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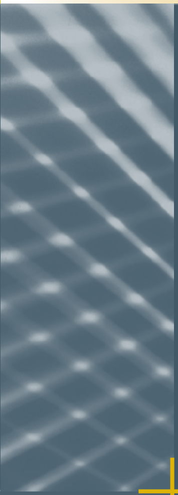
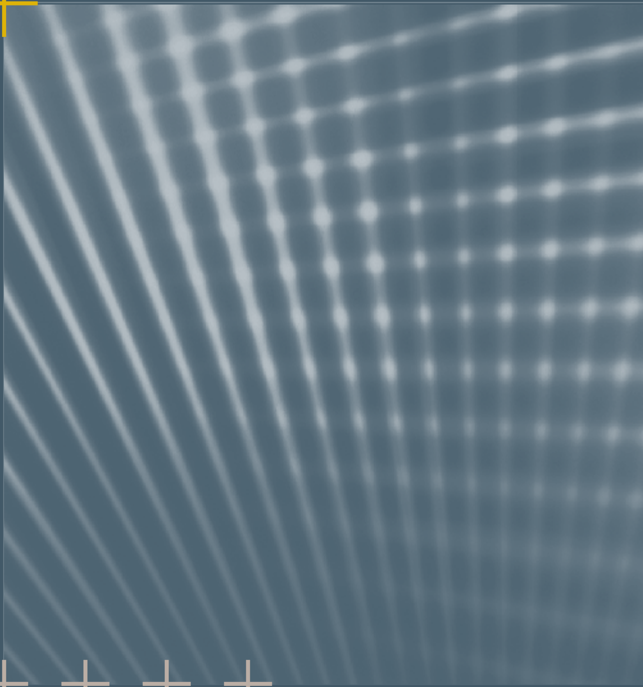


KNOWLEDGE MAP OF THE VIRTUAL ECONOMY

CONVERTING THE VIRTUAL ECONOMY INTO DEVELOPMENT POTENTIAL



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CONVERTING THE VIRTUAL ECONOMY
INTO DEVELOPMENT POTENTIAL

KNOWLEDGE MAP OF THE VIRTUAL ECONOMY

AN *info*Dev PUBLICATION WRITTEN BY:

