

Towards a synergic innovation management model: the interplay of market, technology, and management innovations

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Innovation, Innovation Management, Market Innovation, Technological Innovation, Management Innovation, Strategic Management, Dynamic Capabilities, Market Capabilities, Technological Capabilities, Management Capabilities, Core Competence.

Abstract

This paper outlines a model of firm innovation management known as the synergic innovation management model. Building on the theory of dynamic capabilities and core competence, the paper suggest three capabilities of firms namely market, technology, management capabilities that drive firms' innovations. The combination of these three capabilities creates a unique configuration for a firm known as the firm's core competence that informs the firm's strategic decisions. The synergic innovation management model guides firm in the simultaneous exploration of market, technology, and management innovations required for sustainable business. The paper concludes with limitations of the model and suggestions for further research.

1-Introduction

Firms exist to create value for their customers in a profitable and sustainable way. Innovation being the catalyst for value creation and growth is a necessary endeavor for any firm on the path to building a sustainable business or operating an established business. Firms¹ that do not engage in proper innovation management activities, in the long run, will be wiped out by competitors that repeatedly introduce into their industry new business models, new products, and new processes that command superior value to customers at lower costs.

In today modern economies, most firms are aware of the need to innovate, however, their innovation initiatives are frequently left fruitless. The reason why succeeding at innovation seem so unpredictable is that researchers to date haven't provided a body of theory that is valid and reliable enough to give entrepreneurs a solid sense of whether there is "oil down there" before they start drilling(Christensen, 2013). Most innovation management literature focus on specific dimension of innovation such as market innovations(Kjellberg et al., 2015) leading to new customers, technology innovations(Blundell et al., 1995, Garcia and Calantone, 2003) leading to new products, or management innovations(Birkinshaw et al., 2008) leading to new processes. However, none of these innovations dimensions on their own can deliver a sustainable business for a firm. The traditional model of firm innovation management where innovation is regarded as a sequential process of transforming ideas to product launch focuses heavily on technological innovation or product development. The model does not emphasize on the need to simultaneously engage in technology, market, and management innovations, and thus fails to provide opportunities for early validation of assumptions about the customers embedded in the business strategy guiding the innovation initiative. After product launch date, if the product fails to gain the traction assumed in the business strategy, which often is the case, it is usually too late as a lot of capital has already been invested in the technology development efforts. A more feasible approach is for the firm to simultaneously engage in both market development and technology development activities

¹ The term firm is used in this paper to represents any business institution or company.

which will enable the firm to validate key assumptions in its business strategy with early adopters using a minimum viable product MVP (Ganzarain et al., 2014), and thereafter to iterate this approach with variations in its value propositions and business model. An even better approach is for the firm to also engage in management development activities at early stage of a business initiative as this will enable the firm to validate elements of cost hypothesis in its business strategy which will build a foundation for scaling the business once a sustainable business model is identified. Integrating market, technology, and management innovations require a synergic innovation management approach where the firm simultaneously engages in market, technology, and management development activities.

Capabilities drives innovations (Lawson and Samson, 2001, Teece, 2009). As a firm engage in market, technology, management development activities, through learning by doing (Arrow, 1962, Kellie, 2011) they acquire respectively new market, technology, and management capabilities. These new

