Business Models in a New Digital Culture: The Open Long Tail Model

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Abstract

New business models are emerging in global markets. Quirky is producing new products designed and developed by the community and finally produced by the 3D printing technology. Google gives his glasses to different developers who build up their own applications. Kickstarter finds the funders by the use of the crowd, paying them back with the future products. Employees, funders, customers and partners do not play a stable role with the organization but revolve around it using different form of collaborations related to the organization's needs. In this scenario business like Amazon find out their own achievement feeding up different customers' needs.

Keywords: Product Design; 3-D Printing; New Products; Open Business Models; Global Strategy

1. Business Models Innovation in Design-Intensive Industries

Living with global instability and uncertainty is fast becoming a new reality for organizations. While some corporations seem to respond reactively and to revert to fixed strategies, resisting to change, using high control whilst basing their business on fixed standard business models, others seem to be more open to accepting and embracing the change. These organizations are looking for possibilities and opportunities that may somehow exist within this chaos and disorder, by trying to contribute and collaborate with the means of new business models and strategies to proactively deal and work with the speed of change and globalization. In this framework new businesses base their model on the culture of sharing new ideas, on the ability to generate a major number of collaborations in order to build the skills and resources necessary to fulfil the corporate obligations. One example of these new ventures' category is based on internet platforms gathering, collecting and selling ideas and concepts 'posted' by external designers and consumers, using crowdsourcing resources to select the right concept, building up the idea and raising the

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Edited by: ISTEI – University of Milan-Bicocca ISSN: 1593-0319

Rieple Alison, Pisano Paola (2015) Business Models in a New Digital Culture: The Open Long Tail Model, Symphonya. Emerging Issues in Management (symphonya.unimib.it), n. 2, pp. 75 – 88.

http://dx.doi.org/10.4468/2015.2.06pisano.rieple

funds to produce it. Finally the electronic version of the idea takes shape through powerful software tools such as the 3-D printer manufacturing process. These new technologies accelerate an innovative trend of approaching the manufacturing industry, decreasing the limitation of the physical constrains and helping to generate an economically attractive business model. Digital manufacture allows producing different, innovative and customized products and responding to the dynamicity of a new competitive environment. This technology expands the number of products available on the market and, thanks to the digital distribution, becomes easily available for the costumer. This trend is consonant with a new culture and economy that are shifting away from a focus on a relatively small number of bestsellersand moving toward a huge number of niches. The previous tendency is amplified by another one defined in the literature as a "true economic force" (Anderson, 2013), 'the market movement' (Dougherty of O'Reilly Media; 2005), or rather a web generation creating physical things rather than just pixels on screens. MIT Media Lab define the maker movement as people that are treating atoms like bits using the powerful tools of software and information industries to revolutionize the way we make tangible objects (Anderson, 2013). While the new digital tools enable the product's flexibility, the Internet platform model gives the companies the opportunity to collaborate and decrease physical constraints like shelf space and other bottlenecks of the distribution. The objective of this paper is to highlight a series of propositions that qualify an innovative business model emerged from a new culture and new technology and supported by the three practice cases.

2. Literature Review: Two Different Frameworks

In this paragraph the authors review the literature on the Open Business Model (OBM) and long tail model from which emerges the open long tail model.

The Open System Model (OSM) is a model in which the firm creates and captures value to take advantage of both internal and external resources. In his book "*Open business model: how to thrive in the innovation landscape,*" Chesbrough (2006a) analyzed the characteristics that a firm should exhibit to create an open organization.

According to the author, indeed, in the old model of "closed organization", companies had to generate their own ideas that they would then develop, manufacture, market, distribute and service themselves.

The open organization model involves organizational characteristics that are suitable for managing creativity innovations, including the process of acquiring and integrating new ideas into organization and marketing them. As 'valuable ideas can come from inside or outside the company and can go to market from inside or outside the company as well' (Chesbrough, 2006b), in the open organization model, firms commercialize external (as well as

internal) ideas by deploying outside (as well as in-house) pathways to the market. Specifically, companies can commercialize internal (external) ideas through channels outside (inside) of their current businesses to generate value for the organization.