Dr. Vili Lehdonvirta & Dr. Mirko Ernkvist

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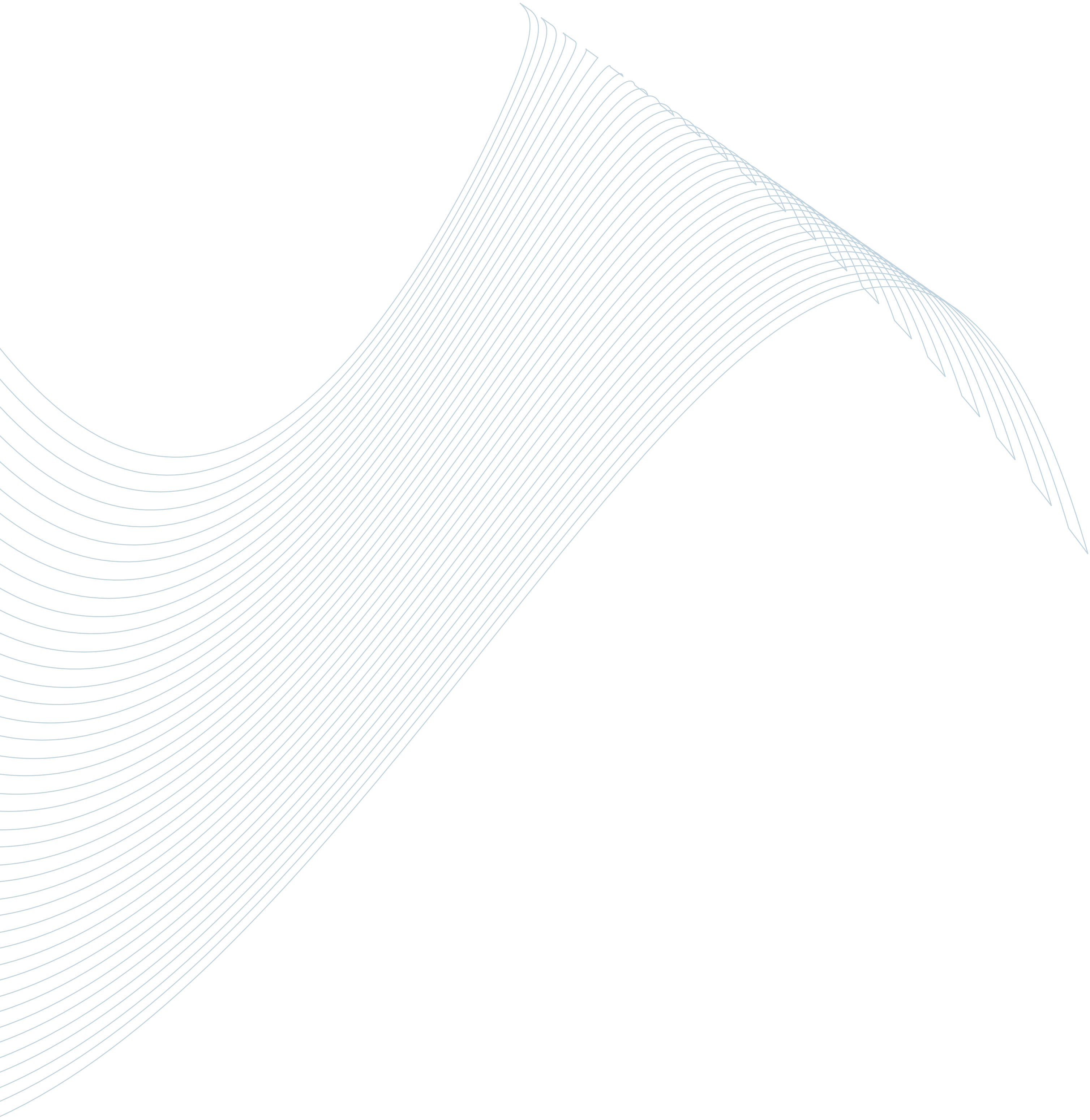
Note: All dollar amounts are in US dollars unless otherwise indicated.



Executive Summary

The widespread adoption of information and communication technologies (ICTs) in everyday life and commerce has given rise to new digital problems and challenges. Although information provided by networks is abundant, the human attention required to process it is limited. And although digital resources in principle are unlimited, many online platforms have artificial scarcities built into them as part of their design. The demand for these scarce resources, their supply, and the markets where the supply and the demand meet, constitute a computer-mediated *virtual economy*.

During the past decade, developing countries have rapidly followed developed countries in ICT adoption, and in some areas, such as mobile payments, even surpassed them. However, developing countries' roles in the digital economy mostly have been limited to being users and consumers of technology. Creating new digital services and technologies for the global market requires advanced skills and infrastructure, and continues to be out of reach for most entrepreneurs in developing countries.

In contrast, entrepreneurial opportunities in the virtual economy of digital scarcities have sometimes been successfully exploited, even with limited skills and infrastructure. A prominent example of this is the *third-party gaming services industry*. An estimated 100,000 young, low-skilled workers in countries such as China and Vietnam earn their primary income by harvesting virtual resources and providing player-for-hire services in popular online games such as *World of Warcraft*. The demand for these services comes from millions of wealthier players who have a serious interest in the game world and the social connections it facilitates, but lack the time (and patience) to reach far into the game alone.

Development impact

The gross revenues of the third-party gaming services industry were approximately $3.0 billion in 2009, most of which was captured in the developing countries where these services were produced. In comparison, the global coffee market, on which many developing countries are highly dependent, was worth over $70 billion—but only $5.5 billion was captured by the developing countries that produced the coffee beans. This suggests that the virtual economy can have a significant impact on local economies despite its modest size. It can also support the organic development of local ICT infrastructure by providing revenue models that maintain existing deployments and justify new private investments.

