

# The Age of Prosumerism: Some Micro-Economic Analysis

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## Abstract

Many users or consumers now operate the two sides of the market as consumers and producers. They are known as prosumers. Their presence is changing the economic dynamic. This paper develops two models, the prosumerism model that determines the prosumer equilibrium; the amount of the private good and prosumer good. The second one is the customization model based on the principal agent framework, where the principal is the manufacturer innovator and the agent the user. Results obtained predict abundance of the prosumer good in the prosumerism model and that the most innovative users will have a higher level of participation in the value creation process than the less innovative ones in the customization model. Hence, policy should encourage users' participation in the value creation and innovation processes to achieve a higher social welfare.

**Keywords:** Prosumer, Customization, Network effects, Microeconomic, Open innovation

## 1 Introduction

We are witnessing a transformation in the market model. Actual consumption is turning the consumer into a prosumer; a term which is the result of combining Producer and Consumer. Alvin Toffler's concepts of prosumer and prosumerism, provide a proper theoretical basis for analyzing different levels of participation and involvement of people. Prosumerism is the increased involvement of customers in the production process, typified by the use of customer feedback and direct design request in high-tech industries like computer-aided manufacturing systems [21] p.285 and the rise of customization in both goods and services markets .

Before the exploitation of the social networks, consumers were only considered a consumption mass by the firms. There was no communication between firm and client and, moreover, there was a lack of appropriate channels where consumers could express their preferences. Some ideas about innovation by users were already present before Web 2.0. Users have been found to be the developers of many commercially important innovations and, in fields studied to date, from 10% to nearly 40% of users have been found to have developed or modified products for their own use [8].

A series of recent social changes, essentially those associated with the internet penetration and the Web 2.0 (the user generated web e.g Facebook, Twitter, social networking sites and so on), have promoted the diffusion of prosumption. Toffler (1980) argued that prosumption had been predominant in pre-industrial societies, what he called the first wave. Consumers turning into prosumer have emerged in the mid-1950 while pumping ones' own gasoline in the filling station; using the Automated Teller Machine (ATM) in the bank, scanning one's own food brought in the supermarket, among others.

But, it is on web 2.0 that prosumption exploited. For instance, in eBay consumers create the market, and although electronic markets tend to be rather more anonymous, the eBay reputation mechanism becomes important [4]. This second wave was due to marketization that separates both functions by distinguishing between producers and consumers. Then, a third wave implies their reintegration in the rise of the prosumer.

Nowadays, the web 2.0 leads to a fluid relationship between firm and client, leading to a collaborative environment where clients express their opinions and firms have learned to listen to them. This favorable environment boosts the transition from a passive consumer to an active consumer or prosumer. Prosumption was clearly not invented on Web 2.0, but given the massive involvement in, and popularity of, many of these developments, it can be argued that it is currently both the most prevalent location of prosumption and its most important facilitator as a 'means of prosumption' [17].

The prosumption trend receives other terms. Prahalad and Ramaswamy (2004) refer to value co-creation. In the same line, we found innovation by end-users of product and processes which has been shown to be an important phenomenon within economies [8].

The prosumer is capable of creating content, opinions and comments about goods and services which are shared in a community with similar tastes. For instance, in the case of wiki audience members become active producers. Similarly, Facebook has become a powerful marketing tool as it joins a large pool of consumers. Brands should know what topics their followers are interested in and what communication skills can induce fans' willingness to participate [11]. Likewise, eBay is a global commerce and payments leader which connects millions of buyers and sellers creating one of the largest online marketplaces. After an auction is completed, both the buyer and the seller can give the other party a grade of + 1 (positive), 0 (neutral), or - 1 (negative), along with any textual comments [3]. Such a business is becoming an economic phenomenon: 2014 enabled a commerce volume of \$255 billion and a total payment volume of \$228 billion. Marketplaces gained 14.9 million new buyers for the full year.

Contrary to other activities, prosumerism is an unpaid activity. On the one hand, Corporations and other organizations are unwilling to pay for the prosumers work. On the other hand, prosumers prefer to pay little or nothing for the content they consume on the internet (social networking sites, news, blogs, and so on) [1].

