Networked Production And Outsourced Design. A comparison of three case studies.

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Abstract: Openness is a common feature in the contemporary design field. It may be found in both production and design processes, and enables the ability to spread information, create networks and connect people, skills or companies. In the last few year many new web platforms have based their business model on crowdsourcing, networking and on collective intelligence, envisioning new relations between the customer, the designer and the production system. Today not all of them are still on the market, and others have taken new directions. This paper presents a comparison of the path of three design companies: Opendesk, Quirky and Formabilio. The first company is still flourishing, the second changed its intent in part and the third closed after three years of activity. All these platforms have some points in common: they are design companies, they produce objects, their work is based on using internet and they create networks. The paper seeks to analyze these similarities, as well as the differences between these companies, by focusing the role of design, the methods of production and distribution, and the degree of openness in each of them.

Keywords: Open Design, Network Production, Outsourced Design, Crowdsourcing, Open Manufacturing

1. Introduction

In recent years, references related to the open design\(^1\) field are growing, and many companies have tried to use “opening tools” to generate new forms of business. Some of these have based their business model on an open design process (Huizingh, 2011), others on an open production or manufacturing process (Wulfsberg et al., 2011; Heyer, & Seliger, 2012; Bianchini, & Maffei, 2013; Bauwens, 2014; Seravalli, 2014). What all the different types of openness share is the partial change

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\(^1\) In this paper the meaning of “open design” is considered in the broadest sense of the term. There are, in fact, many different interpretations of this notion (Vallance, Kiani and Nayfeh, 2001; Abel, Evers, Klaassen & Troxler, 2011; Balka, 2011; Cruickshank & Atkinson, 2013; Marttila, Nilsson & Seravalli 2014; Altamurto, Holland & Hussain, 2015; Menichinelli, 2014; Cruickshank, 2015).
in their original design intent. According to Blauvelt (2008), design history may be briefly divided into three different phases: in the first, which took place in the early twenties, design itself decided what was good for the masses (Dorfles, 1980; Maldonado, De Fusco, 2003; Vitta, 2011); between the 1960s and 1990s, the designer came closer to the user and became the spokesman for an audience (Norman & Draper, 1986; Fischer & Giaccardi, 2004; Sanders, 2008; Rizzo, 2009). In the third phase, after 1990, design expanded its field, dividing the discipline into specific micro areas (Yee, Jefferies, & Tan, 2013). In this particular phase the user has become part of the process. The original relation between the designer, industry and the consumer has now changed into something different. What was originally called “industrial design”, may now be called “non-industrial design” (Celaschi, 2016), while at the same time, the discipline itself shifts from: “design when the designer designs” to “design when everybody designs” (Manzini, 2015).

According to a previous research study (Gasparotto, 2016), there are many opening processes in the design field, including: open design, co-design, crowd design, open manufacturing, making and self-production. In this ecosystem, specialists from various fields, designers, non-designers and producers co-exist. The variety of people is not the only factor that creates disorientation; another involves the ability of an open system to create business. According to Bonvoisin and Boujut (2015, p. 3): “Openness refers to the use of non-pecuniary inbound and outbound flows of information/expertise/resources, i.e. from inside the project team to the public domain and the other way round.” Nevertheless, there are some example of companies that prosper through an open model, such as Arduino (Open source model), Quirky (crowd-based-model) and Fab Labs (Open production-model).

As Balka said (2011): “[...] the idea of deriving profit from open and therefore easily imitable design seems counterintuitive to many industry experts.” Of all the different opening processes in the design practice, crowd design and open production processes seem to be more profitable because they base their model on networked production, and outsourced design (Camarinha-Matos, 2009; Digout, Azouri, Decaudin & Rochard, 2013).

Most research studies in this field focused on topics such as the involvement of the user in the design and production processes (Maher, Paulini, & Murty, 2012; Maldini, 2012) or on the improvement of the process itself (Mele, Russo Spena, & Colurcio, 2010). However, in this scenario, it could be interesting to understand the reasons for success and the critical issues of an open business. The research, in fact, aims to answer the following questions:

What are the positive aspects and the main difficulties in managing a company that deals with network production and outsourced design?
What opening tools are the most suitable for creating successful businesses?
How does the designer's role evolve from a traditional design process to an open one?

