

# Why traditional (manufacturing) industry will suffer the fate of print media

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## Abstract

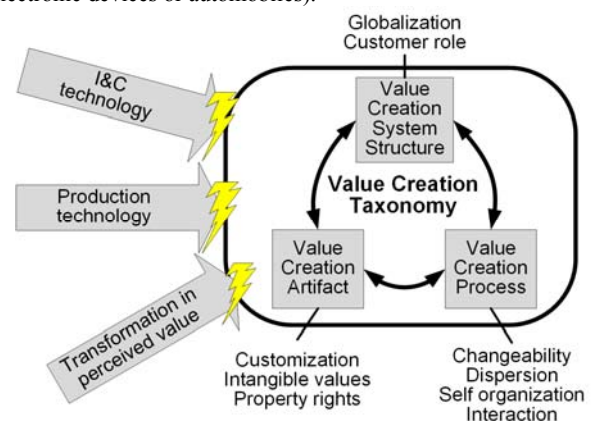
*The purpose of this paper is to make a contribution to a theory of value co-creation by integrating a case observation and conceptual insights from literature that are concerned with co-creation phenomena. A value creation taxonomy is introduced as a reference model which is used to describe an ongoing paradigm shift from traditional industrial production towards Bottom-up economics. On this basis a conceptual framework is derived for comparing how traditional value chain elements might be rearranged by organizations relying on value co-creation. The underlying research work also aims to apply the authors' framework in order to illustrate how completely new business models arise and how traditional (manufacturing) companies could be enabled to make use of value co-creation patterns observed in the 36 cases under consideration. Each case is employing its own distinct approach to value creation.*

## 1. Introduction

In 2013 the distribution of the printed version of the German Brockhaus encyclopedia finally was ceased. For more than two hundred years it was the most important reference work or at least an important status symbol in German bookshelves. Brockhaus is one of several popular cases of traditional media industry revealing the loss of its means of existence due to the rise of Wikipedia. Fears are easily comprehensible in other areas of print, music and film industry, whose existence is perceived threatened because there are paper books being substituted by ebooks, cinema attendance and record purchases substituted by internet streams and downloads. Of course, there are fundamental differences between the media world and the world of real physical goods whose fabrication constitutes the *raison d'être* of manufacturing companies. However, also in the field of the physical or material goods patterns can be recognized that represent an increasingly collaborative, decentralized and individualized type of value creation, which is significantly different from traditional industrial production. The latest example of such a pattern, which came into the picture, was Elon Musk's, CEO of Tesla Motors, announcement of opening up the electric car company's patents to all comers [22]. The waiver of confidentiality and patents and the focus on openness and collaboration within a community contradict the methods of traditional industrial corporations. Another glaring example for such new methods can be found in the US-based company Local Motors, that managed to bring a car to production with the use of open source-principles in a collaborative way together with an internet community. The street legal off-road car is named Rally Fighter. It is close to the outer appearance of the BMW X6. The design of the exterior as well as the selection of most parts of the vehicle resulted of the common work of a community of interested and dedicated volunteers and potential customers of the company. Early design concepts were accessible for everyone. Everyone could also make suggestions for improvements. The final assembly of the vehicle

takes place under the guidance of company-employed engineers and by the customers themselves in one of the "micro-factories" of Local Motors. Due to the success of this project, the U.S. military ordered a prototype for a desert vehicle from the local motors company, which should then be further developed by army engineers [2]. These are new patterns, which give a first hint of the ongoing paradigm shift concerning value creation towards value co-creation in value creation systems. To describe this shift the authors use a value creation taxonomy [48,79] that is constituted by structures, processes, and the subject of value creation (i.e. the value creation artifact). The authors prefer "value creation artifact" for describing the outcome of value creation processes instead of the term "product" for three reasons. Firstly, customers are increasingly demanding individualized products and services. Secondly, the ratio of intangible to tangible components of the "product" is rising, which among other factors can be attributed to the increasing importance of software and service components. The third aspect is closely linked with the second. Here the issue concerns the property rights constellation of the value creation artifact. While the benefits of regulated exclusive property rights are accepted for physical goods, this acceptance requires a revaluation in the case of goods with an increasing intangible or informational character (e.g. Open Source Software (OSS) and Open Source Hardware).