Traditional capitalism, either producer or consumer capitalism is based on scarcity, but prosumer capitalism online is increasingly a world of abundance [18] p.22. The costs for companies to host vast amounts of digital content is dropping and the sheer number of users creating content on sites such as Facebook is increasing [1]. Nowadays, people are spending plenty of time to these abundant tasks. For instance, Wikipedia is based on a system of nearly infinite inputs designed in the end to get an entry right and up to date no matter what it takes for the prosumers who create the entry. Firms also benefit from a stable two-sided relationship with the audience by achieving a better market position [9].

In this context, the objective of this paper consists in providing some economic insights and microeconomic analysis about the sources and mechanisms of these shifts in the economy. To achieve this goal we provide two theoretical models based on the consumer equilibrium and the principal agent model. The first model focuses on prosumerism while the second one explains the customization outcome.

## 2 Theoretical Framework

Nowadays, the market faces a different pattern, transforming the nature of the relationship between the consumer and the firm. The meaning of value and the process of value creation are rapidly shifting from a product and firm-centric view to personalized consumer experiences. Those consumers which are informed, networked, empowered, and active are increasingly co-creating value with the firm.

On the one side, consumers, equipped with new tools and dissatisfied with available choices, are willing to interact with firms and thereby *co-create* value. On the other side, firms should target and manage the *right* customers to achieve this goal by customer relationship management [16].

According to [9], participation and involvement are not binary categories, where people either participate or not (either by users, consumers or adopters). The concepts of prosumer and prosumerism developed by [21], based on the distinction between customization and production, settle the theoretical basis to analyze levels of involvement.

Prosumerism and prosumer has two aspects. On the one side, the *production for use* means customers produce goods and services for their own personal use. On the other side, customization and customer involvement in a production process that is still completely controlled and managed by other/s. Then, customization requires lower levels of involvement than production [9]. Customization features include users not generating actual content but rather commenting on existing content, or generating small amounts of content [15].

Jönsson and Örnering (2010) consider low participation the user-generated content which is basically a different way of viewing content visible only to the individual user. On the other side, medium participation is individual content created when it is actively directed and solicited, and /or in conjunction with existent content. Lastly, high participation implies production of content even when not actively solicited. According to the American University Center for Social Media there are different habits in terms of complexity and level of involvement: choice, conversation, curation, creation, and collaboration. In this vein, [18] examines the potential of the internet for the democracy and she lists the habits that are participatory.

Nowadays, several social customers serve as prosumers who act as influencing agents that spread highly salient information about products and services via social channels [3]. By involving consumers, one can potentially gain more transparency in the process of food production; contrary to traditional markets where asymmetry of information between consumer and producer prevail [6]. As a result of this co-creation process, products and services are becoming social objects that can be examined, discussed and shared among members of peer networks [14].

Usually, user-content generation and prosumers are present in markets with network effects. Network effects refer to the manner in which the value of adopting a technology depends on the number of customers who have already adopted that technology. Consequently, a technology with more current adopters benefits adopters more than one with fewer adopters [19].

For the diffusion of network effect goods the differentiation into providers and consumers is not crucial since both standard providers and consumers have a common interest in a wide diffusion to benefit from high producer margins and high network externalities [2]. The consumer of a communication standard provides the same standard at the same time to its business partners and can be seen consequently as provider and consumer (prosumer) simultaneously. This situation does not always hold if a market-dominant supplier or monopolist demands monopoly prices thereby shrinking the optimal network size.

The diffusion concept refers to the process by which an innovation is communicated through certain channels over time among the members of a social system [17] p.5. Cascading adoption at at least two levels (provider and adopter) can be observed in all kinds of settings, where two different and inhomogeneous groups with different preferences have to adopt a standard to benefit from network effects [2]. For instance, Electronic Data Interchange (EDI) standards between a large and Small and Medium Sized Enterprises (SME); and mobile data services (between the mobile service provider and the customers). Suppliers of products supporting a certain standard perceive benefits from increasing demand, but only users or adopters can benefit from direct and indirect network effects.

