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RESEARCH ARTICLE

Dynamics of the Business Model of a Startup firm: a bioplastic case-study

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Abstract

This article explores the business model of a bioplastics startup in an emerging industry. This business model exploration is given by using the RCOV framework [resources and competences (RC) to value or combine; the organization (O) of the business within a valuenetwork or within the firm's boundaries; and the value propositions (V) through the supply of products and services]. This study aims the different stages of a startup and its implications on its business model. The RCOV framework, drawn from the resource-based view (RBV), allows one to identify the core elements of the business model and to understand the dynamics between these elements and the environment of the company. Therefore, the business models are important tools for analyzing the trajectory of startup companies in innovation process.

Keywords: *Bioplastics, Business model, Innovation, Startup, PHA*

Introduction

The creation of a technology-based startup has its origin in a technological base and the need for it to become commercially viable. Despite investment and structure capacity constraints, startups have been of great importance for various industries such as semiconductors, communication, biotechnology and Internet. Startups enable established companies, initially conditioned to lock-in [1] to externally lead technological breakthrough projects. The development of such innovations is facilitated in startups because their organizational structures are endowed with certain autonomy [2].The high-tech firms are those that prioritize innovation in its business strategy, employing more resources in R&D and high participation of scientists and engineers on its team [3]. These companies may be originated from spin-offs of research institutes and universities or companies already established as a way to enable new businesses.

Established companies may not know how to deal with new technologies, using spin-offs to innovate in business models and technologies [4].Innovation in business models through startups was explored by Chesbrough and Rosenbloom [5], who studied why several technologies developed at the research center of the Xerox Company (PARC) have failed. Most projects that have paid off were those developed by former employees of Xerox Research Center launching their own businesses - technology-based startups, independent and funded by venture capital.

Even though, initially, startups act only in smaller and specific markets such as technology niches [6], apparently protected from the mainstream, their business models are key to the success of technological innovations and become critical factors when they decide for the transition to larger markets.

The favorable context for so called green chemical products, justified by high oil prices and its volatility, as the growth of government incentives and stricter legislation regarding lower emissions of greenhouse gases [7-9] has attracted a growing number of companies to bioproducts development and it has naturally stimulated the emergence of startups. In this area, there is a significant number of projects in progress, aimed at developing technologies and business models that allow its output to specific niches toward the mainstream with commercial scales.

Bioplastics, polymers derived from renewable raw materials such as sugar cane, sugar beet, corn, cellulose, and others stand out among bioproducts. It is projected a production capacity of six million tonnes of bioplastics in 2016, representing less than 2% of the capacity for conventional plastics [10]. Despite the low percentage when considering the current capacity estimated at one million tonnes [11], the

challenge to achieve that volume is quite considerable. The startups face uncertainties regarding several choices about technologies, raw materials and products [12]. Therefore, startups have a very important role in this context as initial conductors of projects toward markets outside of technological niches.

Understanding the technology dynamics around bioplastics and the critical dimensions that shall guide the its growth demand will require attention to the trajectories of startup companies, their business models (BM) and the environment. Business models reflect the strategy of firm [13], i.e., the logic of how the company will compete in the market and deliver its value proposition [4], to create and capture value [14] and respond to environmental changes. BMs configure as one of the critical dimensions for the growth of individual firms and consequently, the growth of bioplastics demand among end users.

It is therefore essential to discuss how startups involved with the development of bioplastics should structure their resources and skills and define their value propositions to reach larger markets, competing with conventional plastics of fossil origin. How can BMs generate conditions for startups to go from niche into mainstream? Therefore, this article aims to understand how BMs can be changed and respond to environmental changes, positive or negative, to create a sustainable growth for startups. It is believed that the origin of the funds of a startup used to finance such growth may influence decisions on the BM. For this, core elements of BMs should be identified, as well as how the relationship occurs between these elements and the environment of the company. The relationship between core elements of BM and the firm´s environment is an important mechanism for understanding how internal factors related to the company can respond to environmental changes. This dynamic between internal and external elements sometimes is ignored in the multiple approaches towards the BMs, usually more concerned with description of elements that reduces the perception of the real contribution of BM in the context of innovation.