2. Network Production

The network production is rooted in the capitalist system, a system that has constantly differentiated its production structure.

The early industrial age was characterized by a scientific division of labor and it can be described in words such as: standardization, fragmentation, synchronization and centralization. This model is characterized by large factories: closed, fragmented and “militarily organized” places, in which resources, tools and labor are controlled and optimized in every aspect of the production process.

2 The meaning of crowd design is referred to the practice of crowdsourcing related to the design process.
With the rapid changes in technology and the development of new energy resources, the production system seems to evolve reproducing the dynamics that Paul Baran (1964) theorized for the development of the communication system: centralized, decentralized and distributed. According to Rifkin (2014) these models are related to the evolution of the energy production system: from a single stationary source, to an easily transportable source, to widespread renewable energies.

Thanks to the evolution of energy production systems, computer science and telecommunications, companies had the possibility to comply with market requests "in real time", and inventories consequently became an onerous burden to eliminate. The assembly line (rigid sequence) was replaced by the so called “working groups” or “islands”\(^3\) (Butera & De Witt, 2011) and especially in Italian manufacturing, companies grouped together as industrial clusters and business networks around one or more leading companies.

A large Japanese company in the 1990s introduced an important innovation in the organization of production, called the “Toyota production system”. According to this model the company intended to produce only what the customer needed, in real time, with extreme attention to quality and flexibility (Boyer, & Freyssenet, 2005).

In recent years, we are beginning to see a new conformation of production systems with the open network structure (Camarinha-Matos, Afsarmanesh, & Ollus, 2008). Small companies, artisans or even fab labs around the world, create a network of production centers that can manufacture the same product locally, reducing distribution and environmental costs. This kind of production does not yet have the characteristics necessary to face all manufacturing requirements, and frequently the result can be more similar to a prototype than a finished object, but this model is constantly growing thanks to the development of new technologies, and can bring real change to the production system (Mele, Russo Spena, & Colurcio, 2010).

### 3. Outsourced design

As mentioned in the introduction, the second opening process that seems to be more profitable for companies is outsourced design. It is related to the transition from the figure of the static consumer\(^4\) to that of the active contributor, which emerged between the Sixties and the Seventies when the explosion of protest movements gave rise to a very critical debate on the standardization of mass culture\(^5\). Originally the consumer was considered the last element in a top-down process that began with the extraction of the raw materials and ended with the sale and consumption of the final product. On the contrary since the Sixties, the inclusion of the consumer in the design process became more and more relevant (Sanders, 2006).

In the early 2000s, thanks to the internet, the involvement of a large group of people became simpler, and the design process opened to a large group of people, called community\(^6\) or crowd\(^7\).

These groups of people, composed of many different professionals, both designers and non-

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\(^3\) They are small production units formed by 15-20 workers responsible for the quality and testing of a product or a part of it. This kind of organization is no longer based on a chain made of simple operations lasting a few seconds, but tasks are different and more complex: they require competence and responsibility.

\(^4\) The expression “consumer” indicates someone who uses a good or a service provided by the economic system.

\(^5\) Mass culture was accused of standardizing things and approving values and behaviors that didn’t allow the freedom of individual expression.

\(^6\) The community is characterized by individuals who share ethical values, specific purposes, and have strong connections with each other (Cross, 2013).

\(^7\) The crowd, according to Le Bon (1985), is composed by a heterogeneous group of people with a common purpose or shared emotions.
designers, were no longer considered by companies as a market segment, but became a potential source of ideas and innovations.

The role of the designer – originally considered as a god who shaped reality, the only holder of the knowledge required for the act of design (Flusser, 1999) – has now changed. In this context: “[...] design decisions are made jointly or collectively by the designer, the computer software and the user” (Marshall, Atkinson, & Unver, 2008).

Practices such as open innovation and crowdsourcing allow companies to reduce the costs of product development and to reach a great variety of human capital, outsourcing, de facto, the R&D unit. The trigger that encourages people to participate is, in most cases, a contest that promises a certain winner or other kind of reward. The process is, for that reason, closer to the idea of competitiveness than to one of collaboration (Gasparotto, 2016).

