In order to identify and structure the various key stakeholders that form part of the organisation structure of the CVCM, a matrix is created to map the potential stakeholders. The CVCM matrix is synthesised in Figure 7 (Appendix A) below and includes the following (*satisfying DC1.1 & DC1.2*):

- i. *Funding Support*: The CVCM follows VC principles in raising capital through capital seeking entities and providing investable entrepreneurial teams as an innovation pipeline. The funding support is based on the funding stages illustrated in Table 3 (Appendix B) to provide a platform to overcome funding gaps in the innovation value chain. The entrepreneurial teams primarily seek funding at earlier stages to overcome gaps. Other funding mechanisms such as crowdfunding can also be used for smaller amounts at the bottom level. At a later stage with a tertiary cooperative structure, additional investing options to investors can be provided for both national and regional portfolios.
- ii. *Management & Execution*: The management and executives are divided into three levels, which aim eventually to establish a portfolio of regional and/or national investment opportunities. This approach will lead to a bottom-up and top-down management style whereby top management enables the structure and environment, and bottom management enables successful portfolios.
  - a. *Regional or national portfolio management (top or tertiary cooperative level)*: The role of these executive managers is to establish investment funds and necessary strategic partnerships in specific regions and/or manage the national portfolio (depending on scale).
  - b. *Portfolio management (middle or secondary cooperative level)*: The role of the general manager is to support and enable the various entrepreneurial teams to take their ideas and inventions successfully to market. This includes establishment of investment funds, raising the necessary funding, and sourcing the necessary general partnerships and collaborations for additional support.
  - c. *Start-up management (bottom or primary cooperative level)*: The role of start-up managers is to establish entrepreneurial teams and create value through taking ideas and inventions to market.
- iii. *Key Partnerships*: The reason for key partnerships as a separate category is to identify key resources and activities in the business model and organisational structure that will enable the successful implementation of the CVCM. The key partnership is also divided into three levels, namely, strategic partners, general partners and collaborating catalyst projects.
  - a. *Strategic partners*: Partners that are identified as essential for implementing a regional and/or national portfolio. These partners can also supply services and access to funding at a regional or nationwide level.
  - b. *General partners*: Any partners that are identified as supplying essential services that can enable entrepreneurial teams to grow. These services can be seen as cost effective and existing in the market, which means that the CVCM will not be required to provide it internally.

- c. *Collaborating catalyst projects*: These are essential projects that are identified for numerous reasons (e.g. marketing, member acquisition, idea filters, team development, culture etc.) that can act as a catalyst in enabling the growth of the CVCM.
- iv. *Cooperative Administration*: Due to the challenge of complexity in managing fast scaling and large cooperatives, a dedicated management role for cooperative administration is required. This specialist management area will also be divided into three levels, namely, organisation cultural management (top level), general cooperative administration (middle level) and catalyst project administration (bottom level, including event, marketing, etc.).

## **VERIFICATION OF CONCEPTUAL MODEL**

In Figure 1, the systems engineering approach is illustrated that is used in the research methodology whereby the verification is shown in the development process of the model. The external verification is based on the enterprise engineering structural components that externally verifies the conceptual model developed.

### **Model Design Criteria**

The design criteria for the CVCM are developed from the literature reviewed after breaking down the complex problem. The MMO was achieved in developing an alternative solution of creating an innovation pipeline, as all the design criteria has been satisfied. The key design criteria (*DC2.1*) is the only criteria that is difficult to completely satisfy as there are always numerous challenges and risks associated that are unavoidable, but key challenges are mitigated. The new paradigm created in structuring a cooperative is developed from best practice in ('trustworthy') literature and provides an authentic paradigm of cooperatives to support and promote an innovation pipeline.

### **Enterprise Engineering Methodology**

The field of enterprise engineering is a sub-discipline of systems engineering and the enterprise engineering structural components are developed from the enterprise engineering classification systems by Dietz, *et al.* (2013). The enterprise engineering structural components consists out of the following:

- i. *Enterprise operational processes and systems*: The role and responsibilities of the CVCM management and executives are to establish the alignment between the organisation structure and formal processes and systems. Essentially it includes establishing the investment fund, establishing general partnerships with support services, and establishing a pipeline of entrepreneurial teams.
- ii. *Human resource management and incentives*: The CVCM incentivises the investors to invest into the fund through competitively providing tax deductions and return on investment. The CVCM also incentivise entrepreneurial teams to join through providing unique supporting services and investment to grow their businesses. The fund also includes other investors such as tax levies and public support which requires different incentivising such as poverty alleviation, employment generation, etc. which needs to be guaranteed.
- iii. *Information and knowledge flow*: The CVCM uses the cooperative administration and coordination software to manage critical information and knowledge flow between cooperatives. It is also used to promote and manage other important information of support



services (e.g. accounting, legal, marketing, etc.), while education-training programmes supports knowledge creation.

