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Innovation Mapping and Business Choices – A model for Innovation Management & Marketing

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Abstract

The study examines the concept and types of innovation management and the evolution of relevant academic thought and frameworks. Academic approaches tend by definition to focus on specific aspects, techniques, frameworks and concepts related to innovation management. The study attempts to provide a mapping of innovation types and propose business choices for various types of innovation. Different types and stages for innovation process are presented, such as sustaining and disruptive, incremental, autonomous and systemic, radical and architectural innovation, and different stages in the innovation process such as idea evaluation, business models, business canvas, start ups, alliances and marketing evolved through the last decades. The present study attempts a synthesis and a critical review of these concepts in an effort to provide a holistic approach to innovation management and marketing. More specifically the study examines different types of innovation and the related business practices, throughout the different phases of idea development, new product development, new product launching, entrepreneurship and start ups. The study examines the reasons behind the evolution of academic through and the importance of several key factors for innovation, such as pioneer advantage, entrepreneurship, strategic alliances, evolutionary and disruptive innovation, business models and scalability, in order to provide a new model for understanding innovation marketing and commercialization.

The proposed model can highlight different aspects of innovation marketing, as a holistic academic and business framework. The issues examined will provide academics, entrepreneurs and venture capitals a holistic framework for identifying critical success factors and improve decision making in a changing and challenging business environment. The framework highlights the importance of identifying the innovation type and offers managers and entrepreneurs a best practices framework for business success, and to academics an integrated framework to evaluate business strategy, options and risks related to different innovation types.

Keywords: Innovation Management, Start-Ups, Business Models, Entrepreneurship, New Product Development, Strategy

JEL CLASSIFICATION CODES: L26, M13, O30, O31, O32, O33

Innovation Mapping and Business Choices - A model for Innovation Management & Marketing

A Typology of Innovation

Defining and understanding the term "innovation" is not an easy task, considering the various dimensions of innovation and processes. "Innovation is the management of all the activities involved in the process of idea generation, technology development manufacturing and marketing of a new (or improved product or manufacturing process or equipment". (Trott, 1998, p. 12). Other studies highlighted other dimensions of innovation. "A product has two key dimensions. Technology - the fund of knowledge, technical and otherwise - enabling the product to be economically produced and markets - to whom and how the product is to be sold - enabling profitable distribution. These two characteristics are inseparable. An invention is not a new product until it is produced and distributed in a form that people can and will buy." (Rothberg 1981, p 177). According to Mardas (1994), technological innovation aims to establish a dynamic competitive advantage by focusing on new methods of production or new products.

"We need to think of Innovation as a multifunctional, multi-site process in which marketing and manufacturing staff are fully part of the process alongside their R&D and engineering colleagues" (Haour 1999, p.72). Cooper (1998), highlights the need to develop product innovation strategies. "As firms face mature and flat markets, increasing competition from home and abroad, and accelerating technological change, more companies are looking to product innovation as a strategic weapon. With the increasing importance of innovation also comes a desire to manage innovation hence the wish to develop product innovation strategies." (Cooper, 1998 p. 324).

Previous academic research (Aaby & Discenza 1995) identified three fields for innovations in firm's internal environment: Product Technology, consisting of a set of ideas embroidered within the product, Process Technology as set of ideas involved in the manufacture or the steps necessary to combine materials and components to produce a finished product and Management Technology as a set of administrative procedures associated with marketing the product and the administration of the business unit.

Trott (1998) provides a Typology of Innovations, in an attempt to create a framework, in order to identify the variety of innovation types.

Table 1. A Typology of Innovations	
Product Innovation	The development of a new or improved product.
Process Innovation	The development of a new manufacturing process such as Pilkington's float glass process.
Organizational Innovation	A new venture division, a new internal communication system, introduction of a new accounting procedure.
Management Innovation	TQM (Total Quality Management) systems, BPR (business process re-engineering), introduction of SAP R3

Production Innovation	Quality circles, just-in-time (JIT) manufacturing system, new production planning software, e.g. MRPII, new inspection system.
Commercial/Marketing Innovation	New financing arrangements, new sales approach, e.g. direct marketing
Service Innovation	Telephone Financial Services

(Source: Trott 1998 p. 14)

Another study (Burgelman *et al*, 1996) categorizes innovation to Incremental (existing products, services, production and delivery systems), Radical (entirely new products, production and delivery systems) and Architectural (change of components that constitute the product).