The paper is organized into four main sections. Following the introduction, the second section discusses the main elements of BM and the dynamics between these elements and the environment the third section shows the trajectory of Metabolix, a startup that runs one of the most important development projects of polyhydroxyalkanoates bioplastics (PHA) and how BM responds to major environmental changes. The fourth section presents the main conclusions and contributions to the discussion around the subject explored in this research.

Theoretical Background

Dynamics of BM and its Main Elements for a Startup

The BM is an essential tool for startups, both in terms of management and search of investors to fund the business. To Magretta [13], a good BM is essential to the success of an organization, representing a new or better way to create and capture value for organizations, generating new demand and revenue sources. The BM describes how parts of a business combine and interact. According to Casadesus-Masanell and Ricart [13], the BM refers to the logic of the firm, how it operates and how it creates value for its shareholders, customers and stakeholders in general once the strategy refers to the choice of BM through which the firm will compete in the market.

Conceptualize a BM as the description of the relationship between various components or "building blocks" to produce a proposal that can generate value for consumers and thereby for the firm. Broadly, two different uses of the concept can be identified. The first use refers to a static approach, geared primarily for the description and consistency between its main components. The second use of the concept is a dynamic and transformational approach, in which the BM is considered as a tool to address the firm's environmental changes and focuses on innovation. In this approach, highlight the creation of a sustainable BM, rarely observed at an early stage, since its development requires dynamic changes, adaptations and gradual improvements. BMs would then function to provide "internal consistency" and/or assist the firm in the process of adaptation to positive or negative changes imposed by the environment.

The static approach of BMs allows building typologies and the study of relationship between a given BM and the company's performance, but it is limited to describe the evolution of BM. From the managerial point of view, the static approach gives a consistent picture of the BM through the organization of its various components, facilitating communication and understanding, which may be particularly important for startups in order to gain the confidence of investors.

Combine the two approaches (static and dynamic) to handle the interactions between their building blocks and suggest the application of RCOV

framework (see figure 1) inspired by the *Penrose´s view* that lies in the dynamic vision of firm´s growth.

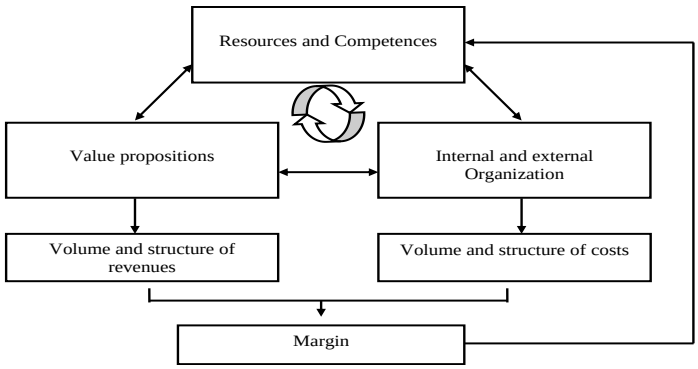


Fig. 1: RCOV framework and main components of business model.

The value that a given set of resources can provide the firm will depend on its management ability to extract value from its use and to create combinations more or less innovative. The accumulation of resources throughout the history of firm will promote changes in its structure, which may enable it to develop new opportunities and value propositions in current or future markets. Following Penrose's (1959) vision about the growth of the firm, the structure of a BM from three core components: its resources and competencies (RC), organizational structure (O) and their value proposals (V):

Resources and Competencies (RC): A set of resources and competencies accumulated by firm, which include tangible and intangible assets, such as the technological know-how, for example, translated into patents and developed technologies;

Organizational structure (O): set of activities of firm establishing relationships with other organizations to combine and exploit its resources. It includes the so-called "value chain" of activities, i.e., the set of multiple discrete processes that comprise the firm´s activities and its value network formed by relationships established with external stakeholders (suppliers, customers, competitors, regulators);

Value Proposition (V): set of value propositions offered to customers in form of products and services. For its understanding, it is important to identify how and to whom they are delivered, i.e., reflecting different ways of generating revenues by firm. It is important to note firms may address value propositions to various types of "customers" as consumers, suppliers, complementors agents, competitors or sponsors.