The drivers of change in value creation systems are technology innovations and the change in the perceived values of value creation artifacts (see Figure 1). The two key drivers concerning technology innovations are the recent developments and spread of information and communication technologies (e.g. number of people with internet access, number of devices with internet access) as well as development and spread of certain game changing production technologies (e.g. generative technologies). The aspect of transformation of the perceived value is based on the increase of informational and therefore intangible proportions in produced goods and services (e.g. increasing proportion of software in electronic devices or automobiles).



**Figure 1: Value creation taxonomy and drivers of change**

The transformation of value creation structures can firstly be attributed to globalization [15,71,76,]. The spread of I&C technologies and the accompanying fall in transaction costs means that the benefits of widely dislocated value creation activities are increasing, which is followed by permanently changing relations between the worldwide operating actors. However, as the pressure of competition increases, this is also accompanied by a potential expansion of sales opportunities. Secondly, an increase in the importance of the customer's role can be detected. Since knowledge work is gaining importance as part of value creation processes, customer's power over the producer is rising due to a better access to I&C technology and networks. Therefore the value creation and production cannot longer be seen within the boundaries of a company. It is no longer possible to achieve a clear demarcation between the domains of customers and producers ('prosumer') and accordingly the role of traditional companies is changing.

The transformation of the value creation processes stems directly from the influence of the value creation structure. The demand for individualized products and globalization thus calls for changeable production systems and processes. In addition, the number of actors involved in the value creation process is increasing. Coordination of these actors takes place less through hierarchical organizations: With the decreasing importance of conditions of time and space, the value creation processes are increasingly based on interaction, collaboration and self-organization [57] of the worldwide distributed actors to cope with the increasing complexity.

Concerning the value creation artifact, three essential aspects of change can be identified. Firstly, customers are increasingly demanding individualized products and services. This involves an additional challenge for manufacturers. Secondly, the ratio of intangible components of the product is rising in proportion to tangible components, which among other factors can be attributed to the increasing importance of software and service components.

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## 2. Bottom-up economics

The transformation within the three core areas of value creation taxonomy is leading to new patterns of value creation, which can be summed up with the term 'Bottom-up economics' [48,79]. Bottom-up economics differ essentially in its structure-related and process-related character from traditional industrial production, which in turn represents a manifestation of top-down economics. While in industrial production mass production is the dominating concept, the Bottom-up economics is connected with the concepts of value co-creation and collaboration [45]. In order to describe the phenomena of change in post-industrial value creation several new keywords and concepts entered and fed the scientific discourses. Still lacking an overall theoretical framework to explain these patterns Management Sciences tried to challenge the transformation by following some eclectic scholarly concepts until now (see Figure 2). Bottom-up economics is characterized by a fusing of production and consumption [64], by distributed structures and processes and by collaboration as the most intensive form of interaction between actors. In all areas of value creation signs of this paradigm change can be found: such as R&D (e.g. User Innovation [70], Collective Invention [1] and Open Innovation [10]), production (e.g. Crowdsourcing [23], production networks [73], mass customization [43], mass collaboration [63], collaborative engineering [31]) and marketing (e.g. social commerce [3], viral marketing [29]).