Table 2. Innovation Types	
Innovation Type	Definition
Incremental	Improve existing products, services & delivery systems
Radical	Entirely new products, services & delivery systems
Architectural	Change of product components

Burgelman *et al*, 1996

Furthermore Hart and Milstein (1999) provided a framework regarding Continuous Improvement and Creative Destruction of industries. According to their approach, industries can be either "rationalized" by continuous improvements or being "creatively disrupted" by breakthrough innovation and technology.

Table 3. Continuous Improvement Vs Creative Destruction Strategies	
Continuous Improvement	Creative Destruction
Focus on Existing Products Processes Suppliers Customers Shareholders	Focus on Emerging Technologies Markets Partners Customers Shareholders
Characteristics	
Incremental continues improvement rationalizes industry	Discontinues creative destruction restructures industry.

Hart and Milstein (1999, p. 24)

However Christensen (1997) distinguishes two major technology categories, Sustaining and Disruptive technologies, and provides a framework for understanding technological change and estimating its impact in the market. Furthermore, Christensen & Overdrot, (2000) define "sustaining technologies are innovations that make a product or service perform better in ways that customers in the mainstream market already value...Disruptive innovations create an entirely new market through the introduction of a new kind of product or service, one that's actually worse, initially as judged by the performance metrics that mainstream customers value". (Christensen & Overdrot, 2000, p. 72-73). They conclude that as established companies focus on mainstream markets and invest in proved technologies to secure their market share in existing markets, they fail to realize and invest on

new, disruptive technologies, which initially address to minor market segments.

According to Christensen (1997), technologies of the first type came from the market leaders, while technologies of the second type developed by small/new companies resulting problems for the market leaders. Furthermore Bowler & Christensen (1999, p. 151-152) identified two characteristics of disruptive technologies: First they typically present a different package of performance attributes -ones that, at least at the outset, are not valued by existing customers. Second, the performance attributes that existing customers do value improve at such a rapid rate that the new technology can latter invade those established markets. Only at this point will mainstream customers want the technology.

Table 4. Sustaining Versus Disruptive Technologies	
Sustaining Technologies	Disruptive Technologies
Improve the performance of established products	Brink to the market a very different value proposition
Aim to improved product performance where the standards are clearly defined and accepted	Result in worse product performance at least in the near-term. They usually under-perform established products in mainstream markets.
Based on the commonly accepted industry standards they add new features.	Provide new features that new customer segments value, and a new philosophy and approach to satisfy a need.
Usually more complex and expensive.	Typically simpler, cheaper, smaller, more easy to use.
Performance standards remain the same.	Performance standards can change dramatically.

Furthermore, Cooper (2000, p.2) uses a framework for classifying change developed by Golembiewski, Billingsley and Yeager (1976). Instead of assuming that change is a single, unified concept, they distinguished three distinct types of change as follows:

Table 5. Change Classification	
Type of Change	Definition
Alpha change	A variation measured on a fixed scale. This change amounts to repositioning a brand in an existing framework, such as a perceptual map. The dimensions do not change, nor is there any implied change in what people value. Rather, the attempt is to realign the brand image to capture existing values better. (e.g. repositioning a product using advertising).
Beta change	A variation measured on a changing scale. This change occurs when values change with a corresponding change in ideal points in a product map. The change of consumer's values due to new conditions is the driver of change. The product features that were important decisions making factors change and other features seem to be more popular.
Gamma change	A variation that can be measured only by adding a new perceived dimension to product positioning that redefines the product and

	ideal points in a perceptual map of a market. There is a change in the dimension of the problem (and the product) as characteristic of gamma change. The way that performance is measured changes and new standards are set.
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According to this approach (Cooper 2000, p.2) "Products are radically new from a consumer perspective when gamma change occurs. Even gamma changes come in widely varying degrees." A single dimension reflects the least change for a product to be considered as radically new, from a consumer perspective. "A technological revolution that reshapes where and how people work or how they live their family lives engages many new dimensions of experience and expression. Be it one - or many - dimensional, gamma change should cause planners to rethink what are often considered settled questions about the environment and infrastructure". To this respect Cooper offers an additional framework for analyzing disruptive innovation by examining the level of change; and the number of new dimensions involved for the end users.