The vehicles for accomplishing this goal are contingent upon the organization's ability to create connections with external actors to absorb different types of knowledge (Ahuja, 2000), improve survival rates (Baum, & Oliver, 1991), increase innovativeness (Baum, Calabrese, & Silverman, 2000; Stuart, 2000), improve performance (Hagedoorn, & Schakenraad, 1994; Shan, Walker, & Kogut, 1994) and grow faster in general (Powell, Koput, & Smith-Doerr, 1996; Stuart, 2000).

Many are the organizations modelled as 'open': InnoCentive, an Eli Lilly spin-off, manages a platform where organizations can post their technical issues that need solving and addressed to the scientist community, which seeks for solutions with the means of internal R&D of pharmaceutical organizations; Fold.it, for instance, is a revolutionary new computer game enabling everyone to contribute to important scientific research.

The long tail concept was coined by Chris Anderson (2006) to describe a shift in the media business from selling a small number of "hit" items in large volumes toward selling a very large number of niche items each in relatively small quantities. Anderson (2006) believes three economic factors triggered this phenomenon in the media industry:

- Democratization of tools of production: falling technology costs gave individuals access to tools that were prohibitively expensive just a few years ago. Million of passionate amateurs can now record music, produce short films, design simple software with professional results and create object with 3-D3-D printer technology;
- Democratization of distribution: the internet has made digital content distribution a commodity and dramatically lowered inventory, communications and transactions costs opening up new markets for niche products;
- Falling search costs to connect supply with demand: the real challenge of selling niche content is finding interested potential buyers. Powerful search and recommendation engines, user ratings and communities of interest have made this much easier.

For many product categories smart technology is transforming mass market into millions of small niche markets. Although each of these niche markets may be small, if combined, the volume of business reveals actually greater than in traditional mass markets. However, simply offering more variety alone won't generate greater demand. Instead consumer need to have tools which will help them find product niches which match their tastes and interests. These tools need to act as filters by simplifying the finding process. An example of organization that use this business model is the online video rental company Netflix or Lulu.com, a multi-sided platform- serves and connects authors and readers with long Tail of user-generated niche content.

In the following paragraph the authors describe the methodology and the related practice cases.

3.Building Propositions through Case Studies: A Consistence Methodology

Scholars have used case studies to develop theories about topics as diverse as group processes (Edmondson, Bohmer, & Pisano, 2001), internal organizations (Galunic, & Eisenhardt, 2001; Gilbert, 2005), and strategies (Mintzberg, & Waters, 1982). Building theories from case studies is a research strategy that involves using one or more cases to create theoretical constructs, propositions and/or midrange theories from case-based, empirical evidence (Eisenhardt, 1989b). Case studies are rich, empirical descriptions of particular instances of a phenomenon that are typically based on a variety of data sources (Yin, 1994).

The scant literature on new forms of entrepreneurship based on creativity and design (Abecassis-Moedas, Mahmoud-Jouini, Dell'Era, Manceau, & Verganti, 2012) lays the foundation for exploratory research that builds propositions and turns them into initial statements to be used as triggers in future research. The central point in our analysis is to use cases as the basis from which a theory can be developed inductively. The theory emerges from a practical case and is developed by recognizing patterns of relationships in constructs and cases. The theory building process occurs via recursive cycling in the case data, emerging theory, and later extant literature (Eisenhardt, 1989a; Mintzberg, 1979; Pettigrew, 1988; Yin, 2008). The use of an inductive theory built from cases is relevant especially in the first stage of an analysis because it can produce new theories that are accurate, interesting and testable. This process creates the basis for the second stage of our analysis where data and deductive theory testing complete the cycle.

The selection of practice cases was carried out in line with the criteria of unusually revelatory and extreme exemplars for an atypical research access, as appropriately underlined by Yin (1994). Moreover we decided to select not only one case but three because while single-case studies could richly describe the existence of a phenomenon (Siggelkow, 2007), multiple-case studies would typically provide a stronger base for theory building (Yin, 1994).

Multiple cases enabled us to compare them to each other and clarify whether an emergent finding was simply idiosyncratic to a single case or consistently replicated by several cases (Eisenhardt, 1991), creating a more robust theory and grounding the propositions in varied empirical evidence. Using multiple cases can delineate constructs and relationships more precisely because it is easier to determine accurate definitions and appropriate levels of construct abstraction from multiple cases (Eisenhardt, & Graebner, 2007). Otherwise, as Eisenhardt and Graebner (2007) highlight, theory

building from multiple cases typically yields more robust, generalizable, and testable theories than single-case research.