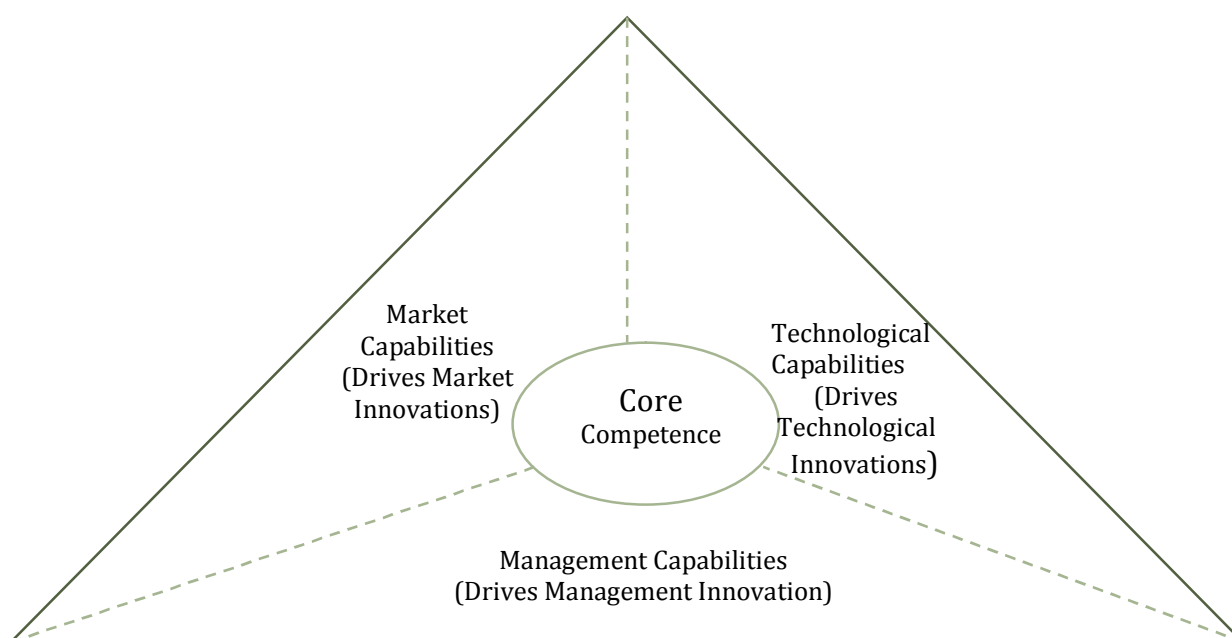


Figure 1: Synergic Innovation Driving Capabilities

capabilities interacts and re-enforce their respective existing capabilities (for example new technological capability interacting with existing technological capability) resulting to what is known as synergy within capability. Also, the interactions between market, technology, management capabilities further re-enforce each other in a way that the business impact of the whole is greater than the sum of the business impact of the individual capabilities. This is known as synergy across capabilities. These Interactions results to a unique configuration of the firm capabilities known as the firm core-competence (Coombs, 2007, Javidan, 1998) that turns to differentiate a firm from other firms in its industry. Figure 1 summarizes the capabilities that drive synergic innovation within a firm. From this perspective, a firm uniqueness or core competence emerges from its ability to generate and assimilated new capabilities which in turns drives the firm's innovations. This gives rise to a new paradigm for the sources of competitive advantage of firms, the innovation based view (IBV) of a firm, that supplement existing paradigms of competitive advantage based on the possession of unique resources (Nonaka and Toyama, 2003) and market positioning (Porter, 2007). In today modern economies, resources (talented employees, suppliers, access to capital, distribution channels) and market positioning are difficult to monopolize making it difficult to build sustainable competitive advantage solely on resources possession and market positioning.

Firms can benefit from synergy within capabilities as they apply previous experience to solving new problems thereby speeding their innovation process. Firms can also benefit from synergy across capabilities as it aligns its customers, products, and processes thereby ensuring that customers derive value from the firm's innovations. Synergy across capabilities also renders firm innovation as a whole resistance to erosion from competitive forces as imitating the firm's innovations will require acquiring the firm's core competence which is much more costly compared to acquiring a single dimension of the firm's capability or innovation. The characteristics of synergic innovation to be fast, valuable to customers, and resistance to erosion from competitors make it the engine of a firm's sustainable growth.

The mental model of a firm used in this paper is one whose internal settings consist of two conceptual factories, an innovation exploration factory and an innovation exploitation factory (Gupta et al., 2006, March, 1991). Both factories are operated by a strategic management or leadership team that plans the exploration and exploitation activities of the firm. A startup is predominantly an innovation exploration factory as the primary objective of a startup business is to search for a sustainable business model for the startup (Blank and Dorf, 2012). The degree of exploitation activities in the startup are kept to minimal until a viable business model is found. On the other side of the spectrum of business evolution is the established business which is predominately a factory of exploitation of innovation as the primary objectives of the established business is to execute on a massive scale the repeatable business model of the firm. In the middle of this spectrum are firms that are in transition from startup business to established business. These are the firms most active in the development of management capabilities. At the transition phase, the firm has already found a profitable business model and is building management capabilities for its exploitation factory in preparation for massive scaling. At the startup end of the spectrum, more often than not, the real customers for the firm's products are unknown, the product is loosely defined, and elements of the business model are still being validated. During this early phase, making high investment or pre-mature scaling (Ries, 2011) to build special functional departments such as HR, Accounting, and Purchasing will lead to low return on investment as these functional departments excel more in exploitation mode where rapid execution on a mass scale is of prime importance. At this early stage outsourcing most of the specialized supporting functions needed by the firm will be a better use of the firm's capital.