In addition, Chessbrough and Teece (1999) distinguish autonomous (pursued independently from other organizations) and systemic (benefits realized only in conjunction with related innovations) innovation. Their study highlights how organizations need to secure and respond fast to information flow regarding research findings, pilot product launches, initial customer feedback, market data, and other types of information and knowledge.

Additional studies (Weaver (1995), Prajogo et al (2003)) highlight Demming's Quality Principles into the innovation management concept - more specifically secure that innovation fits to processes of the potential customer - and the processes of his own customers in turn. To this respect, considering the increased needs for seamlessly innovation and compliance in today's business environment, most innovations in order to succeed are advised to consider systemic innovation. To this respect both the business environment, the company's ecosystem and strategic analysis are advised to be examined.

Strebel (1997), introduces the concept of industry breakpoints. "An industry breakpoint is a new offering to the market that is so superior in terms of customer value and delivered cost that it disrupts the rules of the competitive game: a new business system is required to deliver it. The new offering typically causes a sharp shift in the industry's growth rate while the competitive response to the new business system results in a dramatic realignment of market shares" (Strebel 1997, p. 543). Furthermore, Strebel (1997, p. 545) identifies two basic types of breakpoints:

- Divergent Breakpoints associated with sharply increased variety in the competitive offerings, resulting in more value for the customer.
- Convergent Breakpoints associated with sharp improvements in the systems and processes used to deliver the offerings, resulting in lower delivered cost.

Additional study (Guiltinan, 1999) adopts a similar approach distinguishing improved products, product innovation and new-to-the world products to define different levels of innovation.

The role of the Business Model innovation is critical, especially for Radical and Disruptive Innovation. Further studies (Amit et al, 2012, p.1) defined business model "as a system of interconnected and interdependent activities that determines the way the company "does business" with its customers, partners and vendors." Business model describes the way(s) that the company operates in order to create and deliver value to customers.

Zott et al (2010, 2011) provide a holistic view of business model creation and impact, on both creating, capturing and sharing value for the firm, defining in reality the way firms actually do business. Further studies (Amit et al, 2012) highlight the importance of formatting or evaluating new business models and promoting innovation through new business models instead of new product development. More specifically, Amit concludes that business model innovation is usually undervalued; and that business model innovation is much harder to be copied or imitated, in comparison to product or process innovation, resulting a more stable competitive advantage. Finally Aulet (2013) recommends evaluation of the business model early in the start-up process.

Innovation Mapping.

Based on the above literature review, a number of innovation types have been identified by previous studies. However the number of innovation types defined appears to be big, due to the different criteria used in each study for distinguishing innovation types or due to specific names chosen for defining the different innovation types. The result appears to be a long list of innovation types defined.

In order for create a more clear understanding of innovation, the present study attempts to create an innovation map. The first step of course will be to identify and provide a common base for the different types of innovations presented from past studies.