- iv. *Organisational structure:* The CVCM developed an organisation structure through combining cooperative and venture capital models that finances and supports entrepreneurial teams.
- v. *Strategic management of initiatives:* The strategic options to scale the CVCM to regional and national tertiary cooperatives to serves the purpose and interests in implementing multiple secondary portfolio cooperatives. The CVCM supports entrepreneurial teams to use hybrid cooperatives that provides them with multiple strategic options (e.g. not give equity away early) and flexibility to take the idea to market with speed.
- vi. *Overall integration of complex systems and structures:* The CVCM integrates each of the above-mentioned structural components in its organisation structure to provide a value proposition to all stakeholders involved with its incentive structures.

## CONCLUSION

In this research paper, an explorative qualitative study was conducted to develop a solution that can address the complex problem of exploitation innovation. A Cooperative Venture Capital Model (CVCM) that uses a unique organisational structuring was developed based on the constructivism theory and guided by a systems engineering approach.

The CVCM is engineered to specifically support entrepreneurial teams and promote the exploitation of the innovation. An integrated system allows for the development of an innovation pipeline through the establishment and application of the CVCM. Using an incentive value proposition, the CVCM incentivises all stakeholders to actively invest in entrepreneurial teams taking ideas to market. The flexibility in the CVCM organisation structure allows for a diverse application in different markets and sectors.

Future research needs to be conducted on case studies from different organisations, including the development of CVCM whereby it is applied for corporate organisations and universities. This paper shows the potential of developing the CVCM into a conceptual framework and the application of the CVCM in case study examples.

