



Digital maker-entrepreneurs in open design: What activities make up their business model?

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Abstract The business models of digital maker-entrepreneurs in open design are inextricably linked to the broader open design community. Digital makers share designs on online platforms such as Thingiverse and use digital manufacturing technology such as 3-D printing as a generative mechanism for their entrepreneurial activities. There is a general understanding of how sharing works in that community and the basic design parameters that determine the business models of these digital maker-entrepreneurs, which are based on a portfolio of activities. This study is based on in-depth interviews with 11 digital maker-entrepreneurs from the open design community. We investigate the activities that constitute their business models using activity theory as a lens with which better to understand them. This study provides a perspective on the complexity of the relationships in which these activities are embedded and analyzes the activities related to the production, distribution, and consumption of value. Finally, we examine the exchanges between digital maker-entrepreneurs in the community, shedding light on how digital maker-entrepreneurs share and exchange goods, services, and knowledge as peers.

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1. Digital maker-entrepreneurs in open design

The combination of accessible digital manufacturing technology with the connectivity of the internet serves as a powerful generative mechanism for recreational, educational, and entrepreneurial

activities. These activities have become known as the *maker movement* (Dougherty, 2012). Members of the maker movement are seen as “high-tech do-it-yourselfers, who are democratizing access to the modern means to make things” (Gershenfeld, 2015, p. 48). When they engage in entrepreneurial activities, we call them *digital maker-entrepreneurs*. Maker culture is based on the three principles of learning: hands-on creation, transdisciplinary collaboration, and sharing (O’Duinn, 2012).

In this article, we investigate the activities that constitute the business models of digital

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maker-entrepreneurs. To do so, we first elaborate on the concept of digital maker-entrepreneurs and the environment of open design in which they interact and share designs. We also briefly acknowledge the scholarly discussion around business models and explain our understanding of a business model as an activity system—introduced by [Zott and Amit \(2010\)](#). Then, we discuss an initial, high-level study of the business models of 11 digital maker-entrepreneurs and the particularities we found in these cases drawn from subject interviews. Following this, we introduce activity theory ([Blackler, 1993](#); [Engeström, 1987, 2000](#)) as a different perspective on business models that allowed us to analyze them in more detail. Loosely following this perspective, we present three typical but contrasting cases for inclusion in this article: a couple with a web store, an entrepreneur in retail 3-D printing, and an incidental 3-D printing intrapreneur. In closing, we run a cross-case analysis and relate the detailed case descriptions to our earlier findings to create a rich picture of how digital maker-entrepreneurs shape the activities that make up their business models.

1.1. Digital maker-entrepreneurs

While the majority of digital makers mainly engage in leisure and educational activities, some of them turn a hobby into a business and become digital maker-entrepreneurs. In this study, we are particularly interested in digital maker-entrepreneurs who embrace the maker culture of co-creation and sharing. As [Wolf and Troxler \(2016\)](#) have shown, maker business models are inextricably linked with the wider maker community. They publish blueprints of designs on online platforms such as Thingiverse and YouMagine that offer the blueprints free for download and replication. They sell their goods on Etsy or eBay, or they promote their capabilities in designing and 3-D printing on brokering platforms such as Makexyz and 3D-Hubs.

1.2. Open design

There is a general understanding of how sharing works in the maker community (for a summary, see [Wolf, Troxler, Kocher, Harboe, & Gaudenz, 2014](#)). Digital makers share the blueprints of their designs online for others to reuse and repurpose. This is also known as *open design* ([van Abel, Evers, Klaassen, & Troxler, 2011](#)). Berlin designer Ronen Kadushin, a pioneer of open design, characterized the generative mechanisms of open design as twofold: (1) sharing digital design files on the internet under a permissive license and (2) being able to manufacture those

designs directly from the files without the need for specialist tooling ([Troxler, 2011](#)).

This corresponds to the way digital makers operate. With regard to business models, [Cruickshank \(2014, p. 23\)](#) noted that open design:

Includes models based on giving things away (free revealing), mass participation in design, co-creation and a range of other approaches that seek to develop new open methods of creativity. . . not necessarily based on conventional business models and a market economy.

2. Fundamentals of a business model

A business model, in its most high-level definition, describes how a firm creates, delivers, and captures value (e.g., [Osterwalder, 2004](#)). That said, there is no general agreement concerning definition, as [Zott, Amit, and Massa \(2011\)](#) found. The concept is developed in silos according to the specific interests of researchers. [Zott et al. \(2011, p. 1038\)](#) offer a minimal definition of a business model from an activity system perspective: “a systemic perspective on how to ‘do business,’ encompassing boundary-spanning activities (performed by a focal firm or others), and focusing on value creation as well as value capture.” While most business literature treats value as purely economic, this concept has been extended in various contexts to cover multidimensional value creation, including open design ([Pekkola, Hirscher, & Fuad-Luke, 2013](#)) or sustainability business models (see, for example, [Schaltegger, Hansen, & Lüdeke-Freund, 2016](#); [Stubbs & Cocklin, 2008](#)).

2.1. The business model as an activity system

[Zott and Amit \(2010\)](#) defined an activity system as a set of interdependent organizational activities centered on a focal firm. These activities include those conducted by the focal firm and also its partners, vendors, or customers. The firm’s activity system transcends the focal firm and spans its boundaries. The system’s focus will remain firm centric in order to enable the focal firm to appropriate a share of the value it created together with its partners.

To analyze the business model as an activity system, [Zott and Amit \(2010\)](#) suggested two lines of inquiry. The first line concerned “the social aspects of relationships between business model participants, as well as the transactional dimension of their relationships” ([Zott & Amit, 2010, p. 224](#)).

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