These three main components (resources and competencies, organization, value propositions) cover several different elements (types of resources, partnerships with different companies within the value network, various types of products offered to customers) been volume, revenue and costs structures a direct consequence of these components. The difference between revenues and costs generates a margin (value captured by the organization) that can feed the stock of competencies and resources and, therefore, will determine the sustainability of BM over time.

The dynamic RCOV framework refers to the result of interactions between its resources, its organization and the ability of the firm to create new value propositions. The decisions about maintenance, adjustments or adaptations in a BM are part of the challenges of startups that are defining their structures over time. Finally, the dynamics is given by the interaction between its core components and response to environmental changes (positive or negative). The environment considered an exogenous variable to the firm, is not configured as an element of the framework, being incorporated into the model through inputs (voluntary or emerging changes) and the responses of the BM, which is shown in Table 1. The changes may be voluntary, with origins in the firm or they may be emerging ones, originating in the environment, been positive or negative.

Table 1: Examples of voluntary and emerging changes of a BM.

Affected component	Voluntary change	Emerging change (positive + and negative -)
Resources and Competences	A company acquire start-ups which deepen its knowledge or recruit new profiles of employees	The cost of a resource increase (-) or the accumulation of new customers create a large installed based of customers that can be further valued (+)
Organization	A company decide to outsource a part of its activities to reduce costs	Customers or suppliers are concentrating, leading to change in the power equilibrium within a value network (-) or productivity of the firm increases due to learning and scale economies (+)
Value proposition	A company enrich its value proposition with new services added to its products	A value proposition is devalued by the offers of competitors due to substitutes (-) or the brand of a company acquires an important reputation over time (+)

Generally, a firm will promote changes in its BM when performance is poor or declining. However, poor performance may be only temporary and independent of the BM, such as business startups or new business units from established firms, which often face losses for considerable periods before generating profits, that occurs only in the operational phase. For instance, the internal consistency of the BM should be evaluated from other indicators, and not only by margins, as the ability to attract new resources, changes in share value, the capacity to approach to market and customers and building of a value network.

External factors refer to constraints or opportunities occasioned by environmental changes that can abruptly disrupt the normal functioning of the organization. A firm may forecast some environmental changes, such as the arrival of new aggressive competitors, entry of a new feature in the firm or the emergence of substitutes that may require a change in their BM, but some external factors can occur unexpectedly.

The success of a current BM, which a priori strengthens its fundamentals, increases the company's knowledge about efficient use of resources and leads to discoveries of new uses (or combinations of uses). As value propositions may generate core rigidities [15], creating barriers for change. This is a dilemma that startups need to deal, because their growth may create difficulties to continue to innovate and cost their survival in future. In short, the changes can arise from one or more components of the BM, they may have an internal or external origin and these changes may generate virtuous or vicious circles, in this case, damaging the sustainability of BM.

The Dynamics of Metabolix's BM: A Startup in the Segment of Bioplastics

It is proposed in this paper to study the trajectory of Metabolix. Metabolix is a startup, created from a spin-off of MIT (Massachusetts Institute of Technology) and currently leads one of the most important projects of production of PHA bioplastic, named among the greatest projected demand bioplastics. This example becomes rich for the study of BMs, once it brings interesting elements for exploration: first, it is a startup, a company created to exploit a technological opportunity with challenges such as technology development and the construction of a organizational structure; second, because it is a bioplastic company, which is an example of a product in an emerging industry; and thirdly, the trajectory of Metabolix shows significant changes in components of the BM, which creates opportunities for a dynamic approach to the BM to be explored.

Today, the startup is in a phase of re-adaptation of its BM in response to adverse factors: since its IPO (Initial Public Offering) in 2006, shares of Metabolix are at their lowest level of prices (Fig. 2) and in 2012, its partnership with U.S. giant ADM was terminated and the firm lost its production assets in commercial scale owned to ADM. Since its formation, significant changes have been observed in the elements of its BM and the environment, as will be described below.

Fig.2: Change in share price of Metabolix

Metabolix and its Phases

The methodology used in this study to understand the BM of Metabolix is exploratory and from secondary sources disclosed by the company, primarily the 10-K annual reports[1] from 2006 to 2012 and official press releases available on its website. Other secondary sources, different from the 10-K reports already properly cited, have been used, such as news articles in specialized magazines and websites, but at a lower volume,

[1] A Form 10-K is an annual report required by the U.S. Securities and Exchange Commission (SEC), that gives a comprehensive summary of a public company's performance. The 10-K includes information such as company history, organizational structure, executive compensation, equity, subsidiaries, and audited financial statements, among other information.

just to supplement the information obtained in official reports of the company. Initially, it is proposed that the trajectory of Metabolix is analyzed from three distinct stages, shown in Table 2.