Established businesses that have built in pockets of active innovation exploration factories to avoid the problems of "the innovator's dilemma" (Christensen, 2013), where big firms become too rigid to innovate, will find it cost effective for these exploration factories to use in sourcing to gain access to special functional departments' resources from the firm's innovation exploitation factory. An established business needs to keep some degree of exploration activities to fuel its growth and stay competitive. The output of the exploration factory should be continuously channeled into the exploitation factory for massive revenue generation. However, caution should be taken not to visualize this channeling as a handover of the outcome of the exploration factory to the exploitation factory. The channeling should be seamless as those leading the exploitation factory need to very much involve in the activities of the exploration factory.

This paper focuses on the process aspect of the mechanics of the innovation exploration factory or process aspect of the mechanics of firm innovation management. The paper also focuses on the management of a single innovation initiative and not a portfolio of innovation initiatives. The phenomena of firm innovation are still largely an art and it is the role of firm innovation management research community to supplement the art of innovation management with science of innovation management. The contribution of this paper is to add to the body of knowledge of firm innovation management models and to extend to the concept of firm innovation to a multi-dimensional process consisting of market, technology, and management innovations. In the following section of this paper, we reviewed the existing literature on models of firm innovation management. That is innovation management at a micro-economic

level. This is followed with an outline of the synergic innovation management model, and discussion on the implications of a synergic innovation management approach to firm innovation management.

2-Literature Review

Firm innovation is performed within the structure of the firm or corporate innovation system which is a set of actors, activities, resources, institutions and their interrelations (Granstrand, 2000). Innovation actors such as customers, employees, and partners participant in a firm's innovation activities to input ideas or solutions. Institutions such as financial institutions, government agencies, academics institutions and other companies interact with the firm providing resources to facilitate innovation. These interactions between a firm and its environment is even more profound in the context of open innovation (Chesbrough et al., 2005) where firms do not only make use of internal resources to foster innovations but also attempt to pull ideas and innovative solutions from the society in which they operate.

The theory of innovation was pioneered by Schumpeter who described innovation as a processed of "creative destruction" where new products and services are continuously created to replace old ones (Schumpeter, 1942). Schumpeter saw innovation as the engine of economic growth and firms with entrepreneurs at the core as agent of economic growth. Later, Rogers expanded the theory of innovation with his work on the diffusion of innovation(Rogers, 1962). Rogers described the adoption of new technology as a phenomenon taking place in five phases (innovators, early adopters, early majority, late majority, and laggards) with each phase facing different set of users with different level tolerance for change. The distribution of the users follows a normal distribution bell shape with the early majority and late majority representing the mainstream users when the innovation is at its peak of adoption. Moore expanded the work of Rogers with his idea of crossing the chasm(Moore, 1999). Moore argued that the characteristics and expectations of early adopters and early majority are different, and suggest techniques to help firms successfully cross the chasm in their attempt to market their products to mainstream users. The implication of the work of Rogers and Moore are very important to the management of firm innovations. Firms can attempt to validate their business model by engaging with innovators and early adopters. Once a profitable business model is identified, firms can then adopt different strategies in scaling the business and marketing to mainstream users.

The stage-gate model or idea-launch process is considered one of the very early practical models used in firm innovation management. The stage gate guides firms during various stages of their product development process as the firm attempts to transform an idea to a new product that will eventually be launched into a target market. The process usually involves preliminary assessment, detail investigation, development, testing & validation, and full production & market launch. Each stage is preceded by a gate at which the firm is required to make go/no decision before beginning the next stage of the product development process (Cooper, 2008, Cooper, 1990).