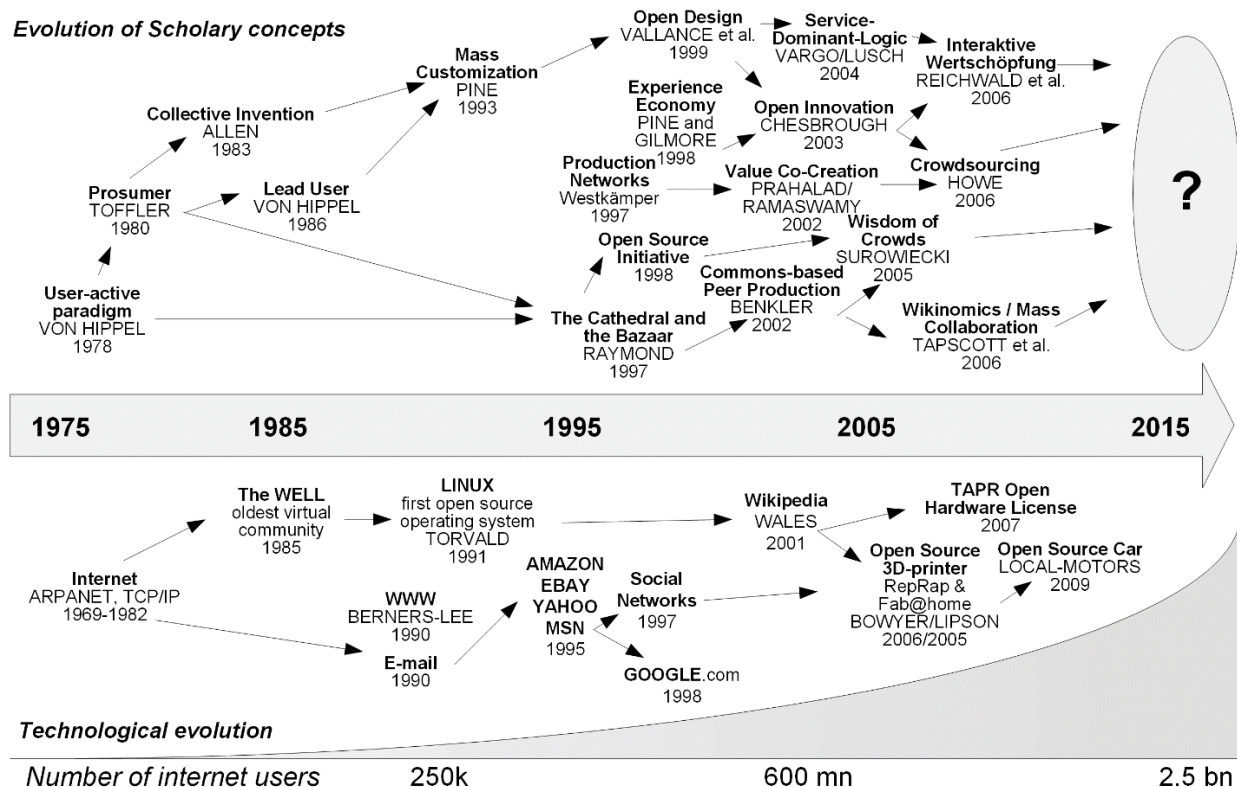


Figure 2: Evolution of eclectic concepts and instruments of value co-creation

The basis for the development of these scholarly concepts generated parallel with a technological evolution (Figure 2) starting with the development of the internet and the following rise of virtual communities and the World Wide Web. Technological innovations were always a precondition for the development of the virtual world. But several times there has been a feedback to developments into real life and into the physical domain. For example: Wikipedia as the first open and free encyclopedia was the result of the work of an internet community. Within this project could be observed (once more besides OSS) that job performance has not always to be rewarded with money. Thus, Wikipedia can be reflected as an evidence for the obsolescence of the concept of a rational homo oeconomicus, another key concept of traditional industrial production. Further the concept of open source software and community work was followed by the idea of Open Design [68], i.e. transforming the principles of dealing with open source software and creating value by communities in form of hardware. Collaborative or community developments of Open Source Hardware could be observed resulting in computers or other electronic and medical devices, mobile phones and even machine tools as Desktop 3D-printers and cars as recent cases show.

Further the interconnectedness of people by ICT lead to a new balance within consumer and producer markets. Customers were considered key resources and co-creators of value in the Service-Dominant Logic [69]. Chesbrough tried to implement the idea of opening the innovation process in companies [10] and Prahalad showed how value co-creation with customers works [45]. Gilmore and Pine revealed that the experience in the value creation adds more value into a product than the tangible element itself [20]. Benkler developed the concept of commons based peer production [5] on the basis of Raymond [47].