As case studies can accommodate a rich variety of data sources we decided to include three semi-structured depth interviews with the professors of Technology Management at Stanford University, Westminster University of London and the University of Turin, to view the phenomena from different perspectives and make a more confident selection of the practice cases.

We investigate three practice cases. The first case is Quirky, a new venture firm created around the potentials of 3-D printing in order to develop ideas and concepts suggested by users and designers. The second is I-Materialize, an incumbent company specialized in prototyping services that uses 3-D printing to create a digital connection platform between creative communities and users. The third is Fab-Lab, a new global network of design shops based on 3-D printing technology that works with small businesses, users and craftsmen in the production and sales of their products.

4. Business Model Explanation in Practice

In these paragraphs we are going to briefly illustrate three companies in order to define the information useful to give consistence to the business model explanation.

Quirky is a company of consumer products that turns crowd-sourced invention into retail products with a manufacturing process based on 3-D printing technology. Since its launching in 2009, Quirky has rapidly changed the way the world perceives product development.

The process, which goes from an idea to a final product, involves a significant number of different types of actors. Each week different ideas are submitted by dozens of amateurs such as kitchen workers, technology experts, jewellers, etc..; then, hundreds of online community members (or "Quirks")- mainly made of hobby inventors, students, retirees and product-design enthusiasts - weigh in on the products and vote for their favourite submissions. Finally, the two most popular ideas are sent to an in-house team of engineers and designers to research, render and prototype. Mr. Kaufman (Quirky's founder) and his team cull the results, sort out potential patent conflicts or production problems and then make the final call on the week's winner. At every stage--design, colours, naming, logo are consulted with the community. The best suggestions are incorporated, giving to secondary "influencers" a portion of future sales revenue.

Even if a product gets communities approval, it will only make it to market if enough Web surfers pre-order it to cover production costs. "This is where we find out if a good idea is also a good product," Mr. Kaufman says. "The world doesn't need more junk" – he adds.

In fact, less than a third of Quirky's products are made with an active participation of the community. Quirky collects a wide range of multi-disciplinary skills needed to turn an idea into something tangible. A

background in design, electrical engineering, marketing, fund raising and access to retailers and manufacturers are all required skills that can be found inside the sourcing community in order to complete and sell a product. Thus, the community members that participate in many aspects of product creation, from design to naming and coming up with a tagline for a piece ("Protect Your Produce" is the Mercado slogan) will receive a small share of profits.

The manufacturing process includes a small factory with 3-D3-D printers, a laser cutter, milling machines, a spray-painting booth and other necessary equipment. This prototyping shop is fundamental to Quirky's business of turning other people's ideas into products: Quirky's product-development team makes a prototype. Users review this online and contribute towards its final design, packaging and marketing, and help set a price for it. Quirky then looks for suitable manufacturers. The product is sold on the Quirky website and, if demand grows, also by retail chains. Moreover, Quirky handles patents and standards approvals and gives a 30% share of the revenue from direct sales to the inventors and others who have participated in the process.

By using its community as a sounding board, Quirky can quickly establish if there is a market for a product and set the right price before committing itself to making it. Moreover, the speed with which Quirky turns designs into products (thanks to 3-D3-D printing technology) is remarkable."The amount of creativity that happens when you are standing next to a machine that's making hundreds of thousands of things is much greater than when you are working 4,000 miles away," says Mr. Kaufman. "Your mind is spinning as to what else you can design for the machine to make."

Kaufman calls this process the "social product development."

"We bring at least three brand new consumer products to market each week, by enabling a fluid conversation between a global community and Quirky's expert product design staff".

The world influences Quirky' s business in real-time, and Quirky shares its revenue directly with the people who helped them make successful decisions.

'I.materialize' believes that people have an inherent need to express themselves, more than ever before, in this world where standardization has become the rule. Therefore, I.materialize offers to everybody the possibility of turning these ideas into 3-D reality.