Another prominent model of firm innovation management is design thinking (Geissdoerfer et al., 2016, Luebkehan and Brown, 2015). The process of design thinking usually involves empathize, define, ideate, prototype, and test. Unlike the stage-gate system that moves from idea to product launch, design thinking starts by discovering customer needs. It assumes that users may not adequately describe what they need until they have experience with a product or at least a prototype of the product. In order to help user identify their needs design thinking employ rapid prototyping for user needs validation, analyzing and synthesizing user feedbacks throughout each iteration of the prototype. Thus, design thinking is focused on solving the right problem for the users. This greatly enhances product-market fit as the product being developed is targeted at meeting the needs of a particular segment of customers.

The lean startup (Erickson, 2015, Hart, 2012, Ries, 2011) approach to innovation management is another methodology that is gaining grounds especially in high tech industry. The lean start methodology is built on the ideas of lean manufacturing (Liker, 2014), agile software development(Cohen et al., 2003), and customer development (Blank, 2013).The lean startup methodology uses a Build-Measure-Learn

process that attempts to eliminate waste in the process of innovation. It advises the implementation of actionable metrics using innovation accounting to ensure that work being done during the innovation process is focused on validating customers' needs and by so doing minimizes any work that does not add value to customers.

The ideas in this paper were first outlined in (Tchuta and Fuji, 2013). Over the coming years the concepts of iteration for incremental innovation and waste reduction (Ries, 2011), and business model design (Osterwalder, 2004) have been incorporated into the synergic innovation management approach. The synergic innovation management (SIM) model is grounded on the theory of dynamic capabilities (Teece, 2007) and core competence (Coombs, 2007). The SIM model views firm innovation as a multidimensional process involving market, technology, and management innovations that have to interplay to ensure sustainability of firm innovation outcomes. Rather than limiting innovation management to building and launching products into a target market, SIM model adopts a broader concept for innovation management as the process of transforming ideas to sustainable business. The following section describes the SIM model approach to innovation management.

3- The Synergic Innovation Management Model

The synergic innovation management is an approach to innovation management that integrates firm market, technology, and management innovations activities in way that enhances customer value capturing and development of sustainable business. The main application of synergic innovation management is in the transformation of an idea or business opportunity to a sustainable business. Thus synergic innovation management encourages entrepreneurs to view innovation management as a practice for developing sustainable business rather than a mere product development tool.

The main challenges in innovation initiatives is not in building and launching a product to the market, but is on whether there is a market with customers for the product being launch and whether the firm can continuously deliver to these customers in a profitable way. The SIM model integrates key activities of firm innovation management in a way that enables a firm to engage simultaneously in market, technology, and management development activities in search for a profitable business model while at the same time remaining aligned to the firm's vision. From the perspective of the SIM model, the key activities in firm innovation are strategy and financing, market development, technology development, and management development. Figure 2 shows the key activities in the SIM model and their interactions.

These key activities are intended to (1) validate assumptions in the firm's business model, (2) align