The impact of the wisdom of crowds was reflected by Surowiecki [62] who fostered the vision of new concepts as mass collaboration [23,63]. A comprehensive framework for the description of the previously described concepts is still lacking

### 3. Conceptual framework of Bottom-up Economics

A conceptual framework such as Bottom-up economics is needed to describe value creation and value creation systems in terms of the structures, processes, objects of value creation and the interrelations in between these elements, since some of the presented new patterns of value creation cannot be understood on the basis of traditional concepts. Therefore, Bottom-up economics is a conceptual framework to describe how value creation works founded on the value creation taxonomy introduced earlier.

The common denominator in the various traditional definitions is the assumption that value creation is a process within the borders of a company (e.g. referring to value chains as being part of the companies according to Porter [44]). Therefore, the research in value creation is focused or sometimes limited to structures, functions and processes within the firms or firm networks. According to the authors of this paper, this perspective is not sufficient to describe value creation, because companies may only be one of several elements within a value creation system. The traditional notion of value creation situates the producer (i.e. a company) as the main player in the domain of value creation. Producers receive information about the needs of customers and conduct several value creation tasks (according to the value chain) to create a value creation artifact that might satisfy customer needs. According to that, value creation is a directed process towards the customer. The domain of value creation encompasses merely the producer and the value creation artifact (Figure 3, left). By that approach not necessarily all processes and actors involved in the value creation will be considered. For example functions as customer innovation, customer design, customer production, crowdsourcing or several other collaborative activities that do not belong solely to the company domain will not be considered, even though contributing to the value added.

In contrast, the authors of this paper define value creation systems as systems with borders extended beyond the company domain and value creation as an interactive process between a variety of actors within that system. That means value creation tasks relating to a specific value creation artifact are not necessarily conducted within companies solely, but instead by several actors of the system (e.g. including the customers). A common company and customer domain of value co-creation exists (Figure 3, right side).

What are the consequences from the managerial perspective following the antecedently supposed arguments of companies being only one out of several elements of value creation systems and an upcoming shift from traditional industrial production to Bottom-up economics? The theory of openness [48,79] implies that openness might be an adequate strategy to cope with these developments. Openness means hereby the ability (e.g. of companies) to interact with each other and with other elements of a value creation system to successfully create value. How openness might be adopted within structures, processes and strategies shall be found out by a systematical analysis of cases of value co-creation that cannot be explained by traditional models.

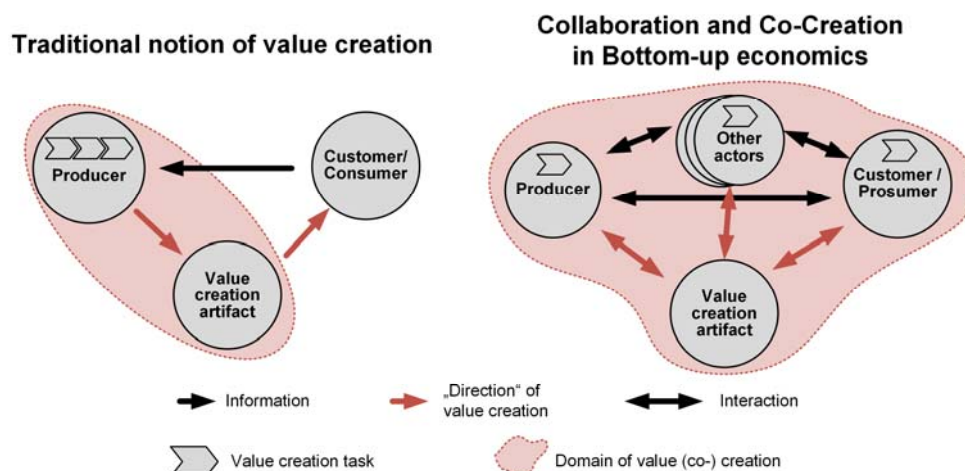


Figure 3: Notion of value creation traditional view vs. Bottom-up economics based on [66,67]

## 4. Typology of Bottom-up economic concepts

In this chapter the results of a systematic analysis of 36 cases of value co-creation are presented as a typology to obtain a comprehensive and clear understanding of concepts of Bottom-up economics. For the purpose of discovering differences and similarities of the concepts, emerging patterns are clustered (Figure 4).