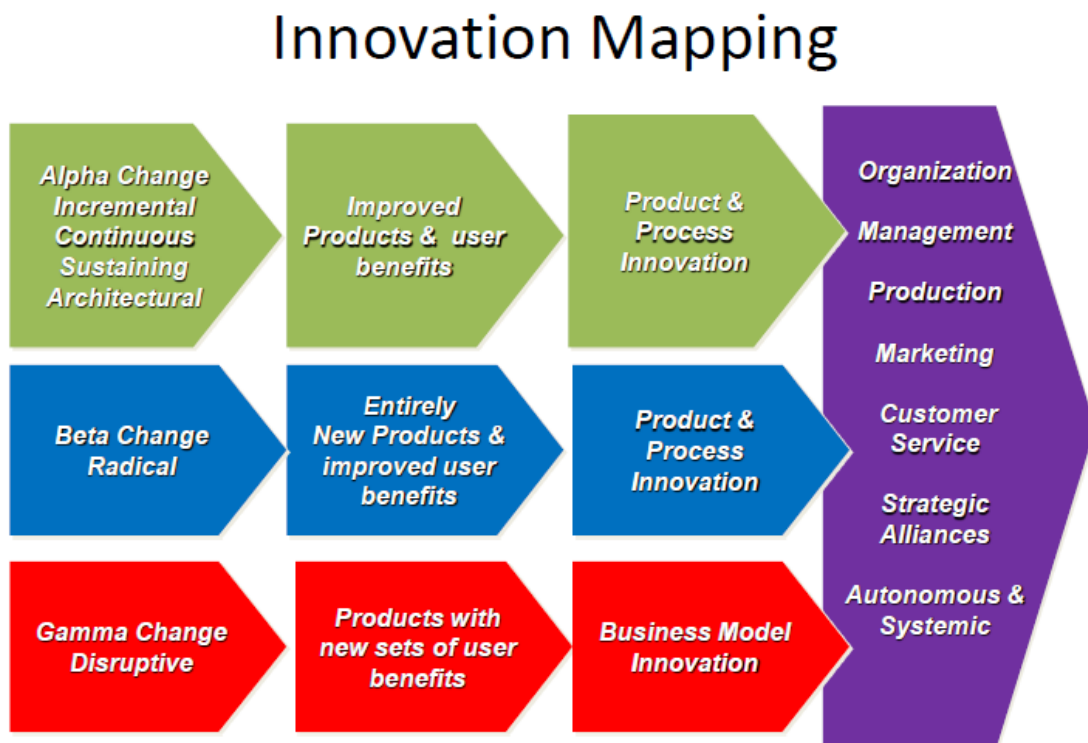
The first step is to create a common ground of the different innovation studies, based on the criteria set by the authors of each study, and identify which types of innovation present similarities and can be effectively used to define the same type or level or change and innovation. This led into grouping several innovation types into a common group, since they present similar characteristics.

Table 6. Innovative Types Grouping			
Groups	Innovation Types	Main Innovative Characteristics	Comments
1	Alpha Change Incremental Continuous Sustaining Architectural	Improved Versions of existing products Address to the same (mainstream market) Increased user benefits of the same type and standards	Architectural innovations refers to similar set of benefits
2	Beta Change Radical Divergent	New to the world, innovative products Set new industry standards	

	Breakpoints		
3	Gamma Change Disruptive Convergent Breakpoints Business Model Innovation	Products that offer a totally new set of benefits to users Redefine / reshape the industry	

Based on the grouping of Table 6, the following diagram describes the main innovation groups.

Scheme 1 - Innovation Mapping



Management Implications

The value of the Innovation Map presented in scheme 6 is that it is enabling academics, managers and entrepreneurs to have a clearer perception regarding the level of innovation examined. This is important, since both business practices and academic frameworks associate each innovation level with a different set of challenges, risks and tools.

Regardless the level of innovation, traditional success factors do apply in innovation marketing and management. Aulet (2013) provides an integrated framework for start up companies. Aulet proposes a 24 steps approach; As expected, traditional marketing principles do apply in innovation marketing as well; Market Segmentation, Targeting, Pricing,

Product Design, Sales management are all critical success points. Poor performance in any of these factors will lead to failure.

Other factors, such as ecosystem and strategic alliances are also important; however their impact may vary between industries and levels of innovation. The role of ecosystems and strategy is also analyzed; "Another strategy that uses ecologies is linking and leveraging. This means transferring a user base build-up upon one node of the ecology (one product) to neighboring nodes, or products... by offering inexpensive updates and by bundling applications...". (Arthur, 1999, p.161) Technology integration has always been important, but in the past ten years it has become much more important -and challenging- for obvious reasons." (Iansity, West, 1999, p. 3)

Furthermore, from a marketing perspective, Guiltinan (1999) examines the marketing challenges and tools across different innovation levels. The conclusions are summarized below:

Table 7 - Innovation Levels & Launch Marketing Strategies			
Groups	Group A.	Group B.	Group C.
Innovation Level	Alpha Change Incremental Continuous Sustaining Architectural	Beta Change Radical	Gamma Change Disruptive Business Model
Marketing Strategies	Selective Demand, Low Customer Risk, Trial & Repeat Advertising, Selling, Promotion, Distribution	Replacement Demand, Medium Customer Risk, Migration, Concerns regarding older products continuity	Primary Demand, High Customer Risk, Adoption & Diffusion Target Innovation Adoption, alternative strategies for late entrants

Guiltinan highlights the differences between innovation launches during the launching phase; therefore a lot of marketing work is not included such as marketing research, segmentation, targeting; as a consequence, issues related with managerial and organizational issues that have to do with information, knowledge, decision making process and culture are not examined.

Regarding the first Group, academic research offered managers a conclusive advice for success: "Innovate incrementally on proven technology through a continued R&D process". This way the firm develops modifications for the basic product and process "without undertaking major basic research in areas unrelated to the original successful innovation" (Grosse & Kujava 1999, p. 509).

Sustaining innovators of the first group are usually "staying close to lead customers, as they have been trained to do, managers focus resources on fulfilling the requirements of those reliable customers that can be served profitably. Risk is reduced -and careers are safeguarded- by giving known customers what they want." (Bowler & Christensen, 1999, p. 158-159)

Such an approach is usually a safe option for corporations; they can use effectively and efficiently the existing resources, knowledge and skills, existing market share and assets, both physical and

intellectual, to develop improved products. Suppliers and distribution channels practices and bargaining power are already known. The roadmap to success and market standards are already known, and improved products will be replacing existing ones or act as additions to product lines, capturing market share from both previous versions of the company's products and - hopefully - from competitors.

This approach can work safely with established corporations; in fact the only problems appear from innovators that aim innovation types of the second and third group. In case of the second group, a product can be so innovative that it may change the standards of the industry; in case of the third group, the innovation aims to change the industry as a whole.

"Managers of companies that have championed disruptive technologies in emerging markets look at the world quite differently. Without the high cost structures of their established counterparts, these companies find the emerging markets appealing." (Bowler & Christensen, 1999, p. 156)

According to Christensen and Overdroft (2000, p. 73), "processes are not really as flexible or adaptable as resources are, and values are even less so." To their views, when a company adopts sustaining or disruptive innovation and new capabilities are required, new processes and values are required as well. They recommend three ways that managers can create a new organizational space to develop these capabilities.

- Create new organizational structures within corporate boundaries in which new processes can be developed.
- Spin out an independent organization from the existing organization and develop within it the new processes and values required to solve the new problem.
- Acquire a different organization whose processes and values closely match the requirements of the new task.

This analysis highlights the importance of Start-Ups, new organizations committed to test hypotheses and prove actual value of innovation; whether in terms of products, business models or customer value propositions.

Scheme 2 - Innovation Management Options

Innovation Management Options



Baptista (2001, p. 31) highlights the role of market education and access to knowledge; he concludes that the diffusion of an innovation occurs faster in areas where "the density of sources of knowledge about such technologies is higher". Baptista indicates that adoption is a multidimensional process, which includes knowledge, trial and evaluation. This reinforces conclusions of previous studies (Kuester et al, 1999, p. 182) who also suggests that from a customer's point of view, "expectations of benefits form an emerging technology grows as more information becomes available and uncertainty is resolved. The company can perform strategic actions that can reduce the perceived risk of an emerging technology and reduce the hardness of adoption for early users."

The role of First Entry (First to Market; Pioneer Advantage) has been examined by Trott (1998), Shankar and Krisnamurti (1999), Christensen (1997), Dyer et al, (1999), Chessbrough and Teece (1999), Carpenter (1999), Smith (1999), Michaelson (2001) Narayanan (2001). Managers and Academic research debate whether the first one that enters a market gains a significant and sustainable competitive advantage. Arthur (1999) provides the law of increasing returns for high technology markets, and highlights the role of up-front costs, network effects and customer grooving in for explaining high profitability of specific innovations and the way that such cases can reshape industries. Arthur concludes that two areas are required for success: being first to market, and having a superior product.