Table 2: Phases of metabolix trajectory

Phases	Description/Focus	Period
1st phase: Initial	From establishment to Telles (JV with ADM),Focus: technology development to scale up.	1992-2006 (14 years)
2nd phase: Growth	Telles: JV with ADM,Focus: scale up of the operation.	2006-2012 (6 years)
3rd phase: *Downsizing*	Telles termination: ADM left, Focus: re-adaptation to move "forward".	2012-on (6 months)

Source: Author´s elaboration

Initial Phase–from Foundation to Telles (1992-2006)

It is proposed as an initial phase the one that begins with the formation of the company and will go on until the formation of Telles, a joint venture with ADM. By late 80s, genetic engineering tools have advanced significantly and the microorganisms were already being genetically modified to produce various types of products. At MIT, Oliver Peoples and Anthony Sinskey, founders of Metabolix, identified the key genes required for PHA biosynthesis, increasing the storage capacity of biopolymer produced in cells, an essential condition for achieving a future commercial production. The use of genetically modified organisms, in place of the wild type, allowed a greater level of control over the process and increased efficiency and productivity in the fermentation process, critical to the commercial viability of the project and scale up.

In 1992, Metabolix was founded, a spin-off from MIT, initiating a series of investments in the development of technology for producing bioproducts, especially PHA bioplastics. In 1981, Imperial Chemical Industries ("ICI") developed a controlled fermentation process, using a wild type strain of bacteria to produce a copolymer of PHA introduced commercially as Biopol. Although various applications have been developed for Biopol, the production costs using the natural bacterial strains was also prohibitively high and presented limited performance properties. Biopol assets were sold to Monsanto in the late 80s and later acquired by Metabolix, which now holds the ownership of issued patents.

In the 2000s, the oil price rose from a level of US$ 20/barrel to above US$ 100/barrel (Brent reference), stimulating the emergence of government and private investments in projects related to biomass use. Besides the high oil prices and its volatility, the increased awareness and knowledge of society and businesses on issues related to sustainability was noted. This context allowed an approximation between Metabolix investors and potential partners, such as BP and ADM. In 2005, the company established a technical collaboration agreement with BP petrochemicals which also provided economic feasibility studies for commercial production of PHA, but it went no further. The alliance with ADM will be explored next section.

Other important partnerships in Metabolix trajectory occurred with the DOE (Department of Energy of the United States) through a funding for research in bioplastics development and also with the National Institute of Standards and Technology (NIST). Besides US governments incentives, Metabolix featured the incentives of the Canadian (Ministry of Agriculture) governments for the technological development of alternative raw materials for the production of renewable bioproducts. Since 2001, more than US$ 15 million in government funding was used for research and development.

Growth Phase - Telles Joint Venture (2006-2012)

The Telles joint venture, established in 2006, was the union of the technological development promoted by Metabolix and access to raw-material, corn (biomass) and financial resources of giant food production company ADM. Also in 2006, they announced the construction of a fermentation plant for production of 50,000 tons of PHA /year which came into operation in 2008. The plant was built in the U.S. state of Iowa, within the industrial facilities of ADM.

ADM assumed responsibility for financing the construction of commercial facility (in the amount of US$ 433 million), and ADM would also assumed the working capital expenditures of Telles. After the beginning of commercial sales, Telles was to pay royalties to Metabolix for all bioplastics sold, as well as to ADM for the production services (holder of the production

plant). Moreover, Telles was to pay Metabolix for the research and development activities of new technologies and formulations.

Also in 2006, Metabolix held an initial public offering (IPO) of its shares to raise funds to finance the acquisition of equipment for the pilot and commercial plants and working capital, including marketing activities and production during the pre-commercial research and development of new technologies, products and other biomass and finally for hiring additional staff for research and development. The company raised funds of around US$ 95 million.