The horizontal dimension “Value creation tasks/functions” presents the fundamental tasks and functions for the constitution of a viable value creation system, being noted as primary value creating activities of a firm in traditional concepts (e.g. Porter [44]). Therefore, tasks and functions serve as classification key for clustering the observed cases in terms of traditional industrial production concepts. The vertical dimension “Concepts of Bottom-up economics” shows the clustering of the cases according to the definitions in the following paragraphs. The concepts have in common, that they define or at least enable a more open value creation from a systems perspective meaning that they tend to be more participative, collaborative and interactive. In the following we define the seven distinct concepts: Open Innovation platforms and intermediates, Open high-tech production sites, Cloud based Design and manufacturing, Participatory commerce, Marketing crowdsourcing, Crowdfunding, Crowd- / Cloud-services.

### 4.1. Open Innovation platforms and intermediates

Open Innovation platforms are virtual places where companies and other organizations post R&D related problems to be solved by individuals or other firms that can earn non-monetary (e.g. OpenIDEO [41,51]) or monetary rewards (e.g. Innocentive [6,7,25,59] and Innoget [4,53]) for merely participation or winning contributions.

Intermediate platforms connect on the one hand specialists and experts with companies having specific challenges/problems on an ad hoc basis for a specific project duration (e.g. Yourencore [80]), on the other hand they allow brokerage of innovative technology and intellectual property between scientists, companies, government labs and other organizations (Yet2 [18,24,34,36]).

### 4.2. Open high-tech production sites

Open high-tech production sites such as Fablabs [35,37] provide public access to industrial tools and equipment and production knowledge. The main goal of the Fablab movement was to enable participation and empowerment of individuals in order to work with industrial production technologies and get access to production knowledge. Fablabs offer production process and technology related training and assistance. They might be run by non-profit organizations (e.g. universities) and therefore the use might be free of charge. Often they are run by companies or individuals applying a business model to the Fablab idea. For example Techshop (13,55,60) offers membership based workshops with professional industrial tools and equipment. Members are enabled to develop and fabricate their own parts and products. Machinery encompasses laser and water jet cutters, welding machines, CAD software, sewing machines, 3D printers and electronic labs

### 4.3. Cloud-based Design and Manufacturing

Cloud-based Design and Manufacturing enables rapid product development through a networking and negotiation platform as well as a parallel and distributed system of manufacturing resources. Such a network is a huge shared service pool of design and manufacturing resources, where users may find tools and equipment for specific products available in the manufacturing cloud that can satisfy their requirements [78].

Cloud manufacturing platforms like eMachineShop [12] or Ponoko [13,16,77] allow manufacturing companies with not enough capacity or inadequate technology or just individuals to forward manufacturing orders to a machine shop. The platforms offer free

and easy to use software where custom parts can be designed. After getting expert design feedback a quote for the desired product will be automatically derived. Other examples where customers receive online access to the special manufacturing technology of high-end 3D printers are Shapeways [8] and i.materialize [38]. Users design and upload 3D printable files, and get “prints” of the objects. 100kgarages [83] is a decentralized community of small manufacturers, designers and consumers. Makers have to own a machine tool to participate on the site and, furthermore, post a profile about their manufacturing capabilities. Designers and Consumers are given the opportunity to post their design ideas in form of CAD-designs or to just post a description of the object they want to have manufactured, negotiate costs and other issues directly online as well. Being a user of Alibaba [39], a platform for trading, communication and made to order production allows to connect with more than 50 million small and medium sized businesses predominantly based in China for cloud manufacturing purposes.