In the prosumer capitalism, there is a trend toward unpaid rather than paid labor and toward offering products at no cost, and the system is characterized by abundance [17]. Ritzer and Jurgenson (2008) theorize the emerging importance of prosumption and the prosumer, and [8] argues that prosumption online marks a reversal of the historic trend toward increasing rationalization in favor of a deMcDonaldization of, at least, the internet.

The traditional theory relies on the production function as the organizing framework of the analysis. But companies are moving away from the making of things in the United States and focusing increasingly on services or product development, design and marketing [5].

Harhoff et al (2003) explore the incentives that users might have to freely reveal their proprietary innovations. They conclude that free revealing pays. Innovating users often do not sell or license their innovations to manufacturers. But, they freely reveal details of their innovations to other users and to manufacturers [21]. Free revealing is also a central feature of open source software development projects. Contributors to such projects freely reveal the software code they have created to fellow innovators and to free riders on equal terms [13].

To economists, free revealing is surprising, since it violates a central tenant of the economic theory of innovation. According to the traditional view, appropriating returns to innovation requires agents to keep the knowledge underlying an innovation secret or to protect it by patents (or other means). After all, non-compensated spillovers of innovation-related information should represent a loss that innovators would seek to avoid if at all possible, even at some cost. Why then do we observe that some innovation-related information is revealed freely? Is unpaid?

Lead users are members of a user population with two distinct characteristics: First, by being at the top of important trends, leads leader users to experience novelty needs that later on will be experienced by the rest of users. Second, they anticipate receiving relatively high gains from obtaining a solution to their needs, and so they may innovate [22]. Adding another source of innovation (users) to the welfare analysis of new goods might exacerbate a tendency towards overprovision of new goods. User innovation leads to the reduction of information asymmetries and increase efficiency of the innovation process. Manufacturers can advance the users' work by producing a robust good, producible at low cost [8].

### 3 Theoretical Models

In this section, we develop two models, the prosumerism model based on the consumer equilibrium to determine the prosumer equilibrium, that is, the amount of the private good and prosumer good, as well as the relative prices. The second model is the customization model based on the principal agent framework, where the principal is the manufacturer innovator and the agent the user. By using the contract theory, we determine the level of participation corresponding to each type of user.

#### 3.1 A Model of Prosumerism

We develop a model that allows us to treat the prosumer in the following manner. Under the prosumer figure, we joint both the consumer and producer. The prosumer occupies both roles at the same time. On the one side, it is part of the users and clients of a product or service. He demands a product or service with network externalities. On the other side, by being part of a community of users his experience of consumption is crucial to the product's future development and innovation. By providing experience of use and innovative changes, he helps improving the content of the product or service. By revealing this information at no cost and knowing his contribution will be introduce into the product or service, they gain a personal reputational advantage [12].

Moreover, the prosumer positively values his participation in the development of the product. The prosumer does not receive a monetary payment for participation (this follows the tendency towards unpaid labor in presumption). It could also be the case of users that produced new products at home.

As a consumer, the prosumer faces a utility function:

$$U = xq^\theta N \quad (1)$$

Where  $x$  is a private good,  $q$  the prosumer good with network effects,  $\theta$  is a parameter that represents the intensity of the network effects. We suppose  $\theta > 1$ .  $N$  represents the size of the population (potential consumers).

The consumer has a budget constraint; his income must be at least equal to the amount of expenditures in  $x$  and  $q$ . The consumer holds a monetary payment  $\bar{y}$  and a non-monetary payment  $v$  which is the degree to which the prosumer participates in the innovation and development of the product with network externalities (prosumer good) and in the process of value creation. Following [6] if  $v=1$  there is complete generability of the network good, if  $v=0$  there is complete specificity and the participation of the users in the value creation process is limited.