From 2006 to 2011, there is a series of changes in the organizational structure (O) of Metabolix: an increase of employees (see table 3) and as a result, a significant elevation of expenses (see chart 1), clearly scoring two distinct phases of its trajectory. The company that started with a total of 42 employees in 2005, began the second phase of its trajectory with 59 employees in 2006 and reached its maximum headcount of 119 employees in 2011. Operating expenses obviously accompanied this growth: US$ 8.7 million (annual average between 2001 and 2005) to US$ 34 million (annual average between 2006 and 2011), an increase of 289%.

Table 3: Evolution of headcount per activity

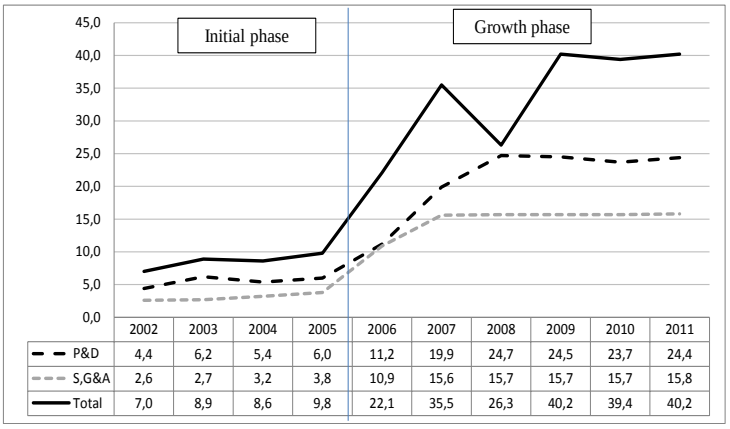
Activity	2005	2006	2007	2008	2009	2010	2011	(March-2012)
P&D	31	39	49	64	69	72	75	59
	74%	*66%*	*64%*	*65%*	*64%*	*62%*	*63%*	*66%*
Sales and Marketing	3	7	9	7	9	6	7	0
	7%	*12%*	*12%*	*7%*	*8%*	*5%*	*6%*	*0%*
Administration	8	13	19	27	29	38	37	31
	19%	*22%*	*25%*	*28%*	*27%*	*33%*	*31%*	*34%*
Total	**42**	**59**	**77**	**98**	**107**	**116**	**119**	**90**

Source: author´s elaboration from metabolix Annual Reports

The growth in the administrative area, which initially represented 19% of headcount (2005) and rose to 31% (2011), is a direct result of its trajectory toward the production and marketing in commercial scale of the product, exemplifying a significant change in the company's profile: a startup company to an operating company. The company, which reported administrative costs of around US$ 3 million (annual average between 2001 and 2005), went on to US$ 15 million (annual average between 2006 and 2011), an increase of 387%.

R&D also showed strong growth and the expenditure evolved: from US$ 5.7 million (annual average between 2001 and 2005) to US$ 21.4 million (annual average between 2006 and 2011), an increase of 310%. Throughout the growth trajectory of its R&D, Metabolix rose from 12 PhD's (2005) to 29 PhD's (2009), which signals the building of a critical mass to strengthen its technological competencies.

During the second phase of its trajectory, driven by the prospect of commercial scale production (resource of 50,000 t/y), the company focused its efforts on increasing the number of possible applications for its material, working in various segments. In its annual reports from 2007 to 2010, Metabolix stated the intention of exploring more than 100 customers in the development of these applications.



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
P&D	4,4	6,2	5,4	6,0	11,2	19,9	24,7	24,5	23,7	24,4
S,G&A	2,6	2,7	3,2	3,8	10,9	15,6	15,7	15,7	15,7	15,8
Total	7,0	8,9	8,6	9,8	22,1	35,5	26,3	40,2	39,4	40,2

Chart 1 :Evolution of metabolix expenditures (US$ million)

Source: author´s elaboration from Metabolix Annual Reports.

In 2006, the company had more than 60 different applications in development for PHA in 40 different potential end users. After this period, Metabolix accumulated the deposit of 480 patent applications in the U.S., 230 in other countries and over 50 licensed patents.