The third-party gaming services industry is one example of a virtual economic activity that creates value for the customer by overcoming artificial scarcities. Another example is a marketing agency that pays users to inflate the number of fans a particular brand has on a social networking system, such as Facebook, in order to boost that brand's visibility in searches. A problem with services that create value by overcoming artificial scarcities is that they degrade the value of the platform for other users. As a result, their net social value can sometimes be negative.

A different set of virtual economic activities creates unambiguously positive value by helping customers overcome natural scarcities that linger in the digital world. A prominent example of this is the *microwork industry*. Thousands of men and women in countries such as India and Kenya earn primary and supplementary income by completing simple human intelligence tasks, such as assessing whether two images are of the same product, or transcribing a fragment of handwritten text. The demand for these services comes from companies, such as Amazon, that rely extensively on digital technology in their everyday business, yet find that computers are not yet able to do all of the tasks required of them.

In contrast to the third-party gaming services industry, the microwork industry is still a new and emerging phenomenon. Although microwork itself requires no technological expertise, converting computational and business problems into microtasks and thus making them addressable by microworkers is a significant technological challenge. A handful of start-up companies are currently working on expanding the range of problems that can be addressed by microworkers. The potential market size is difficult to estimate, but could reach billions of dollars per year in the next five years, as the technology matures. Others are working on easier user interfaces and more efficient distribution methods to allow microwork to be offered to some of the poorest and least educated workers in developing countries.

Scope for interventions

Like traditional labor-intensive industries, activities in the virtual economy are organized into value chains that include functions such as marketing and quality control besides the manual work itself. The manual work is typically carried out in developing countries, while the customer-facing functions are generally located in developed countries. In the long run, wage competition is likely to limit income development from the manual work. For a sustained development impact, it may be necessary for microwork entrepreneurs in developing countries to find ways to upgrade their positions in the value chain, and to offer a more diverse range of services, with higher value-added. The gaming services industry successfully underwent such a transition during the last decade. All aspects of the third-party gaming services value chain—from production to marketing—can now apparently be carried out from countries such as China and the Philippines. As a result, the industry may employ as many as tens of thousands of skilled customer service and management staff in these locations.

Planned donor or NGO-led interventions could enhance the development impact of the virtual economy. Interventions should focus on segments based on natural instead of artificial scarcities in order to ensure that their net social contribution is positive. The most prominent current example is the microwork industry. It is recommended that development interventions focus on three aspects of microwork: enabling demand for microwork, building capacities for the supply of microwork in developing countries, and helping producers in developing countries to upgrade their businesses to increase the value generated. The latter two objectives could be addressed with the development of software tools that facilitate the conduct of microwork. To be successful in least-developed countries, such tools would have to be primarily mobile-based applications.

Besides microwork, development interventions could help promote the development of new digital networks and services that have potential to provide jobs in the virtual economy in the future. In the same way that access to high speed Internet backbone connections helped India develop its business process outsourcing (BPO) industry in the 2000s, so the development of mobile broadband networks (so-called 3G and 4G networks) could assist a wider range of developing countries to create jobs and generate wealth from the new opportunities that the virtual economy brings.

Chapter 1

Introduction

1.1 Background

The widespread adoption of ICTs in everyday life has given rise to a massive new market for digital goods and services. Addressing the business opportunities in this market has traditionally required significant skills and infrastructure, putting them out of reach for most people in the developing world. However, new marketplaces and value chains have emerged that provide digital earning opportunities for semi-skilled and unskilled workers with access to relatively basic digital infrastructure. Thousands of students and migrant workers make a living in China by playing online games and selling the resulting virtual assets to wealthier players (Heeks 2009). A growing number of crowdsourcing and "microwork" platforms employ unskilled workers in digital tasks ranging from pattern recognition to data input. This "virtual economy" of digital goods and services, and its potential for economic and social development, are the subject of this report.