### 4.4. Participatory commerce platforms

Participatory commerce platforms are meant to be participatory due to the fact that customers are able to design, develop and sell their own products supported by means of mass customization [50] via an online platform by the use of certain web tools (e.g. product configurators) and production technologies (e.g. 2D on clothing and 3D printing). For example Spreadshirt [49] offers services for private individuals and commercial organizations to design, buy and sell creative personalized apparel in a personal shop. All transactions are handled via the platform. Individual shop operators upload designs for their products. Then Spreadshirt covers all operations from warehousing to production, shipping and payment processing as well as customer service. Zazzle [81] is an online retailer that allows users to upload images and create their own merchandise as there is printed clothing, posters, cups etc. Customers may also buy products created by other users, or they may offer and sell their own creations to other customers worldwide, by opening their own shop on the platform, where they can determine the profit they wish to make on each item.

### 4.5. Marketing Crowdsourcing

Viral marketing [29], user generated advertising campaigns [72] (e.g. Youtube and Zooppa [82]), social or collaborative filtering, peer recommendations and collective buying [3] are patterns of crowdsourcing activities fulfilling marketing tasks with the potential of being more efficient and effective than methods being conducted by a marketing department within the corporate domain. Online advertising markets (e.g. 99Designs [75]), online retail and business-to-business e-commerce (e.g. Alibaba [39]), online distribution channels (e.g. Ebay, Etsy, Amazon) also substitute traditional retail channels [30].

Due to decreasing efficiency of traditional marketing methods and enabled by increasing networking effects; word of mouth concepts such as viral marketing raise in importance today [29]. And others show that the selective use of viral marketing offers a bigger lever for influencing the purchase decisions than traditional methods. Viral marketing campaigns can be conducted via social networking platforms such as Twitter or Facebook as well as video sharing platforms as Youtube or others.

Since viral marketing is in analogy to the epidemic processes rather a passive form of marketing, user generated advertising [72], however, has the character of an activated or active mass collaboration. A user generated campaign (e.g. with Youtube) involves individuals to share ideas “of what the brand means to them” [72] using print media, audio or film. Results of this collaboration might be evaluated by the community. As overall result the advertising companies achieve a deeper connection with their customers [54]. Another example is the online platform Zooppa [82] which allows user-generated advertising campaigns and contests in cooperation with global brands and agencies. It calls

filmmakers and graphic designers, copywriters and other creative workers to submit original ideas. Bases are a client's brief and reward for winning proposals.

Other important patterns related to the umbrella term of social commerce can be found in social or collaborative (e.g. Amazon) filtering, in peer recommendations (e.g. Amazon, Facebook) or social navigation (e.g. Amazon) and also in group buying (e.g. Letsbuyit [9], Groupon [14]). Social navigation is the ability of users to mutually influence their behavior through comments and reviews, while social filtering encompasses methods for similarity determination of individual interest profiles of different users. Group buying or collective buying is the internet enabled setting up of an ad hoc group of buyers of one single product in order to achieve reduced prices on the condition of critical (minimum) number of buyers.

Another form of advertising based on Crowdsourcing is the use of community co-creation (e.g. 99 Designs [75]) where similar to Open Innovation platforms creative tasks of agencies and brand companies are sourced out to professional designers or semiprofessional individuals. Whitley has examined the particular applicability of crowdsourcing for marketing related tasks as product development, advertising and promotion as well as market research [75] (e.g. Clickworker [17], Mechanical Turk [46]). He found identifiable benefits of the crowdsourcing approach in marketing and expects all firms to at least “consider their working processes and organization of labor to see whether some scope for crowdsourcing (...) exists” [75].

#### 4.6. Crowdfunding

Most value creation activities require capital funding. In firms we therefore find the function of corporate finance, which deals with the sources of funding and the capital structure of corporations. Crowdfunding in contrast is defined as any collective effort to raise and pool money for a project that is proposed by some other people or organization, collecting investments of any range starting from micro amounts from a big number of people [42].