As a "value" to customers, in addition to biodegradability and biobased concept, the company saw an opportunity to differentiate itself through voluntary actions such as the creation of Mirel trademark, which would allow the identification of PHA in the products packaging of customers. The international certification as biobased product received by the Belgian institution Vinçotte allowed marketing with "ok biodegradability soil" and "ok biodegradability

water" labels, highlighting its biodegradability in soil and water.

Downsizing Phase - Telles Termination (2012-on)

Just under two years after the startup of the plant in Iowa, ADM, in January 2012, announced the end of commercial alliance. In a statement to the market, ADM announced its decision to leave the project after a review of its business portfolio in priority areas with delivering results and less uncertainty. The short and accelerated growth curve of firm size by number of employees was stopped with the termination of the partnership with ADM. The company lost its operating assets (the production plant), having to disband its sales and marketing team. Although the company stated that it would keep its core team, there was a noticeable reduction in its R&D team, which after reaching a peak of 75 employees in 2011, it went down to 59 in 2012. In summary, it is clear the attempt to transition from a startup company towards the growth of its organizational structure to make it an operating company. As the growth of its structure and its operating costs were not accompanied by an increase in revenue (see chart 2), the need for inputs rose dramatically, which may have pushed ADM to reassess its position in the project at the time of revaluation of its portfolio of projects. The difficulty of matching the growth of its structure at a pace that is not sustainable by its BM is not uncommon among startups.

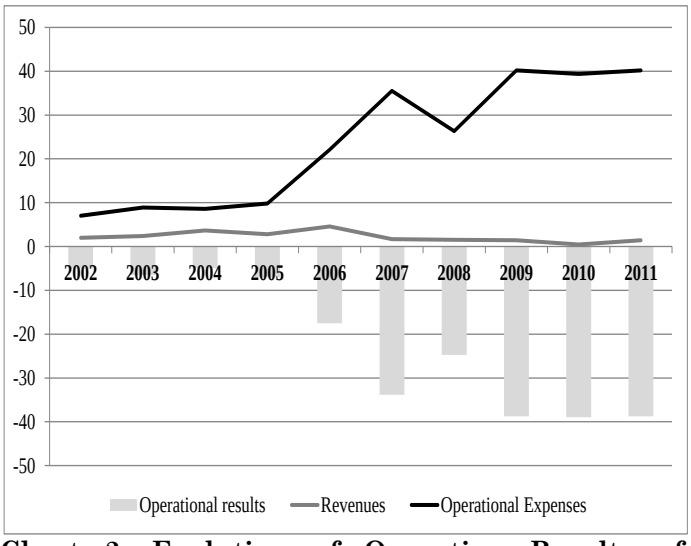


Chart 2: Evolution of Operating Results of Metabolix (U.S. $ million)

Source: author´s elaboration from Metabolix Annual Reports.

With the end of the partnership, the fermentation unit located within the premises of ADM remained as its assets and the rights to the technology assets (patents) remained with Metabolix, which set out to find new partners. In July 2012 it signed an agreement for the production of PHA in a demonstration plant of the company Antibiotics, which is being adapted for a cost of around US$ 10 million.

The loss of the plant in Iowa has led the firm to declare a new value proposition (V): cut its target market to 10,000 t/year, focusing on segments that value the biodegradability: use in agriculture (mulch films, greenhouse, bale wrappers, erosion control, etc.), containers for organic compounds, such as fertilizers, waste and applications in which biodegradation is a requirement. In addition, the company has to invest in the development of PHA copolymers, used as a properties modifier additive of PVC plastic.

Table 4: shows the three core elements of its BM in Metabolix trajectory, noting that the third phase, still recent, does not yet features sufficient data for further exploration

Result and Discussion

BMs are interesting tools for the observation of startups as they make the firm strategy clear to understand [13]. Although the startups are the analysis unit of this study, it is necessary to understand its origin, often a spin-off of established companies or universities. Therefore, startups are instruments that enable innovations outside the structures of established companies [4].

Metabolix, which has emerged as a spin-off from MIT to explore a technological opportunity around bioplastics, has become a tool of ADM to enable its stated strategy of business diversification [16]. ADM, a giant with annual revenues of US$ 81 billion [17], which focuses on agriculture, oil processing and food production, would most likely have difficulties to conduct a project relatively small and uncertain as the production of bioplastics.