4. Research methodology and selection of case studies

To better understand how business adopted open design processes, and what their strategies are in this emerging field, it was considered useful to analyze three different companies. The comparison has been made through the construction of a table organized to collect the same information for the three case studies. The companies chosen are: Opendesk, Quirky and Formabilio. All of them have based their business on product design and also operate in the context of the open design processes. These platforms were also chosen to analyze three different cases. In fact, Opendesk is a furniture design company that is still in activity, Quirky operates in the open innovation field and has made changes after failing, and Formabilio was a crowdsourcing design company which sold furniture and closed in 2015.

Data has been collected mainly through the examination of scientific literature and newspaper articles8, but also by directly examining the three companies’ websites. Some specific information, such as growth factor, and critical issues were confirmed by three short interviews on these specific issues9.

4.1 Opendesk

Opendesk is a web platform designed in 2013 to collect projects that can be produced locally with CNC machines. The website offers a range of open source furniture that can be produced by a global network of manufacturers composed of small businesses, artisans and fab labs. The creation of this

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8 Papers and articles referred to Formabilio are: Caridà, A., Edvardsson, B., & Colurcio, M. (2015). Modes of resource integration driving value co-creation: an empirical investigation in virtual brand communities (VBCs). In Naples Fourrum, June 9-12, University of Naples, Italy. http://inchieste.repubblica.it/it/repubblica/rep-it/2014/01/30/news/i_due_mondi_delle_startup_italia-77262296/

9 Papers and articles referred to Opendesk are: http://www.domusweb.it/en/design/2013/08/21/opendesk.html https://www.opendesk.cc/blog https://www.opendesk.cc/open-making

9 Questioning some employees and founders of Opendesk and a former employee of Formabilio. In the case of Quirky data was verified through a public interview of the founder of Quirky (available online at: https://www.youtube.com/watch?v=fJ-8feQxhQ).
network allows designers to have a global distribution channel and fab labs or craftsmen to obtain work and new clients. This type of furniture has a low price thanks to the disintermediation of vendors and distributors.

The user can choose from a list of different furniture items and select the closest production center. OpenDesk also releases open source blueprints of the projects so that anyone can download and eventually modify them for free. Despite this characteristic of openness, the first release of the furniture was entirely designed by a single professional designer.

The platform also shows, by pointing on a map, the picture of the furniture realized, and in some cases, the changes made by the users. The cases of project customization, however, are still few and far between. Most users prefer to reproduce the same object as designed by the designer.

4.2 Quirky

The original Quirky was an online platform, a design studio and a company all at the same time that manufactures and sells physical objects since 2009. The platform involved a huge community of users that shared ideas about innovative new projects and contributed to the development of the different phases of a design process. Every user, according to the entity of their contribution, was finally paid through different royalties.

The purpose of Ben Kaufman, the founder of the company, was to “make innovation accessible”. He tried to apply the principles of open innovation and collective intelligence to a business company, believing that every one can rethink or improve an object with brilliant ideas.

The Quirky platform provided a complex and sophisticated virtual environment in which people could develop a project reaching different steps with other members of the community, vote different proposals and buy the final product.

Anyone who had an intuition on how to improve any aspect of daily life could submit it to the judgment of the Quirky community in the form of sketches or in a short descriptive text. After a week, the most voted proposals were discussed at the Quirky headquarters by a large group of people during the weekly meeting.

The most interesting ideas were developed by the platform’s community with the voluntary contribution of all users, in different stages: research, design, style, name, slogan and definition of the price. At the end of this process, after the final decision of the company, products were manufactured and sold online and in brick and mortar stores.

In February 2015 Quirky went bankrupt, and the production and sale of the objects ended as a consequence. During the following months, the company partially revised the initial idea by outsourcing the production to partner companies such as Harmon-Kardon, Mattel and General Electric.

The foundation of the second version of Quirky, therefore, continues to be the largest community of innovators that offer their ideas and contributions across the entire design chain. Quirky now acts as a connector between the proposals of the community and business needs, bringing together “the small guy and the big guy”\(^\text{10}\).