This report is the first phase in an *info*Dev project to identify and exploit development opportunities in the virtual economy. It is a "knowledge mapping" exercise to understand "what we know and do not know" in a particular field. It draws on existing literature and expert opinions to provide a birds-eye view that can be used as the basis for further research and possible interventions. The report also benefited from discussions at the *info*Dev Virtual Economy workshop held as part of the ICTD 2010 conference at Royal Holloway, University of London, on 13 December 2010.[1]

Existing literature is critically lacking in some of the key interest areas of this report. Western accounts of Chinese "game laborers", which are understood to be part of a multi-million dollar industry, are mostly based on a handful of journalistic accounts (Nardi & Kow 2010). The same data is echoed from one publication to another. In the case of the microwork industry, which is distinguished in this report as a separate concept from the more established notion of crowdsourcing, relevant research has simply not been carried out yet due to the novelty of the industry. In these areas, it was necessary to complement the report with primary research. The resulting novel data and analyses should prove useful in understanding the development potential of the virtual economy.

1.2 Structure and scope of this report

The report is structured as follows. The next section introduces the theoretical notion of a "virtual economy" and explains how it is distinct from other ICT-related economic activities. The following sections describe in detail the main areas of the virtual economy, their economic impact, business models and value chains. The two major areas of the existing virtual economy are identified as *1) third-party gaming services* and *2) microwork*. This report will focus largely on these two distinct but conceptually related areas. Gaming services is an established industry that provides a rich set of evidence for analysis, while microwork is an emerging industry with apparently significant development potential. Other existing activities within the virtual economy are categorized as *3)* marketing related paid-for connections in social media (*"cherry blossoming"*), and *4) user-created virtual goods* in virtual environments. These are not covered in detail due to their limited development potential, at least at present.

The sixth section analyzes the development potential of the virtual economy. Development potential is here understood as the ability to provide income to local economies through employment and

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[1] See "Finding development potential in the scarcity of the virtual economy" at: http://www.infodev.org/en/Article.659.html.

entrepreneurial opportunities. Both short-run opportunities and long-run income development are considered. Development potential also includes the ability to support the development of local ICT infrastructure. In the final section, the report summarizes the key findings, identifies important gaps in current knowledge, and sketches out the scope for possible donor or NGO-led interventions towards maximizing the development potential of the virtual economy.

The geographical scope of the report is, in principle, global, but in practice the majority of empirical evidence concerning the gaming services industry is from China, due to the dominance of actors from that country. Some care must thus be taken in drawing conclusions for less developed countries. In this report, we analyze the value chains of the current microwork industry that span from Western countries to developing countries in Asia, Africa, and South America.

1.3 Methodology

The main analytical framework used in this report is a variation of value chain analysis used in development studies, as described below. The main sources of data were the existing literature (cited where appropriate) and expert interviews (described below). New primary data was also gathered through a survey of Chinese gaming services producers and from the corporate database of CrowdFlower, one of the companies that is active in the microwork industry. These will be described later in their respective sections.

1.3.1 Value chain analysis

A value chain analysis describes the activities that bring a product through the different phases of production, distribution, and marketing to the final consumer. It also involves describing possible ways to capture more value though different forms of upgrading strategies. Intra-firm value chain analysis was first introduced by Porter (1985). The approach was subsequently expanded also to supply chains.

There are some characteristic features of value chain analysis that make it suitable for development studies (Kaplinsky & Morris 2001). First, it recognizes the different bargaining power of different actors in the transaction environment, and provides a framework for understanding the competitive and commercial viability of different actors in the industry. This way, it acts as a powerful framework for development programs and efforts to create entrepreneurial opportunities for poor people, and enables empirically grounded assessments of the different barriers and challenges in the industry. Secondly, it focuses on the concept of value added or captured, as opposed to simple gross revenues. This way, it makes it possible to assess the development impact of the industry separately at each country and locality involved, including at the bottom of the economic pyramid.