I.materialize provides demanding designers and inventors with higher quality and greater choice. At the same time, this experience helps the organizations to make 3-D printing more accessible. With their tools, more and more makers have the opportunity to become designers, inventors, producers and the sellers.

I.materialize is an online 3-D printing service, based in Belgium and started as a spin-off of Materialise (since 1990). First, the service uploads a project file, then, it selects material, size and quantity with the aid of a template. Secondly, a quote will appear and, after receiving the confirmation of payment, the product will be manufactured and delivered.. It is also possible to sell own design projects and earn money on it..

On the one hand I.materialize gives designers the chance to show their talent and to sell their products thanks to the worldwide distribution network, on the other hand, the potential buyer can access a unique collection of different products built on demand. In fact, a set of 3-D software supported by I.materialize is used to create files downloadable on the website: Tinkercad, 3-D Tin, 123 autodesk and Google sketch up enable to design some great 3-D printable products without any other previous expertise: the maker can just open the browser and start creating in a very intuitive way. Furthermore, I-Materialize supplies over 20 different 3-D printing materials: common people can sell their design, choose the fee to apply over the production price and manufacture the item in 5 to 15 business days.

A Fab lab (fabrication laboratory) is a small-scale workshop offering (personal) digital fabrication. It is generally equipped with an array of flexible computer controlled tools that cover several different length scales and various materials, with the aim to make "almost anything". This includes technology-enabled products generally perceived as limited to mass production. Fab labs have already shown the potential to empower individuals to create smart devices for themselves.

The real value of this organization is the model able to promote education, business and research in tune with the world, where almost anyone can make almost anything and anywhere. Fab lab shares an evolving inventory of core capabilities allowing people and projects to be shared. The fab lab includes:

- A computer-controlled laser-cutter, for press-fit assembly of 3-D structures from 2D parts.
- A larger (4'x8') numerically-controlled milling machine, for making furniture- (and house-) sized parts.
- A sign-cutter, to produce printing masks, flexible circuits, and antennas.
- A precision (micron resolution) milling machine to make three-dimensional molds and surface mount circuit boards
- Programming tools for low-cost high-speed embedded processors
- Many Fab Labs have opened around the world from Italy to Spain, from California to Finland.

The Fab Lab's Pre-College Maker Learning Programs for youth in middle and high schools are presented in partnership with the University of California, San Diego. These classes are based on the 'Maker' philosophy that San Diego's Fab Lab has developed in response to the need to inspire its students while engaging them into learning next generation technology.

The Fab Lab curriculum includes hands-on, experience-driven activities that are standards based, as well as fun and relevant: Fab Lab Fab Foos is an open source Table Soccer Game, opening in Amsterdam featuring 2 web cams, an audio response, an electronic counter system and vga out. The Fab Lab House comes from the Institute of Advanced Architecture of Catalonia (IAAC) and is a great example of eco-living. This Madrid-based project generates three times the energy it consumes and also houses an orchard in order to produce

food. The shape of this house was dictated by its purpose: a sustainable, self-sufficient construction, which "form follows the energy". All the characteristics of its environment have been carefully studied, taking advantage of natural power sources like wind or solar rays.

5. The Data Analysis Process and Proposition

Identified and explained the three cases, the authors collected qualitative information and data about the practice cases' business model from the both sources company's website, articles and special issues.

The companies analyzed originally offer services, from the concept to the distribution where prototyping and materializing concepts are used to provide input and feedback on the quality and characteristics of products. Such organizations, by materializing the objects, provide companies' designers and R&D offices with the input and the insight that they need for the revision of engineering and conceptualization phases of their process, thus strengthening the relationship between "thought" and "practice" typical of creative processes (Shon, 1984).

3-D printing is among a spectrum of technologies being developed as a way to make easier and more cost efficient to create parts and products in a "personalized" way. The running of a 3-D printer starts from a software technique aimed at helping designers to create shapes of parts in three dimensions on computer screens and then transfer the instructions for making them to production machines. Such software is being used to make products on this basis in a range of industries from aerospace engines to jewellery. Laser scanning systems - made by companies such as the US's Faro Technologies - can be used to measure the dimensions of items that need to be replicated or modified. Such items could be anything from products or parts made by competitors - in so-called "reverse engineering" - to parts of the human body. The information can then be converted into computer codes and secondly sent to the production machine and finally turned into a solid object.