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\(^{10}\) https://www.youtube.com/watch?v=fJ-8feQjXhQ
4.3 Formabilio

Formabilio was an Italian start-up founded in 2012 by Andrea Carboni and Maria Grazia Andali. The idea behind the brand was to create a web platform of crowd design to collect a community of designers and design enthusiasts that could upload their ideas of furniture and furnishing accessories. The process started with the launch of various contests. The most voted ideas were assessed by the in-house team together with the manufacturers; if projects were considered feasible, Formabilio finally included them in the catalogue.

Manufacturers were chosen by Formabilio among Italian artisans that were accustomed to work as providers for other design brands. This choice was made, in fact, to produce high quality furniture with particular attention to detail. Definitely, according to Caridà, Edvardsson & Colurcio (2015): “Formabilio.com is a network of designers, companies (partners) and supporters”.

The first contest brought to the platform 20,500 registrations and 540 projects. This enthusiasm was probably due both to the new process and to the 7% royalties promised to the designer\(^\text{11}\). Participants in the competitions were mostly young professional designers, and design students: the average age was 32 years old. 80% of them were Italians (Gasparotto, 2016).

After three years, many competitions, and a catalogue of more than 90 products, Formabilio closed definitively in 2015.

5. Case studies analysis

The following table synthesizes some of the main characteristics of the three companies.

Table 1. Comparison of the three case studies.

|                   | Opendesk                  | Quirky                      | Formabilio               |
|-------------------|---------------------------|-----------------------------|--------------------------|
| General information |                           |                             |                          |
| Business sector   | Furniture/interior design | Innovative design solutions | Furniture design         |
| Founder/s         | James Arthur, Ian Bennink, Tim Carrigan, Nick Ierodiaconou, Joni Steiner | Ben Kaufman                 | Andrea Carbone, Maria Grazia Andali |
| Head Office       | London (GB)               | New York (US)               | Cison di Valmarino (IT)  |
| Starting/Closing year | 2013                     | 2009                        | 2012/2015                |
| Company size      | Micro                     | Macro                       | Micro                    |
| Area of influence | Global                    | Global                      | Global                   |
| Employees         | 20                        | 274\(^\text{12}\)            | 20                       |
| Size of the community | 5000 (downloaded furniture) | 1.202.642 (November 2016)   | 20.500 (2015)            |

\(^{11}\) Usually the percentage is between 1% and 3%.

\(^{12}\) in April 2015, according to Business Insider.
| Characteristics of the community | The community is composed of designers, makers and clients (downloaders). | The community is composed of both designers and non-designers. | The community is composed of both designers and non-designers. |
|----------------------------------|---------------------------------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------|
| Business model                   |                                                                      |                                                                 |                                                                 |
| Production and distribution channels | Opendesk gathers a network of artisans and Fab labs that produce locally. This model, which the company itself calls "open making", eliminates distribution costs. | The first Quirky took care of production and distribution processes. Objects were sold through the online platform or in physical shops. The second Quirky outsourced production and distribution to companies such as GE, Mattel, etc. | Formabilio outsourced the production system to high qualified Italian artisans. The distribution was ensured by couriers who delivered the ordered items from the company headquarters to the address provided by the recipient. |
| Marketing strategy              | Opendesk relies on the same network of users and producers as a marketing strategy. They also invest on social media and exhibitions. | Quirky's marketing strategy works through the community, but also through traditional channels such as online and offline advertising. | Formabilio invested on social media, banners and trade fairs (Milan, London, Vienna, Lotz). It also gave the designer a kit for self-promotion. |
| Source of income                | Platform fee and interior design service. | Products sales, investors. | Products sales, investors. |
| Growth factors                  | The network of people interesting in the idea of open making. The young internal team. | Fresh ideas from Quirky’s big community, and a great internal team. | Investment in human capital, visibility of the website and sales in other online stores. |
| Critical issues                 | The trust put in the producers: materials and technologies are different for each fab lab or craftsman, so the final quality of products can be different. | The slender margin of profit. Distribution problems. Too many products (thousands of units) and too few retail stores (5000). Quirky should create some sub-brands because it didn’t work in every category. | Formabilio began to sell products too late. They also had only the online sales channel. Investors allowed too little freedom of action. Difficulty in prototyping the objects. High price of the products. |
| Openness proprieties            | Open design, open making, crowd design. | Crowd design. | Crowd design. |
| Open processes                  |                                                                      |                                                                 |                                                                 |
| Open stages                     | Concept, production. | Ideation, concept, design. | Ideation, concept. |
Involvement of the community

The Opendesk community can download the blueprints of the products but cannot intervene personally in the design process of a new object. Designers can submit their own project that must be voted to enter the catalog.