1.3.2 Expert interviews

The experts interviewed for this study are listed in the *Acknowledgements*. They consist of corporate managers involved with various areas of the virtual economy as well as scholars and journalists who have investigated virtual economic phenomena first-hand. An initial set of key experts was identified from literature and a second set through referrals from the first set. Despite efforts to contact relevant experts in the developing world, the majority of the informants represent developed country actors, although with first-hand knowledge of activities in the developing world. The interviews were semi-structured and focused on each informant's areas of expertise. The results are reported in a consolidated form that integrates informants' opinions with analysis without distinguishing between individual informants, except when there is a particular reason. This mode of presentation was necessary for conciseness.

1.3.3 Market size estimates

A major outcome of the knowledge mapping exercise is an assessment of the current market size and future market potential of various branches of the virtual economy. There are two basic approaches to assessing the size of an industry or market: supplier side and buyer side. The former involves obtaining, aggregating, and extrapolating revenue figures from suppliers operating in the market. The latter approach involves estimating the total consumption of the goods provided in the market. If the buyer population can be defined and sampled sufficiently, accurate estimation can be accomplished with a survey study. In industries with complex value chains, or where suppliers and buyers are difficult to define accurately, revenue figures from intermediaries or from complementary products may be used as proxies for the purposes of estimating market size and trends.

Economic activity in the virtual economy is highly distributed. There are numerous suppliers and consumers, and almost no systematically collected data exists especially on the supply side. For estimating the economic impact of the third-party gaming services industry, this report uses the following methods:

1. Reviewing previous estimates and guesstimates. The report collects and critically assesses previous estimates from literature and informants. Some industry informants are in an intermediary role and thus able to estimate at least one fragment of the market with some accuracy.
2. Calculating a new estimate using the buyer side approach. Results from a number of credible survey studies by the Korea Creative Content Agency, the China Internet Network Information Center, the International Data Corporation and others are used as the basis. By comparing the data from the developed Korean market with that from the developing Chinese market, the report also attempts to account for the difference in gaming services spending in developed versus developing countries. This has become increasingly important following the rapid growth of domestic online game markets and the associated gaming services markets in developing countries.

In the microwork area, this report presents analysts' revenue estimates from two related markets, BPO and paid crowdsourcing, and assesses future market potential based on this and other evidence.

Chapter 2

Defining and Segmenting the Virtual Economy

2.1 From digital abundance to virtual scarcity

The economic impact of the pervasive adoption of ICTs in developed countries since mid-1990s can be characterized in terms of an eradication of scarcities (Shapiro & Varian 1999). Digital technology made it possible to duplicate and transmit various information goods at near-zero marginal costs, eradicating scarcities in media and entertainment distribution. Computers and digital communication channels made it possible to automate common office tasks such as distributing memos, thus eradicating scarcities in clerical work. The resulting abundance has been a boon for many. Companies enjoy new efficiencies and better access to markets. Consumers enjoy unprecedented access to a massive wealth of information and entertainment, and even digitally connected consumers in developing countries benefit greatly.

At the same time, industries and individuals whose economic contribution was based on overcoming the old scarcities, such as music distributors, newspapers, and low-skilled white-collar workers, have seen their earning opportunities diminish. This "digital economy" mostly has created new earning opportunities for workers and entrepreneurs with advanced professional skills in disciplines such as technology and marketing (Florida 2002). They have been able to create and capture new scarcities in the economy. Unskilled workers and developing countries have largely not been able to find business opportunities in the digital economy.

However, as the digital economy has grown, new services and platforms have started to give rise to a new set of economic opportunities that seems to contradict the previous history. Individuals with no formal training or qualifications are able to harvest virtual goods and currencies in online games and sell their holdings to other players for real money. Journalistic accounts suggest that thousands of people in countries such as China and Vietnam earn their primary income this way (Heeks 2008). A growing number of paid crowdsourcing and "microwork" platforms provide primary and supplementary income to unskilled workers in tasks ranging from pattern recognition to data input.