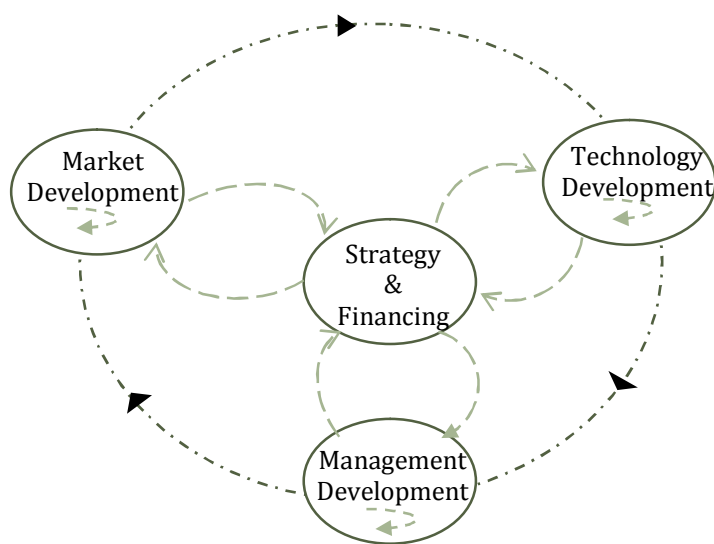


Figure 2: Synergic Innovation Management Model

the firm's customers, products, and processes, (3) generate capabilities and core competence that will fuel further innovation and positioning of the firm for long term sustainable growth. What the customer buys and considers value is never a product. It is always the utility the products provides (Drucker, 1974). Thus the SIM model does not merely focus on product or technology development but on continuously and incrementally verifying that the product being develop provides values to the customer in a cost effective way. The SIM model incorporates two types of formal learning feedback loops and one formal iterating loop. The first type of feedback loops connects each activity set (market, technology, management) with the strategy and financing activity. The second type of feedback loop is within each of the market, technology, and management activities sets. This second type of feedback loops enables each of these activities sets to experiment with multiple alternatives before feeding back their findings to the strategy and financing activity set. The feedback loops follow the plan do study act (PDSA) methodology (Aguayo, 1991, Deming, 1986). The iterating loop directs the flow of assumptions or hypothesis² along market-technology-management-market activities loop. Once the strategy and financing team identifies a set of assumptions or hypothesis from the firm's business model that needs to be validated during a particular iteration of the SIM model, the market development team works with early adopters or potential customers to refine this hypothesis and create user stories around the hypothesis. The technology development team transform the user stories into minimum product features that are required to support the verification of hypothesis of the iteration, the management development team put in place minimum processes and resources to facilitate the verification of the hypothesis of the iteration, and the finally the market development verifies the hypothesis of the iteration. At each step of the iteration flow, each team feedback its findings to the strategy and financing team who gives the green light to moves the iteration to the next set of activities. In the early stage of a business initiative, all four activities may be performed by a single team. However, as the business initiative evolves after a number of iterations different teams can be formed to perform each sets of activities and all teams work synchronize during the strategy and financing review sessions. Below is a brief description of each key activity.

Strategy & Financing

A business or innovation initiative starts with an idea. The entrepreneur builds a grand vision around the idea and all other activities are organized and directed towards that grand vision. The strategy and financing activities of a business initiative, continuously helps a firm to focus its innovation efforts towards its grand vision. The strategy and financing activities needs to ensure that the market position of the firm is aligned with its core competence either by shifting the firm's market position so as to stay aligned with its core- competence or by shifting the core-competence of the firm so that the firm occupies a market position with better opportunities and aligned with its long term grand vision. Shifting of core-competence is done through developing market, technology, and management capabilities that will enable the firm to capture value from its new market position. The activities of the strategy and financing includes developing a baseline business plan (in this case a document initially drafted for the purpose of communicating to stakeholders assumptions, risks and capital requirements for the business), using tools such as business model canvas (Osterwalder and Pigneur, 2010) to construct a business model of the business initiative, identity assumptions in the business model (for example customer acquisition rates, customer segments, price points, core value propositions) that needs to be validated with facts gathered through interactions with real customers or users, design metrics to track the progress of the innovation activities towards the business vision, and base on facts re-evaluate the business initiatives for possible change of strategy. It should be noted here that the business plan and business model canvas are living documents that evolve with business initiatives with possible modification during iterations of the SIM model as facts about the business gradually uncovers. The SIM model places a strong emphasizes on

² The term hypothesis as used in this paper refers to assumptions (for example customer acquisition rate, customer segment, price points) about the business that needs to be verified with facts from the market.

financing. The entrepreneurs must keep an eye on its capital burn rate as the entire innovation process will halt if the business initiative runs out of fund. Thus fund raising is a key aspect of the strategy and financing activities as well.

Market Development

The aim of the market development activities during innovation exploration is to discover the customers and their needs. Market development helps the firm identifies where the real business opportunities for its visions lies. The market development activities have to be driven by the innovation tracking metrics defined by the strategy and financing activities. Relying on metrics for decision making during innovation management process is one of the key enablers of a scientific approach to innovation management. The activities of market development may also include working with technology development team to define the minimum viable product for customer discovery (Blank, 2013), designing and performing experiments that will help validates its business assumptions. Through series of experiments, market development can generate market innovation to compliment the technology, and management innovations. As market development activities gather facts and test hypothesis about elements in the firm's business model, new business models or entirely new customer segments with unmet needs may emerge.