The platform involves a huge community of users who share ideas about new innovative projects and contribute to the development of the different phases in the design process. Every user, depending on the entity of his contribution, will be paid on a different scale of royalties.

Formabilio gathered a mixed community. On one side, there were designers who posted their concept in the contests offered by the platform, on the other side there were those who were interested in purchasing the products. Everyone could vote the proposed concepts.

Design implications

Characteristics of the projects

Opendesk is based on open source furniture that can be produced by a global network of manufacturers using CNC machines.

Quirky works on product innovation. It started with gadgets, but later extended its interest to more elaborate products such as conditioners and demotic systems.

Formabilio’s furniture had to be sustainable, high-quality, and mainly produced with traditional techniques. Despite the different designers, the aesthetics of the products had a common style.

Role of designer

The role of the designer in Opendesk is very similar to the traditional one. Designers can propose their personal projects, with the only difference that they have to release the blueprints in creative commons license.

The designer, in this virtual environment, can be the promoter, the creator of the project, or the contributor to one of the various projects in different phases. Quirky’s internal team is also composed of designers who work on prototyping and product engineering.

Designers in Formabilio composed the active part of the community. Each competition collected between 70 and 200 concepts. Six designers also worked in the internal team. They were responsible for the communication and development aspects of the projects.

5.1 General information:

Following the order of the information in the table, it shows that Opendesk and Quirky are based in a metropolitan area and Formabilio was located in a small town. Nevertheless, all three companies have an extended global market. Opendesk bases its model on network production, using distributed and technological micro-factories (Bianchini & Maffei, 2013). Formabilio chose to work on small series with local artisans and to deliver the products using couriers. Quirky can be considered, at least for the production and distribution processes, a representative case of a globalized macro-company.

Quirky and Formabilio have an active community of users (both designers and non-designers) who participate in the design process, while the Opendesk community is passive, and simply buys products.
5.2 Business model:
Opendesk’s revenue derives mainly from platform fees. Percentage fees are based on the manufacturing cost and are differently apportioned: 8% for the design fee, 12% for the platform fee, 18% for the channel fee, and finally sales taxes depending on the location\textsuperscript{13}.

OpenDesk seems to have no specific economic problems, probably thanks to the reduced distribution costs and the use of a distributed and local production.

Quirky’s first business model was based on the sale of the objects ideated and developed in the platform, but problems such as the thin profit margin and the surplus of products under the same brand led it to bankruptcy.

In an interview\textsuperscript{14} conducted by Fortune magazine with Ben Kaufman, he said: “Very few companies can do everything themselves, best of class. In most cases, they have great ideas, but they don’t have the best Intellectual properties office, or, they have the right material, but they don’t have the supply chain [...].”

Another critical issue was the decision to create another start-up incubated within the first one. Quirky, in fact, decided to finance Wink: a home automation system designed for the mainstream consumer, with enhanced connectivity and security features. This system was composed of many different objects such as light bulbs, alarm systems, switches and other connected things. Quirky’s bankruptcy did not help the development of this system, and according to Ben Kaufman the two companies had to be recovered together. The new Quirky, as mentioned above, maintains the part dedicated to open innovation and outsources the production to big companies, trying to recover a good margin of profit.

Formabilio’s business model was based on the online sales of the products that won the various competitions. Although the Formabilio catalogue was well stocked, they began to sell the products too late, so that they were forced to find other investors to extend the break-even point. The bond with these new investors and their specific requests constrained their freedom and led the company to bankruptcy. In addition to this main problem, Formabilio also had other issues, related, for example, to the fact that they had to order small numbers of pieces at a time from manufacturers. They also had trouble with the transport.