What is common to these new earning opportunities is that they are characterized by the discovery and development of *digital scarcities that can be exploited without advanced skills*. In the case of virtual goods, scarcity is artificially created and maintained by the publishers of online games and social networking sites for the purpose of making the goods desirable. Game laborers toil to harvest these goods and sell them on others. In the case of microwork, natural scarcity remains in the supply of labor for clerical work that could not be automated because of the limitations of computing technology. Companies in the microwork industry have invented ways to use technology to make this work addressable by unskilled workers all over the world. These and other emerging digital scarcities that require time, effort, and comparatively few specialized skills and resources to exploit are referred to in this report as the "virtual economy".

Edward Castronova (2006a) first used the phrase virtual economy to refer to artificial economies inside online games, especially when the artificially scarce goods and currencies of those economies were traded for real money. The phrase was subsequently adopted in this meaning among game scholars and in the game industry. As virtual currencies have started to be used in online services other than games, such as social networking sites and crowdsourcing platforms, the term virtual economy has started to see wider application. This report's definition of the virtual economy builds on this meaning and further widens it by recognizing that not only are virtual goods and currencies scare and tradable within digital marketplaces, but so are many other intangible commodities, such as human effort.

The relationship between the physical ICT infrastructure, the digital economy of services supported by the infrastructure, and the virtual economy that emerges from the digital services, can be depicted as a three-layer model (Figure 1). Existing studies on ICT and development focus on the two bottom layers: how ICT infrastructure is produced and maintained in developing countries, how hardware manufacturing creates jobs, and how digital services can be used to enhance productivity in sectors such as agriculture and trade (e.g., UNCTAD 2010). At the same time, the proliferation of digital services from e-commerce to social networking services in developed as well as developing countries has given rise to new digital needs and problems. This demand, the supply that has arisen to meet it, and the markets where this demand and supply meet, together comprise the virtual economy.

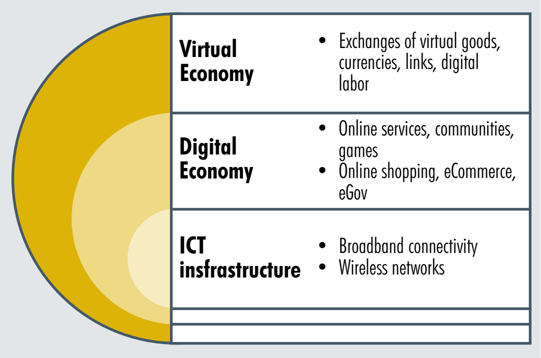
2.2 Key characteristics and differences from traditional digital content industries

The following characteristics are typical of the virtual economy:

- Centers around commodities that are digital yet scarce
- Demand arises from the increasing use of digital services in business and leisure
- Supply is created through the expenditure of human effort, and doing so requires relatively few specialized skills or resources

The virtual economy can be contrasted with the traditional digital content industries that produce content for the digital economy. Traditional content includes such things as music, video, images, news articles, and any other goods that can be represented in digital form. Economists refer to such goods as *information goods*, because they differ from most ordinary goods in two important ways (Shapiro & Varian 1999). The first difference is that, from a producer's point of view, information goods involve high fixed costs but low marginal costs of production. Creating the first copy of an information good may require substantial effort and investment, but once that is done, the cost of creating additional copies by duplicating the original is negligible. The second difference is that from a consumer's point of view, information goods are "experience goods": that is, their value is derived from experiencing them and absorbing their content.

Figure 1. *Three-layer model of ICTs and economy*


Virtual Economy
Exchanges of virtual goods, currencies, links, digital labor
Digital Economy
Online services, communities, games
Online shopping, eCommerce, eGov
ICT infrastructure
Broadband connectivity
Wireless networks

Source: Author's elaboration

In contrast, the commodities of the virtual economy, also known as *virtual goods*, are similar to ordinary goods. Their production can involve significant marginal costs. These costs may be due to natural scarcities, as is the case with microwork, where every individual task must be handcrafted. Although bits, the "raw material" of these goods, are abundant, the supply of human effort is scarce and imposes a marginal cost of production. In other cases, significant marginal costs of production arise from artificial hurdles placed in the way of would-be producers by the designers of the platforms. These hurdles may be necessary to safeguard the value of the goods. In the case of online games, virtual items and accessories that in principle could be duplicated at no cost are made unique and meaningful by requiring that significant effort be expended in order to obtain them.