This yields to the following constraint:

$$\bar{y} + vq = p_x x + pq \quad (2)$$

Where  $p_x$  is the private good price and  $p$  is the price of the good with network effects. In the case of prosumerism, it could be the case that little or no money is exchanged, as it is the case between the users and the owners of many websites (users of Facebook, Twitter). In this case, the price of the service use could be interpreted as the opportunity cost of the service; the time spent using Facebook instead of working (the unpaid wages or income).

By solving the utility maximization problem, such that  $\frac{\partial U / \partial x}{\partial U / \partial q} = \frac{p_x}{p}$  the optimization path is:

$$x = \frac{qp}{\theta p_x} \quad (3)$$

Replacing (3) into (2) we arrive at the solution of the problem:

$$q = \frac{\bar{y}}{p \left( \frac{\theta - 1}{\theta} \right)^{-v}} \quad (4)$$

Since q is a positive variable, then  $\frac{v}{p} < \frac{\theta - 1}{\theta}$ . This condition holds as  $\theta > 1$  and v and p are positive parameters.

Hence, the prosumer's good value should be lower than its opportunity cost.

Replacing (4) into (3) we get the demand of the private good x:

$$x = \frac{p\bar{y}}{p_x [p(\theta - 1) - v\theta]} \quad (5)$$

**Proposition 1:** If network effects and prosumerism are present, the economy could be demanding more prosumer goods than private goods in the equilibrium.

Consider the case where  $p=p_x$ , such that the price of the prosumer good is represented by its opportunity cost. Consumer equilibrium yields:

$$X = \frac{\bar{y}}{p_x(1 + \theta)}; q = \frac{\theta \bar{y}}{(p_x - v)(1 + \theta)} \quad (6)$$

Since  $\theta > 1$ ,  $q > x$ . However, the higher the value of  $\theta$ , the lower the quantity of q and the higher the quantity of x will be.

We suppose five possible increasing values of  $\theta$ , ceteris paribus the other parameters, to examine the relationship between q and x (Table 1 and Figure 1).

Table 1: Relationship between prosumer and private goods

v	P	Θ	y	px	N	q	X	U
0.09	1	1.1	10	1	10	11000	0.01	2789.53589
0.09	1	1.2	10	1	10	116.982286	0.92	2789.53589
0.09	1	1.3	10	1	10	47.7851521	1.83	2789.53589
0.09	1	1.4	10	1	10	27.172498	2.74	2789.53589
0.09	1	1.5	10	1	10	18.0091297	3.65	2789.53589