Technology Development

The technology development activities are focused on building the product or service for the business initiative. The initial focus is on building a minimum viable product MVP that will help support the market development activities. It is important for the business to envision its core product as platform on which derivative products can be developed. Thinking in terms of platform early on helps the business set the ground work for rapidly rolling out slightly differentiated products for different market niche and expanding is revenue streams once the business is stable. However, caution should be taken not to rollout multiple products until the business model have been validated with possibly a single product and the business is generating growing revenue with the initial product. This is because in the early stage of a business venture, focus and speed overweighs diversification. The technology development activities should be driven by the technology development relevant metrics defined in the strategy and financing activities.

Management Development

The aim of management development activities is to ensure that the minimum processes and resources required to smoothly deliver the outcome of technology development activities (products) to the outcome of market development activities (customers) are available when needed. In startup, management development activities are relatively low compare to market and technology development activities, however, minimum viable processes or guidelines needs to be in place to support the market and technology development activities. The minimum viable processes also goes into helping the firm validates cost related hypothesis in its business model. Without any data and metrics related to the cost structure of the business, transitioning from startup to established business will be surrounding by a lot of unforeseen risks. Building a culture for innovation and supporting processes very early on in the business initiative is also critical for the long term success of the business.

The philosophy of the SIM model is to gear the innovation initiative towards the establishment of a sustainable business rather than towards a product launch. Thus the SIM model guides a venture during the initial startup phase while preparing it for transition from startup to established growing business. Along this process the model attempts to reduce the risk associated with the venture which is usually the technology risks, the market risks, and the management risks. All these risks boils down to financial risks as the process of innovation halts if the firm runs out of funds, thereby leaving no room for further mitigations of any market, technology, or management risks.