The new technology is changing many aspects of the manufacturing industry:

- Relationships between designers and production players.The designer will have the chance to do not only the scratch but also the prototype of the product or, better, the final product as it happens at Qurky or Fablab. This change will allow the designer to acquire a part of the value chain belonging to the manufacturing organization.
- Personalization of the product as Fablab, Quirky or I materialize. A key attribute is that the technology makes it possible to produce "one-off" or highly personalised parts more easily than other manufacturing methods. This advantage will have an impact on the reduction of the relevance of inventory risk and management connected to the opportunity of printing on demand of desired artefacts;

- Intrinsic characteristics of 3-D printing technology enable to produce different categories of products, in limited quantities and, above all, without a technological complementary relationship among them.

In fact, in all of the cases studied, there is an extremely high heterogeneity of manufactured and sold categories of goods. Fashion accessories, jewels, toys, shoes, musical instruments, lamps, interior design products are indistinctively found in all product portfolios managed by 3-D printing companies. In fact, the major problems connected to this technology concern different exploitable materials. The absence of links and technological complementarities among potentially creatable products al also the absence of production scale and volume economies – as found in several cases – lead to a wide and heterogeneous management of product portfolio. The profitability logic is founded on generating profits as well as on a number of product lines with low product volumes (Kekre, & Srinivasan, 1990; Osterwalder, & Pigneur, 2010; Amit, & Zott 2001). This characteristic founded in "long tail model" introduced the first proposition:

1° proposition: the emerge of digital tools for design and manufacturing includes the 3 D printer the laser cutter and the 3D scanner and CAD software gives rise to a heterogeneous variety of customized and low volume products with no technological complementarities

Based on the development of the Web 2.0 technologies, the advent and the growing of a global creative class (Florida, 2003), and the evolution of a more educated and sophisticated user (Von Hippel, 2009), the crowdsourcing represents a new source to manage the innovation process leveraging the external creative sources and collaboration. As the tools of creation become digital so do the designs, which are now just files that can be easily shared online. Makers and organizations can thereby take advantage of the web's collaborative innovation, tapping into open source practices and all the other social forces that have emerged on line. The old model of toiling leaves room to a global movement of people working together online in a "crowdsourcing collaborative way": crowdsourcing is used to connect labor demand and supply (cloud labor), to develop aggregated and shared knowledge and information (collective knowledge), to increase audience engagement, to build loyalty through online dialogue with costumers (community building) and, finally, to raise capital for new projects and businesses by soliciting contributions from a large number of stakeholder.

Collectively a large pool of costumers will have virtually unlimited time and energy , which is an important aspect of the long tail model, where capacity need to be extended a very long way (Anderson, 2013). In fact the increase of the human resources allocate in order to create and make things , are shifting away from a focus on a relatively small number of hit (mainstream products and markets) at the head of the demand curve and moving towards a huge number of niche in the tails (Anderson, 2006). Fablab, Quirky and I-materialize make up an example of producing different

category of products as art, fashion, gadgets, games, jewellery, toys, etc… The capability of producing different products for different niches thanks to the costumers that "do the job" turned the unprofitable products and markets into profitable ones.

Platforms like Quirky gather, collect and sell ideas and concepts that are posted by external designers and consumers.

These platforms are mainly supported by two types of makers: (i) designers who submit their own products and market them on the platform (market-oriented designers); (ii) users looking for products that are not standardized or sold in great volumes not even on an industrial scale (customization-driven users).

This new customers have affected the world of manufacturing by forms of self-productions and created a "making culture" where users with different tools and technology (among these the 3-D printing technology) are able to build up products for their own consumptions and are driven by the interest in new forms of craftsmanship (Friedman, 2010; Senneth, 2009; Micelli, 2011; Yair, Tomes, & Press, 1999):

We therefore suggest the following second proposition:

2° proposition: the new business model organization is identifying in the "makers movement " profitability product-portfolio made of a great heterogeneous variety of customized and low volume products with no technological complementarities

Thus, this model not only increases the number of the products sold and the niches discovered but also triggers collaborative behaviours between the members of the community and the organization. For instance, Quirky has 8 designers in its staff for a total of 40 people in the team, and hundreds of members of the community that interact with the platform; the ideas submitted receive more than one evaluation from both: community's members and firm's specialists (both in Quirky, and I materialize). This collaboration involves the costumers in a new model where it is not the organization to meet the needs of the costumers, but it is the costumer to find perfect solutions with the assistance of the company.