APPENDIX A: CVCM ORGANISATIONAL STRUCTURE FIT

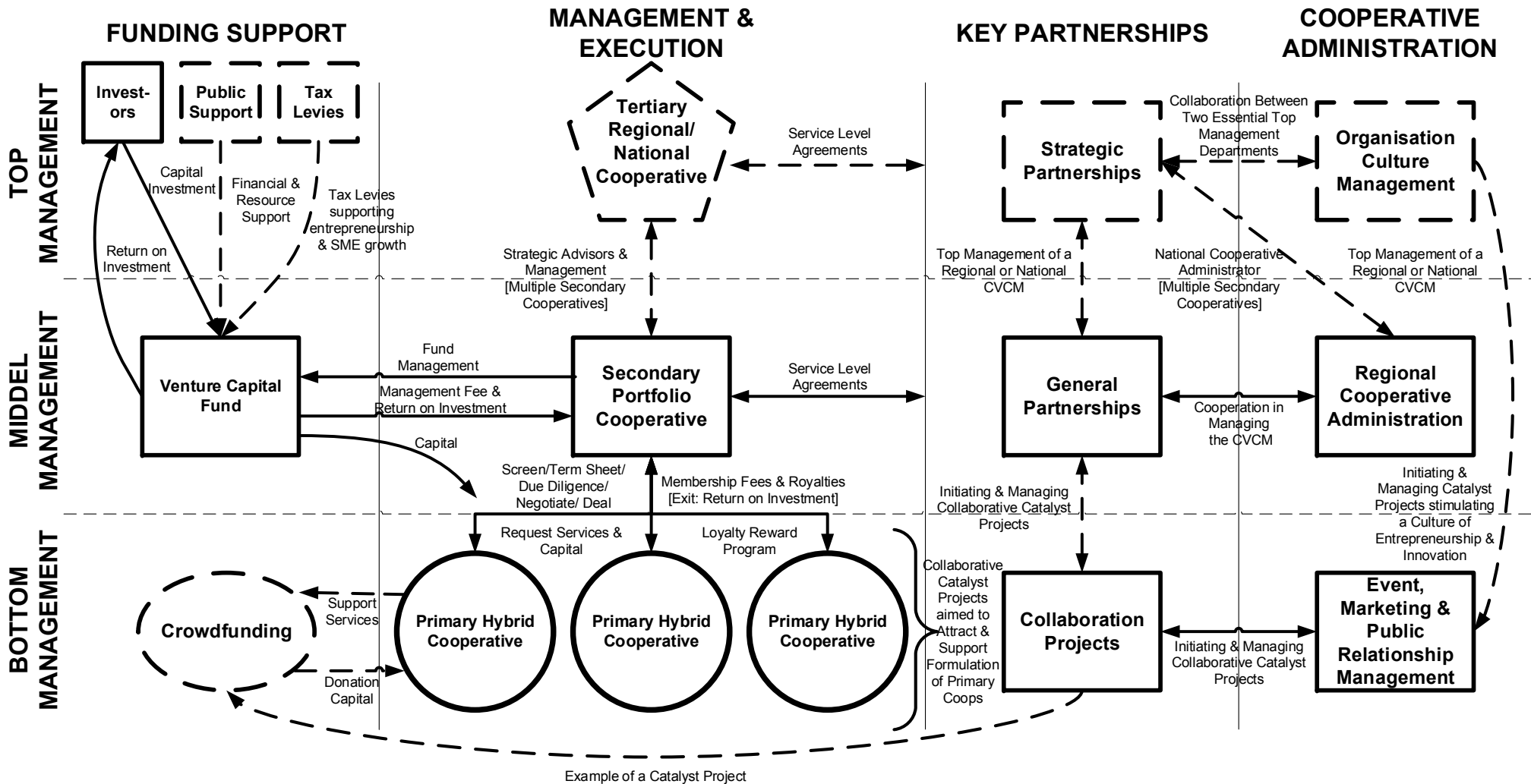


Figure 7: Organisational Structure Fit of the CVCM

**APPENDIX B: PROGRESSIVE GROWTH STAGES OF START-UP BUSINESSES**

*Table 3: Standardised Progression of Start-up Businesses adapted from Smith, et al. (2011) and Van Zyl, et al. (2013).*

<b>Stage</b>	<b>Pre-Seed</b>	<b>Seed</b>	<b>Early Stage</b>	<b>Later Stage</b>	<b>Growth</b>	<b>Exit Strategy</b>
<b>Development Actions</b>	Obtaining pre-seed financing; Assess opportunity; Assess strategic alternatives; Determine organisational structure and form; and Prepare a business case and model.	Obtain seed financing; Build research team; Conduct R&D activities e.g.: Intellectual Property Protection; Minimum Viable Prototype; etc. Test market viability; and Update business case/model.	Obtain early stage (e.g. venture capital) financing; Assess business case/model; Initiate revenue generation; Initiate production; Build starting inventory; Build sales and marketing team; Acquire facilities and equipment.	Obtain later stage financing; Work toward breakeven revenue; Expand team as needed; Expand facilities as needed; Assess/update business case/model.	Obtain further scaling financing, if needed; Work towards proven viability; Expand team as needed; Expand facilities as needed; Build track record for harvest; Assess/update business case/model.	Obtain continuing financing (e.g. IPO, acquisition, buyout, etc.); Early investors harvest; Assess/update business case/model.
<b>Support Options</b>	Gov. grants; Owners capital, FFF & Micro fin.	Crowd funding, Angels & Incubators	Angels, VC's & Incubators	Angels, VC's & Accelerators	VC's, Private Equity & Bank Specialised Financing.	Bank Specialised Financing & Stock Markets.
<b>Necessity Description</b>	All activities involving conceptualising the business case without incurring significant expenses.	All R&D activities in developing the minimum viable prototype	All activities that initiates and relates to revenue generating such as productions, marketing, sales, etc.	All activities during the previous stages until sales are sufficient to breakeven in cashflow.	All the activities after breakeven and before sustainable viability is established. Potential early exit also possible.	All activities are related to est. continuing financing. Formulation and implementation of an exit strategy.
<b>Decision Making</b>	Continue to next stage; Modify concept; and Abandon.	Continue to next stage; Extend stage/financing (optimise); Modify R&D strategy; and Abandon.	Continue to next stage; Modify the process/financing; and Abandon.	Continue to next stage; Extend stage/financing (optimise); and Abandon.	Continue to next stage; Extend stage/financing (optimise); and Abandon.	Choose the best exit strategy.

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