Business Evolution Phases

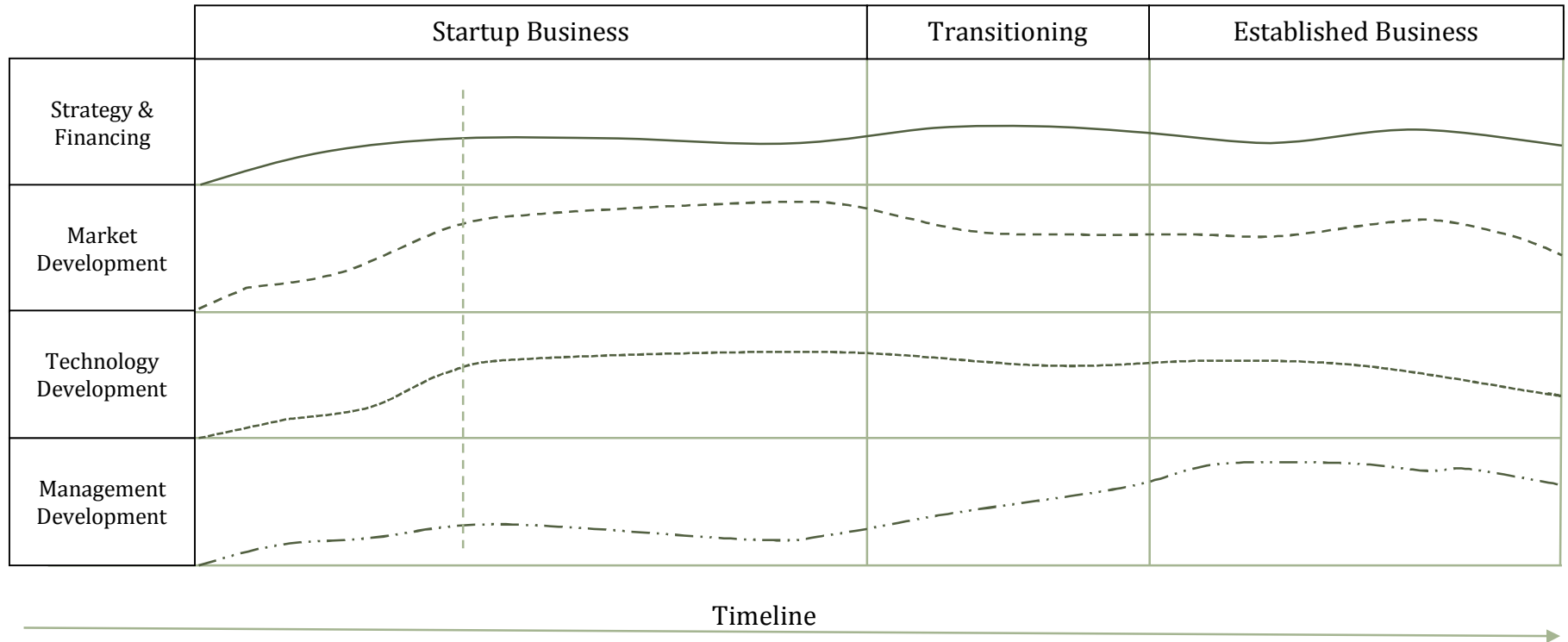


Figure 3: Continuous Exploration of Innovation Using SIM Model

Figure 3 shows a hypothetical view of the various phases of evolution of a business initiative and key activities of the SIM model. Depending on the business initiative, each phase maybe further divided into multiple sub phases with clear milestones. For example, the startup phase can be divided into initial ideas generation, business case formulation, value-customer mapping where the value proposition of the business is validated with customers' needs, business model construction where the components of the business model are put together and validated with data from the market, and business model launching which represents the massive launching of the products to the market with a validated business model.

If we use our conceptual model of a firm which consists of the innovation exploration factory and an innovation exploitation factory, during startup phase, the role of the SIM model is to speed up the engine of the firm's innovation exploration factory while the innovation exploitation factory remains relatively small. In fact, to avoid pre-mature scaling, rolling out of the main building blocks (for example marketing and sales department, purchasing department, and HR department) of the innovation exploitation factory of the firm only happens after the firm has already identity a sustainable business model and the transitioning phase is initiated. At transitioning the firm's customers are known, its product is well defined, its critical processes are known. The firm then rollout is exploitation factory and scale up the business. At this stage the firms needs to optimize for execution and start speeding up its innovation exploitation engine.

4-Discussion

Looking at the hypothetical graph of figure 3, a business initiative goes through three phases, the startup phase, the transitioning phase, and the established business phase. The vertical dotted line in the startup phase represents a point in time. At any point in time, the firm is in the process of performing an iteration of the SIM model. The idea here is that each iteration starts at the strategy and financing activities and goes through all three activities of market development, technology development, and management development. Depending on the business initiative and the point in term, some activities may be more intense than others. For example, management development activities are more intense in the transitioning and established business phases as these phases requires optimizations to drive down cost, and creation of the structure and culture for large scale execution.

Market types (Blank, 2013, Ansoff, 1957) can also effects the intensity of synergic innovation management activities. For example taking an existing product or technology to a new market will require more of market development activities in the new market compare to the technology development activities. The product may need some little twist in order to fit into the new market but much more work has to be done to actually discover the real customer segments and their needs in the new market.

The work in this paper has focused on the innovation process aspect of transforming an idea to a sustainable business. Building a business may require more activities to supplement innovation management activities especially at the transitioning and established business phases. However, the paper considers those supplementary activities as part of the mechanics of innovation exploitation factory and does not address the details of building an organization for the execution of a validated business model on large scale.

5-Conclusion

This paper proposes the SIM model for firm innovation management as a model that enables a firm to transform ideas to sustainable business. The models take into the consideration the multidimensional nature of innovation. It enables a firm to simultaneously engage in market, technology, and management innovations activities. By so doing it helps a firm to align its customers, products, and processes while guiding the firm towards generating capabilities that will position the firm for sustainable growth.

The limitation of this paper is that it provides high level guidelines to entrepreneurs on how to manage an innovation initiative but leaves the very details to the entrepreneur to fill in. The paper does not also provide the metrics needed to gauge progress in each dimension of innovation towards the vision of the firm. Further research could explore a mechanism for defining metrics for monitoring an innovation

initiative toward its goals. This could be done for different industries to generate templates that could be modified by entrepreneurs for different business initiatives.

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