The essence of a business model defining the manner in which the firm delivers value to customers, entices customers into paying for value and converting those payments into profit. Interestingly, it doesn't reflect any more the management's view of what customers want, how they want it, and how the enterprise can organize to best meet those needs, get paid for doing so, and make a profit but the hypothesis that come from a collaboration between makers and organization. In this collaboration the organization supports and participates in the process of creating, developing and producing their ideas. The customer is not only involved in the creation and production but also in the profit share. The users give their advices on the product idea, the brand name, packaging and design, receiving 30% of the profit generated by that specific item. Naturally, also the actual designer of the product will

get a share of this profit once the product has been sold. In order to reduce the risk, Quirky will only start producing and selling a product in their e-shop once 500 items have been sold.

The availability of the organization tools of production (as the tool to draw and produce the object) increases the chances of producing the goods and the number of subjects able to make the product. For example, Fab-lab lends 3-D printing (and other technological devices) to those inventors who can prove their ability, or who have been educated by the Fab Lab Academy, to use these technologies properly. Quirky, I-materialize and Fab lab offer digital fabrication as a service so anyone can effectively rent time on high-end industrial 3D printers or computer controlling milling machines. Quirky and I materialize produce using their own 3D printer or hire them. This way to collaborate introduces the last proposition:

3° proposition: the most important resource in the business model of the digital organization is the crowdsourcing collaboration that boosted the potentiality and profitability of both: the organization and product designers.

Inventing something new is not enough: it has got to get to market too, ideally in big quantity. This means mass production, and traditionally that's been reserved for people who either own a factory or can afford to commission the service of one. That used to involve months or even years of negotiations with different countries and cultures. But today the world factory is increasingly accessible on the web, open to orders of any size from anyone and on any scale. Thanks to the digital production and design, factories in China are flexible enough to take orders online and get paid with a credit card for small as well as large quantities

Finally the acceleration in the production is sustained by the e-commerce in the distribution.

6. Discussion and Conclusion

The business model that comes out is cater on different type of users that start to be designers and makers of little quantity of different products which are selling to few costumers thanks to digital platform. The underpinning process regarding the creation of the idea is based on a collaborative community, which transforms an idea into an object thanks to the design software and the community's feedback and the digital technology.

The new model blends together the open innovation model and the long tail model The disintegration of the conception-conceptualization-engineering-production-sales activities chain of business processes and the breakdown of integrated value chains (Porter, 1980) gave rise to companies specialized in micro-activities and, above all, to a number of "knowledge brokers" and "bridging ties" that link actors, who propose new knowledge in the form of new ideas and products with actors, who are able to accomplish, implement

and sell these ideas and products. This business model supported by the new digital technology and in general the improvement of the technology that enables company to carry far more product items in their catalogues, (because most of the item exist solely as descriptions in an electronic databases and are digitally distributed) permits to define a long tail model too: as Anderson said (2006): "the mass of niche has always existed but the cost of reaching it falls now".

Since the first industrial revolution, the power of making things on a large scale has belonged to those who own the means of production, in other words - big factories, big companies and the mass-market good they were built for (Anderson, 2013). But now we can imagine an open long tail model, where the web digital instruments help to market the objects projected and / or accepted by the community: the consumers finding niche products and niche products finding consumer (Anderson, 2006) and consumer creating niche products for other consumers.

We believe that this may change everything because will create an era of unprecedented choice for consumers and organization together that collaborate to increase their opportunities and profit (Micelli, & Rullani, 2011). All this process is creating an emergent business model that makes possible a bottom up transformation of the manufacturing following the democratization of its trajectory. It's still at its early days but the potential is immense, because manufacturing is one of the biggest industries in the world (Anderson, 2006).

This new niche market is not replacing the market of hits. It is simply giving stage for new business models of the digital fabric organization, redefining the way we design, buy and distribute product complementary to other models.

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