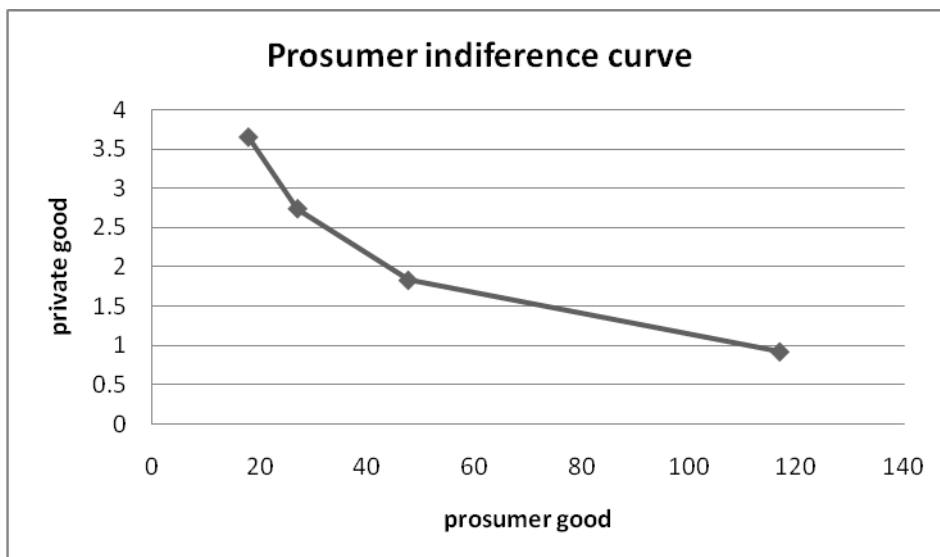


Figure 1: Choice between prosumer and private goods

### 3.2 Market equilibrium

To achieve the market equilibrium we compare the solution under monopoly with perfect competition. Under monopoly, we assume there is only one innovator or producer of the prosumer good. The monopolist income depends on the quantity of the network good sold. We assume users are homogenous so that their demands of  $q$  are equal. Then, the market demand is  $Q=q.N$ .  $N$  is supposed to be of different size: in some cases users require extensive prior knowledge to use (e.g. opens source software),  $N$  small; others require very little knowledge (e.g. making comments on a blog),  $N$  large.

The monopolist total income is the product of price  $p(Q)$  and quantities sold ( $Q$ ).

$$IT = p(Q)Q \tag{7}$$

Arranging (4) to obtain  $p(q)$  and substituting into (6) we get:

$$(\bar{y} + vq)N \frac{\theta}{(\theta - 1)} \tag{8}$$

The Monopoly equilibrium satisfies the condition that Marginal income equals marginal costs. We suppose marginal costs are constant and equal to  $c$ . Therefore, Marginal income equals  $c$ . This condition yields to:

$$\frac{Nv}{c} = \frac{\theta - 1}{\theta} \tag{9}$$

**Proposition 2:** In equilibrium, the higher the value of  $\theta$ , the higher the aggregate value of the network good relative to its production cost.

Replacing (9) into (4) we get:

$$q = \frac{\theta \bar{y}}{(\theta - 1)(p - c/N)} \tag{10}$$

**Proposition 3:** The provision of the network good  $q$  will be positive only if  $Np > c$ .

Since  $p > c$  in monopoly, then  $Np > c$ .

In the case of Perfect competition, we suppose there are many innovators or producers of the network good, as many as users. For instance, in the case of wiki audience members become active producers. In this case equilibrium holds if the price of the network good equals the marginal cost.

$$q = \frac{\theta \bar{y}}{\theta(c-v) - c} \quad (11)$$

**Proposition 4:** By comparing monopoly with perfect competition, we can demonstrate that  $q$  under competition is higher than under monopoly. This condition holds if :

$$p - c / N > -\frac{\theta v}{\theta - 1} \quad (12)$$

Which is always the case since  $p > c/N$ , and  $\theta > 1$ .

## 4 A Model of Customization

Consider the case of mobile applications. There are two business parts, the platform owner (for instance Android, or Windows Phone) and its users. Both parts transact or arrange a business contract for a quantity  $q \in (0, +\infty)$  of participation in the innovation or value creation process and a monetary transfer  $t$ . As [11] state, there are different levels of participation and involvement in the value creation process.

One of the parts, the principal, is the platform owner that sells her products to a user agent. The principal does not know certainly the innovation capability of the agent and the prior knowledge of the user which is needed to reach a proper experience of use.

The user faces an informative advantage related to the principal; he knows his knowledge and innovation capability. However, the principal knows there is an information asymmetry as she cannot observe the knowledge and innovation capability of the agent. She recognizes the existence of users of different sort, but she cannot distinguish between them. Hence, the principal offers second best contracts; each agent type receives a different contract.

Transaction gains or profits depend on a parameter  $\theta$ , the level of knowledge and innovation capability that is privately known by the agent. This parameter can take two possible values:  $l$ ,  $h$ , where  $\theta l$  means low levels of prior knowledge,  $\theta h$  means high levels of knowledge and  $N$  which is the community of users size. Since it is a market with network externalities, the larger the network (the higher the number of users), the better the utility. Thus, when transaction takes place, the agent obtains a utility of  $b(\theta, q, N) - p$ .

On the other side, the principal's utility function is  $p - c(q)$ .

Hence, the total surplus is  $s(\theta, q) = b(\theta, q, N) - c(q)$ .

To avoid restrictions coming from the analysis with a continuum of types, we focus in a simple model with two types of users: the most innovative users ( $h$ ) and the less innovative ones ( $l$ ). In this case,  $\theta h > \theta l$  and  $\text{Prob}(\theta h) = \lambda \in (0, 1)$ .