According to Crowdsourcing LLC 452 crowdfunding platforms such as Kickstarter and Indiegogo [12] were active worldwide in

2012 [11]; the majority in North America and Europe. All together these raised USD 1.5 bn and funded more than one million campaigns successfully in 2011. The primary revenue model for those platforms is percentage based commission on funds paid out to entrepreneurs. Crowdfunding models can be distinct into two models in terms of participant's perspective [11]: First, aiming on financial return (i.e. equity- or lending based), which raised the largest sum of money per campaign recently. This model is most effective for digital goods as movies, software and music. Second, donation- and reward based crowdfunding, which perform best for meaningful campaigns that appeal to funders' personal beliefs and passions (e.g. environment).

#### 4.7. Cloud-/Crowd-services

Cloud- and Crowd-services represent a cross-sectional compilation of value creation tasks reflecting the scope of miscellaneous collaborative, participative and shared services which are not necessarily linked to the corporate domain in terms of primary value creating activities according to Porter.

As far as transportation is concerned, a new participative and collaborative mode is defined by means of shared transportation which is enabled, especially, by mobile internet devices that allow to interconnect passengers who need a ride and drivers who need to drive a route anyway. Uber [65] and Lyft [32] are two platforms that build such a network of drivers with own or rented cars and potential passengers and offer peer to peer ride sharing [56]. Brokerage, negotiation and payments are done via mobile app or via website. Platforms are financed over fees of a percentage of the total fare. The much older concept of car sharing (e.g. Zipcar [61]), where a company owns the cars provided for sharing, is also promoted by the same development.

Accommodation for travelers is another domain where one can find the pattern of sharing and peer to peer rentals. The platform Airbnb [19] for example connects individual or corporate hosts with travelers and enables transactions without owning any rooms itself. Hence, the platform provides not a new source, but it provides access to an existing supply of the good of accommodation.