5.3 Openness properties
Openness in the design process expresses itself in different ways and through different configurations. In the three case studies considered in this paper, the most common characteristic of openness seems to be the participation of people in the form of crowdsourcing. Quirky and Formabilio, in fact, outsourced some of the work originally attributed to designers this way, in particular in the ideation and concept stages of the process. Opendesk uses an open process mainly in the manufacturing stage, although the decision to release the blueprints in open source lets everyone implement the project.

\textsuperscript{13} https://www.opendesk.cc/open-making/join
\textsuperscript{14} https://www.youtube.com/watch?v=fJ-8feQjXhQ
5.4 Design implications

The use of open processes determines a partial mutation in the role of the designer, who doesn’t always have complete control over the design process and who should relate to new and different stakeholders. The consolidated relationship between the designer and the company is now flanked by institutions, individuals or groups. Nevertheless, each of the three companies have an internal design office responsible for the corporate identity and project development, mainly in the engineering and prototyping stages.

The difference with a traditional design process is, instead, less visible as far as the quality of the products is concerned. Apart from Opendesk, which has particular formal characteristics defined by the CNC process, Formabilio and Quirky do not have any formal characteristics that distinguish them from a traditional design company.

6. Conclusion

Generating business in the open design field is more complex than in the traditional field because it affects many different disciplines and many people with different backgrounds and skills. Nevertheless, opening processes carry both positive and negative aspects.

The involvement of a substantial number of people with multidisciplinary skills, especially in the ideation and concept stage, can be a powerful democratic tool which can make the design process more participatory. There are two positive features in the use of the crowd model. The first consists in the possibility of obtaining a large amount of contributions aimed at a specific target in a relatively short time. The second is the ability of this process to gather a large number of people around the same purpose, creating the opportunity to generate collective decisions. When the crowd design process turns into outsourced design, as in Formabilio, the degree of participation decreases and the work of the designers become more difficult because of the strong competition. A company that wants to use the outsourced design process must deal with several relevant issues. First of all, the significant contribution of non-professionals and the consequent difficulties in choosing between projects and ideas. Secondly, the great effort required to manage the crowd and to direct contributions in the right way. In this field, a factor that becomes relevant is the ability to ask the right questions and to represent the problem clearly. Another problem that seems to be relevant, especially in the case of Quirky, is the speed of the design flow. A large amount of new ideas and projects every week, forced the company to create and produce something new in a short span of time, and this can be a double-edged sword, because the company cannot handle a process at its own pace, but must deal with the “crowd time”.

As far as production is concerned, the organization of micro-factories “[...] in which local economies operate as separate, adaptive units [...]” (Manzini, p. 20) has positive effects both on the local and the global economy, and on the sustainability of the system. As for the three case studies, it seems that the creation of a network of manufacturers is more profitable for companies when the work is done by machines, as with Opendesk. The idea of having suppliers who can produce small quantities through craftsmanship (Formabilio) cannot yet be sufficiently assessed and requires too many resources in terms of money and time.
Finally, the idea of the second version of Quirky to connect not only people, but companies as well with many years of experience and a solid background can be a hybrid model that brings together the old centralized production and the new open design process.

From this brief analysis, it seems that both network production and outsourced design can be suitable for creating businesses, but the case studies selected for consideration show that the outsourced design process seems to be more difficult, especially for large companies.

In conclusion, it is also important to reflect on the role of the designer, considering the evolution of his relationship with the stakeholders (Figure 1). Different kind of interactions are possible between them:

the original one, in which the company asks the designer to develop the project;
the second, in which the designer submits a project to the company;
the third, in which the designer produces directly for the user;
the last, in which the designer is considered a fragment of a crowd composed of both designers and non-designers.

![Diagram of stakeholder relationships](image)

Figure 1. Evolution of the relationships between stakeholders in the design process.

In a scenario in which the designer could be an entrepreneur (Arquilla, Bianchini, & Maffei, 2011), or a non-designer could do part of the designer’s job (Manzini, 2015), the bundles of the profession are extremely flexible, and the dynamics of the process are not linear. Perhaps, in these contexts, the expert designers, like conductors, should be able to direct the process by establishing a relationship of mutual trust between the parties (Ratti & Claudel, 2015).
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