The user utility  $UA$  becomes:

$$UA = \theta_i q_i (1 + N) - p_i \quad (13)$$

The principal's utility  $Up$  is:

$$Up = \lambda(p_h - c(q_h)) + (1 - \lambda)(p_l - c(q_l)) \quad (14)$$

Where  $c(q_i) = 1/2 * \theta_i q_i^2$

### 4.1 Case $\theta$ Observable

If  $\theta$  is observable, a contract can directly specify the user's level of participation and the monetary payment, contingent in each realization of  $\theta$ . Thus, a complete information contract consists of two pairs of quantity transfer:  $(p_h, q_h) \in \mathbb{R} \times \mathbb{R}_+$  for state  $\theta_h$  and  $(p_l, q_l) \in \mathbb{R} \times \mathbb{R}_+$  for state  $\theta_l$ .

The principal's problem consists in maximizing her utility subject to the reservation utility constraints of the user:

Max

$$\lambda(p_h - c(q_h)) + (1 - \lambda)(p_l - c(q_l))$$

SA

$$\begin{aligned} U_h &= \theta_h q_h (1 + N) - p_h = 0 \text{ (Reservation utility constraint of the most innovative user)} \\ p_h &= \theta_h q_h (1 + N) \\ U_l &= \theta_l q_l (1 + N) - p_l = 0 \text{ (Reservation utility constraint of the less innovative user)} \\ p_l &= \theta_l q_l (1 + N) \end{aligned} \tag{15}$$

Where  $U_h = U_l = 0$  represent both types of user's reservation utility level, that is, the utility level they must receive to accept the platform contract. We suppose that users' participation will provide them the same level of utility reach outside (for instance, using Windows Phone instead of Android; or by producing the product themselves as in the model of prosumerism).

The participation constraint shows that the platform owner cannot force the users to participate, so the expected utility of each user must be at least equal to its reservation utility. If we introduce the cost functions (which are associated to cost of adoption) of each user type and the reservation utility constraints into the model, we get:

Max

$$\lambda[\theta_h q_h (1 + N) - 1/2 * \theta_h q_h^2] + (1 - \lambda)[\theta_l q_l (1 + N) - 1/2 * \theta_l q_l^2] \tag{16}$$

The first order conditions are:

$$\begin{aligned} \frac{\partial Up}{\partial q_h} &= \lambda[\theta_h (1 + N) - \theta_h q_h] = 0, q_h = 1 + N. \text{ Hence, } \boxed{p_h = \theta_h (1 + N)^2} \\ \frac{\partial Up}{\partial q_l} &= (1 - \lambda)[\theta_l (1 + N) - \theta_l q_l] = 0, q_l = 1 + N. \text{ Hence, } \boxed{p_l = \theta_l (1 + N)^2} \end{aligned} \tag{17}$$

**Proposition 4:** The owner transacts the same level of participation to each type of agent, but the monetary payment is higher the higher the level of knowledge and innovation capabilities of the user, and the larger the community of users.

## 4.2 Case $\theta$ Non Observable

The revelation principle greatly simplifies the analysis of these types of contracting problems. According to this principle, the platform owner can without any loss restricts contracts to the following form:

Max

$$\lambda(p_h - c(q_h)) + (1 - \lambda)(p_l - c(q_l)) \tag{18}$$

SA

$$\begin{aligned} (1) \quad U_l &= \theta_l q_l (1 + N) - p_l = 0 \text{ (Reservation utility constraint of the less innovative user)} \\ p_l &= \theta_l q_l (1 + N) \\ (2) \quad \theta_h q_h (1 + N) - p_h &= \theta_h q_l (1 + N) - p_l \text{ (Incentive compatibility constraint of the most innovative user)} \\ p_h &= (1 + N)[\theta_h q_h - q_l (\theta_h - \theta_l)] \end{aligned} \tag{19}$$

Replacing  $p_l$  and  $p_h$  into the maximizing function we obtain:



Max

$$\lambda[\theta_h q_h(1+N) - q_l(1+N)(\theta_h - \theta_l) - 1/2 * \theta_h q_h^2] + (1-\lambda)(\theta_l q_l(1+N) - 1/2 * \theta_l q_l^2) \quad (20)$$

First order conditions are:

$$\frac{\partial Up}{\partial q_h} = \lambda[\theta_h(1+N) - \theta_h q_h] = 0$$

$$q_h = 1 + N$$

$$\frac{\partial Up}{\partial q_l} = \lambda[-(1+N)(\theta_h - \theta_l)] + (1-\lambda)[\theta_l(1+N) - \theta_l q_l] = 0 \quad (21)$$

$$q_l = \frac{(1+N)[-\lambda(\theta_h - \theta_l) + (1-\lambda)\theta_l]}{(1-\lambda)\theta_l}$$

**Proposition 5:** Since  $\theta_h > \theta_l$ , the level of participation of the less innovative users will be lower than the level of participation of the most innovative ones ( $q_l < q_h$ ).

From values we obtain each agent type payments. Replacing  $q_h$ ,  $q_l$  expressions into  $p_l$ ,  $p_h$  we get:

$$p_h = (1+N)^2 \frac{(\theta_l^2 + \lambda\theta_h^2 - 2\lambda\theta_l\theta_h)}{\theta_l(1-\lambda)} \quad (22)$$

$$p_l = (1+N)^2 \frac{(\theta_l - \lambda\theta_h)}{(1-\lambda)}$$

**Proposition 6:** When innovation capabilities and knowledge are not observable, the level of participation of the most innovative users is higher than the less innovative ones; as a result, the transfer payment to the principal manufacturer or innovator is higher. In other words,  $q_h > q_l$  and  $p_h > p_l$ .

By assuming the parameters values ( $\lambda$ ,  $\theta_h$ ,  $\theta_l$  and  $N$ ) we get the contracts transacted and we can explore the relationship between the parameters and the variables  $q_h$ ,  $q_l$ ,  $p_h$ ,  $p_l$  (Table 2 and Figure 2).

Table 2: Contracts when  $\Theta$  is non-observable

$\lambda$	$\Theta_h$	$\Theta_l$	$N$	$q_h$	$q_l$	$p_h$	$p_l$
0.25	2	1	10	11	7.333333333	117.975	117.897436
0.25	2	1	11	12	8	140.4	140.307692
0.25	2	1	12	13	8.666666667	164.775	164.666667
0.25	2	1	13	14	9.333333333	191.1	190.974359
0.25	2	1	14	15	10	219.375	219.230769
0.25	2	1	15	16	10.66666667	249.6	249.435897

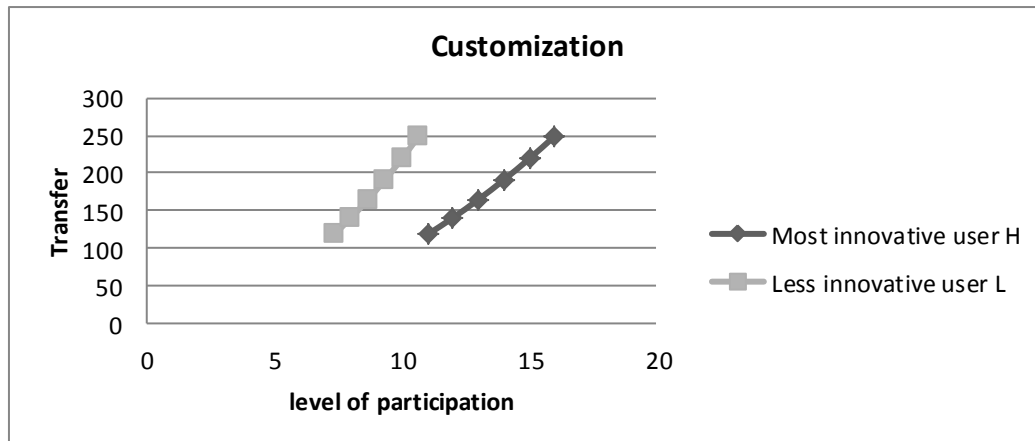


Figure 2: Contracts when  $\Theta$  is non-observable

We can observe that the level of participation in the value creation process transacted to the most innovative user is higher than to the less innovative user. Likewise, the price received from the most innovative user is higher than from the less innovative user. Usually, users with advanced knowledge and innovation capabilities have a higher reservation price than the rest. For instance, there are many social networks or mobile apps where the user must pay a higher fee to access to further services and options.