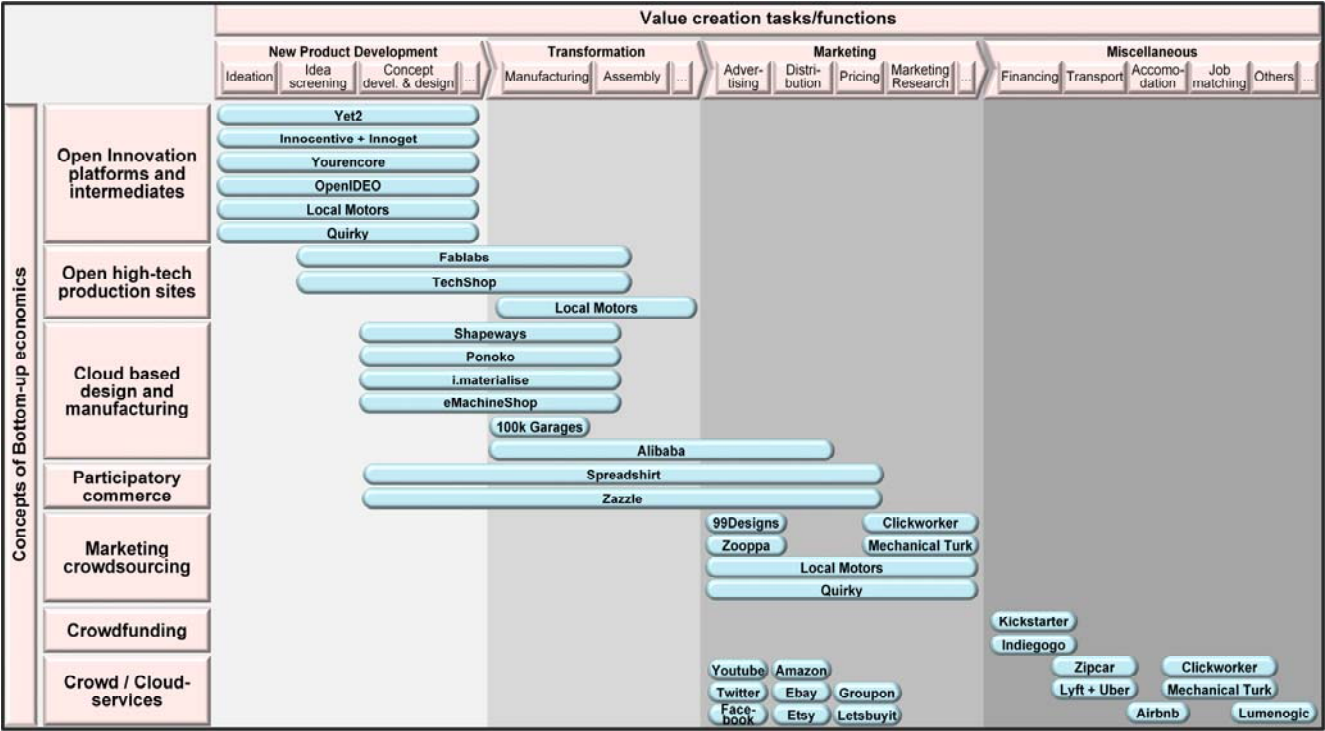


Figure 4: Typology of concepts of Bottom-up economics

Examples for Crowdsourcing of several kinds are job matching or freelancing platforms like Mechanical Turk [46] and Clickworker [17]. These platforms allow job posting by companies or individuals (on a contract for work basis) mostly for tasks of text creation, design and marketing research tasks as well as information verification.

The purpose of platforms like Lumenogic [58] is the utilization of aggregated collective intelligence to offer prediction services to general public and private companies.

#### 4.8. Discussion

The presented concepts represent a mix of enablers, methods and tools to conduct a more open value creation. They reflect how new business models occur, because there is a demand for a more participative, collaborative and interactive way of value creation in Bottom-up economics. These new patterns cover the full range of value creation tasks and many branches of the industry are affected. Taking into account that there was a co-design and co-development of the car, a design contest leading to a marketing campaign and final assembly by the customers themselves, the case of Local Motors reveals that it is possible to set up a business model incorporating openness along the whole value chain. Another glaring example therefore is the case of Quirky [33,52] that allows inventors to submit ideas while other users of the platform vote on the new ideas. The best ideas are conceptually developed under assistance of Quirky staff, physically developed to prototypes and put into production. The community participates in designing, naming and pricing of the products. The process is accompanied by both: input of individual contributors and an in-house team of engineers and designers. Contributors earn a reward share in profits of the new products. Quirky fields about 3000 product ideas a week from an online community of nearly 800,000 inventors.

#### 5. Conclusion

This paper has discussed selected research from the last two decades on value co-creation and derived the Bottom-up economics framework with its concepts marking a new paradigm of value creation compared to the traditional industrial production paradigm.

As it is an exploratory study, neither the scope or amount of cases nor the typology itself lay claim to completeness. Establishing a generic framework of Bottom-up economics is work in progress because new patterns of value co-creation continuously emerge. Nevertheless, it provides an overview of unique value creation patterns and shows how elements of the traditional corporate value chain might be rearranged. Combinations of new and old patterns lead to new business models and roles [27,28] within value creation systems. Such a typology shall provide a conceptual framework for future discussions of the scientific community and decision making in management practice.

The authors argue that openness as a general way of thinking beyond the borders of organizations is needed to implement a value co-creation strategy. Implementation depends on understanding of being part of a value creation system and is followed by implementing openness through rearrangement of structures, processes and the value creation artifact [79]. The presented cases reveal that it is possible to use more "open" or "bottom-up"-concepts to shape new business models. Companies like Local Motors, Quirky and, recently Tesla opened up and collaborate with masses. But still they seek to earn real money.

Traditional (manufacturing) industry will need to pay very close attention to this new paradigm. The patterns of Bottom-up economics seem still to be on the fringes, but the business threats they embody for traditional industries are very real. Business models need to be more open and collaborative to be and, respectively, stay viable in an environment that is characterized by Bottom-up economics. If traditionalists rely on models that are inefficient for

their customers, another new value co-creation pattern is looking to streamline it and, in the last instance, replace it.

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