Furthermore Lambert and Slater (1999) provided a more balanced approach - the first to mindshare approach, where the concept of the pioneer advantage is examined through time and company strategy.

Table 8. First to Market Vs First to Mindshare

First to Market	First to Mindshare
Product Focused	Product line, Portfolio, Company focus.
First Product wins the war	First product wins the battle, best portfolio and series of products, services and company actions wins the war.
Physical Product	Complete extended product.
Short term product-customer relationship	Long term supplier-customer relationship.
Measure: when was the product introduced relative to the competition?	Measures: How did the product contribute to future mindshare strategy? What percentage of the market does the company have mindshare with? Whose products are viewed as setting the standard for others to follow?

(Lambert and Slater, 1999, p. 432)

Further research (Hamel & Prahalad, 1999) discusses disruptive innovation challenges and opportunities for established and new companies. Especially for Disruptive innovations, start ups appear to be the key of success; with no market data (in such cases, markets do not exist and are expected to be created once the new product or business model proves the value for customers). The proposed strategy for disruptive innovators is to established starts up to fast tests the marketability of their solutions and their abilities to scale.

Christensen (1997, p. 196) sets three criteria for launching effectively innovative products, build on disruptive technologies:

- The product ('vehicle') must be simple, reliable and convenient.
- A platform has to be designed in which feature, function, and styling changes can be made quickly and at low cost. This is because no one knows the ultimate market for the product or how it will be ultimately used.
- Marketers should hit a low price point. Disruptive technologies typically have a lower striker price per unit than products that are used in the mainstream (markets), even though their cost in use is often higher.

Disruptive start-ups remain usually below the sustaining innovator's business radars: "Generally, disruptive technologies look financially unattractive to established companies. The potential revenues from the discernible markets are small, and it is often difficult to project how big the markets for the technology will be over the long term" (Bowler & Christensen, 1999, p. 156). Arthur (1999) provides the law of increasing returns for high technology markets, concluding that two areas are critical for success: being first to market, and having a superior product.

Unfortunately for the established suppliers, by then it is often too late: the pioneers of the new technology dominate the market. "Historically, disruptive technologies involve no new technologies; rather, they consist of components built around proven technologies

and put together in a novel product architecture that offers the customer a set of attributes never before available". (Christensen, 1997, p. 197) By the time the disruptive start-up is ready to scale, established companies try to identify the new market; in most cases the best choice is a buy-in.

Further academic studies highlighted the importance of Start-Ups (Lewrick et al, 2011) and the differences from established companies in terms of types of innovation pursued and challenges involved. Evers (2003) summarizing previous research on start-ups concludes that despite previous studies "offer a more comprehensive holistic approach by encapsulating all the important variables and characteristics of preceding models on the venture creation process." (Evers, 2003, p.39). Ries (2011) identifies the key benefits of lean start up strategy the ability to test the value and growth hypotheses; thus the actual value as perceived by the potential customer or user and the ability of the start-up to grow fast enlisting new customers. Further study (Girotra et al, 2014) adds that start-ups may change their approach and offers as they proceed with their venture. Finally scalability and growth are the final questions - a number of studies (Milat et al, 2012, Westley et al, 2014, Øvretveit et al, 2017) highlight the importance of the ability of the new (innovative) product (or market proposal) to "scale up", becoming available to many customers, addressing to a mass market.

Conclusions

The present study attempts to summarize findings of previous studies and present an innovation map based on common criteria, in order for academics and entrepreneurs to secure a better understanding of the innovation levels. Furthermore, key success factors and management choices are presented for various levels of the innovation map, providing an integrated framework for both academics and innovators.

Limitations and areas for further research

The present study attempts to summarize and set within a common context innovation research. However, despite the common characteristics identified between innovation types and criteria, it is possible several factors to have different impact in innovation diffusion. For example, the present study and the literature examined examines innovation as a whole; however the key factors examined may have different impact for innovations, depending on industry sectors, specialized markets or for innovations targeting consumer or business markets. A second limitation derives from the complexity of the business environment; clusters of innovation and innovative ecosystems have the opportunity to speed up the innovation process and diffusion and speed the innovation process.

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