Therefore, an understanding of the development process of bioplastics will require monitoring of technology-based startups and the origin of its resources. The origin of its resources can become a decisive element in the trajectory of these companies. Christensen [18] explores the "good" money and "bad" money for startups through "tolerance" with regard to financial results and the turnaround time for new projects.

In the case of Metabolix, we noticed three main sources of funding: government incentives for

Table 4: Phases of the trajectory of Metabolix and elements of the BM

Elements of the BM	Initial Phase: from establishment to Telles	Growth Phase Telles Joint Venture	Downsizing Phase: Telles termination
Resources and Competencies	Pilot scale plant: (100 t/year) Number of Patents (2006): 340 Main funding source: government incentives (grants)	Commercial plant (50,000 ton/year) Number of patents (2011): 480 Main funding sources: ADM, IPO and government incentives (grants)	Pilot scale plant: Partnership with Antibiotics , building a plant of 10,000 ton/year (estimated starting in 2013) Mains funding source: government incentives
Internal and external organization	Typical start up: predominantly R&D	Transition to Operation: growth of sales and administrative staff.	Downsizing structure: reducing administrative and commercial staff.
Value proposition	Oriented to biodegradability. Market: specific niches.	Oriented by competition with oil based polymers. Market: new applications and broad market segmentation.	Oriented to biodegradability and copolymers. Market: specific niches based on smaller range of applications.

research, IPO and partner-investor. The resource from IPO is a naturally impatient and resource from the side of the partner-investor, ADM, shall be discussed about its tolerance once company had left the partnership in only six years. Companies from traditional sectors and established industries such as the petrochemical, automotive, food and consumer goods have been noted directly or indirectly funding the development of bioplastics. Do these companies have any idea of how much time is necessary to wait to decide on new investment or even disinvestment in startups? Do these companies know which variables are most appropriate to evaluate the performance of startups? What is the right time to analyze the internal consistency of their BMs?

The output of ADM, justified by the weak results obtained by Metabolix and uncertainty of bioplastics business [17], was in fact driven by these reasons or pressures for greater profitability of its business? It is not difficult to accept that the development of bioplastics demands time, because it changes relationships and rules of mainstream; therefore, leading bioplastics to niches with specific applications for larger markets will not take place only by individual initiatives of startups. The changing rules of the current regimes [6] such as regulations, laws, norms of behavior, patterns of consumption, innovation agendas, will demand the participation of producing companies, governments, consumers, suppliers and complementors.

It is common for startups to promote changes in the elements of their BMs due to internal and external factors. For startups firms enabling innovations, they must almost always to grow and strengthen their structures, requiring access to complementary assets [19], such as those related to the supply of raw materials, production, distribution, marketing and technical assistance, which explains the different partnerships observed in the trajectory of Metabolix, featuring its migration to an operational phase. The Metabolix case clearly showed the evolution of the BM toward an operational structure, when the headcount grows in areas not directly related to R&D, such as administrative, sales and marketing areas. This change in their BM is proven by the growth of its operating expenses. However, they were not accompanied by growth of its operating revenues, which generated increased need for working capital.

The end user approach [20] to promote knowledge about the PHA and its application development was observed by the creation of marketing and sales teams. Another issue should be raised in the specific case: why an end user would decide to adopt the PHA, supplied by a single manufacturer? Timing for entry into the mainstream should take into consideration the risk perception of end users. So an approximation is justified, including clients as financial agents of the project. The green biopolymer production on a commercial scale of Brazilian company Braskem was driven from marketing partnerships with end users [21].

This paper contributes to investigate the relationship between the BM and environment of a startup in the segment of bioplastics as revealing its importance as an object of innovation. However, the measure of success of a startup cannot be assigned or limited only to its BM, but the ability of the startup in adapt itself and make timely changes required to respond to the environment and its sources. The decision to go ahead has to consider the existence or possibility of creating windows of opportunity in the mainstream. This is not just an individual movement of a firm, but a note about different movements around bioplastics. It is an industry in emergence and it needs time for learning, cooperation and agenda.

Finally, BMs may contribute to growth strategy of startups firms linking them to mainstream, but their success cannot be entirely explained only observing the elements of BM since environment leads important changes in business establishing a dynamic approach to innovation process [22-33].

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