## 5 Findings

Results obtained predict abundance of the prosumer good in the prosumerism model and that the most innovative users will have a higher level of participation in the value creation process than the less innovative ones in the customization model. The first finding reinforces [7] insight about the tendency towards overprovision of new goods.

By using the word good, we refer both to services and products, but mainly to services which are more prone to promote customers participation and involvement.

The prosumerism model ensures the consumption of prosumer goods or services. If network effects increase, the demanded quantity of the prosumer good will reduce. In the case of customized goods leader users are disposed to pay a high amount of money to participate in the value creation process. Both results guarantee the sustainability of the prosumerism model in the future with more prosumer goods than private goods, and with innovative users participating in the value creation processes.

## 6 Discussion

Since the prosumerism model predicts the prosumer good will be relatively larger than the private good, results obtain confirms the idea expressed by [17] that prosumer capitalism online is increasingly a world of abundance.

In respect to the customization model, participation is opened without restrictions to customers. Similar to [9], involvement of customers becomes a democracy-enhancing development.

However, companies should provide the appropriate incentives to induce customers with high skills to participate. This finding follows [11] that fans willingness to participate depends on building the right communication skills. Those users with higher knowledge and skills will be prone to sharing their experiences under a proper communication channel. For instance, according to [15] firms can target and manage the *right* customers by customer relationship management. On the other side, following [3], another effective marketing strategies is empowering social networking site users, who become voices for a brand, to influence others to buy certain products and services. Therefore, firms should recognize the role of peer community members to promote product and services. This finding supports [14]'s idea of building social objects.

## 7 Conclusion

The recent involvement of customers in the production process is known as Prosumerism. On the other side, users are enabled to customize or modify the experience of use according to their specific needs, which is known as customization. Both processes give control to the user and are enabled by Information and Communication Technologies.

The objective of this paper is to offer a theoretical framework based on some microeconomic models and contribute to promote further analysis on these topics.

Hence, policy should encourage users' participation in the value creation and innovation processes to achieve a higher social welfare. If we assume that prosumers increase social welfare, the results obtained have important policy implications. Policies should incentivate users to innovate and create value. This policy is in line with reducing the intellectual property rights [5].

Some limitations of the paper regard the type of model used. Principal agent models are useful to address many economic issues. The type of functions and assumptions employed are generally accepted in the literature. However, we can disagree with some of the assumptions or functions supposed in the model. For instance, we could try to endogenize the network effect parameter  $\theta$ , instead of using an ad-hoc value.

Moreover, these models take special interest on the interests and skills of more digitally connected people. Hence, broadband investment is justified by the need to provide people the necessary Information and Communication Technologies (ICT) resources to encourage participation in the economic and social life.

Certainly prosumerism and customization are more suitable in some economic activities than in others. Results obtained are therefore proper for many services industries, such as game, media industry, software, among others. It is less likely to achieve abundance of prosumer good in industries such as metalmechanic.

On the other side, customer' experience of use is data. Businesses can open up their data to transform the way they compete. In this vein, policies that pretend to universalize data, promote open innovation. Open data drives innovation as users can get the data needed to innovate to improve their products and services.

Moreover, future trends move towards personalizing customer experiences to enhance customer relationship. This policy will lead to changes in the marketing priorities of a company. Once the most qualified customers are involved, customer loyalty to the brand and reputation could guarantee the process dynamic. Therefore, it seems to be a good strategy for large companies that already have a reputation for managing an effective customer service. We wonder whether these practices are leaving apart small and medium sized enterprises.

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