The value that consumers obtain from virtual goods is consummated in a range of ways (Lehdonvirta 2009a). Some aesthetically pleasing virtual goods might be consumed like information goods, by experiencing them (Denegri-Knott & Molesworth 2010). But a more important reason why consumers buy virtual goods is that the goods are built so as to have tangible uses and functions in the games and digital environments where many people play out parts of their social lives today. Virtual goods are also used to signal social distinctions and bonds in the same way as material consumption commodities (Martin 2008; Lehdonvirta 2009b; Lehdonvirta, Wilska & Johnson 2009). Thanks to artificial scarcity, virtual goods are able to distinguish haves from have-nots in the digital environment—something that information goods that can be infinitely copied are not good at. In this sense, digital consumers are often no less materialistic than material consumers: the only difference is that their material has become digital (Lehdonvirta 2010). In business use, the value of virtual commodities such as microtasks is likewise functional rather than informational: they are cogs in a large machine.

Because of these differences, the value chains and markets of the virtual economy are in principle fundamentally different from those of the traditional digital content industries. Traditional content industry employs a small number of highly skilled producers, while the suppliers in the virtual economy use a large number of less skilled workers. Traditional digital content loses its value fast as its novelty wears out, while virtual goods can be more valuable years after their creation than they were initially. It should be noted that the companies that produce the platforms on top of which virtual economies operate, such as online games and digital work exchanges, are themselves usually part of the traditional content industries.

In practice, the distinction between the virtual economy and traditional content industries is not always as clear. Digital music and film distributors use digital rights/restrictions management technologies (DRM) to impose artificial scarcity on media files, which brings them conceptually closer to virtual goods (Lehdonvirta & Virtanen 2010). Online retailers adopt virtual currency based loyalty programs. Crowdsourcing-based content production models blur the boundaries between traditional web content production and microwork. Many objects of value may in the future find expression in scarce digital form, and be sourced and exchanged through lightweight online interactions rather than through the more rigid structures of the formal economy. However, this report focuses on today's commercially significant areas that are distinct from traditional content production activities.

2.3 Segmenting the virtual economy

Commercially significant activities in today's virtual economy can be roughly categorized into four segments:

- Third-party online gaming services
- Microwork
- "Cherry blossoming"
- User-created virtual goods production

The third-party online gaming services segment consists mainly of activities known as "gold farming" and "powerleveling". Both are essentially services where an online game player hires someone else to play the game on their behalf. They do this in order to obtain the virtual rewards of the play without having to spend the time and effort. In contrast, the microwork segment consists mainly of services catering to business clients. It involves breaking insurmountable computational problems into simple human intelligence tasks or "microtasks" that can be distributed to and addressed by human workers.

"Cherry blossoming" is a term used in this report to refer to small marketing related digital tasks, such as "liking" a brand's Facebook page against a small pay. It resembles microwork in that it involves recruiting large numbers of workers to complete small tasks for a business client. However, unlike microwork, the tasks involve overcoming artificial scarcities created by the designers of the platforms. In this aspect, cherry blossoming is comparable to third-party online gaming services. The user-created virtual goods segment consists of activities for producing and selling user-generated virtual items, textures and other artificially scarce virtual objects for virtual environments such as *Second Life* and *Instant Messaging Virtual Universe (IMVU)*. Although the resulting goods are artificially scarce to the buyers, the real scarcity overcome by this activity is the effort required to design the goods.

The four segments of the virtual economy, their target groups, and scarcities are depicted in Table 1. In the following sections, the segments are analyzed in detail, focusing especially on the segments with significant development potential: third-party online gaming services and microwork.

TABLE 1. *Segmenting the virtual economy*

	Artificial scarcity	**Natural scarcity**
Consumer oriented	Third-party online gaming services	User-generated virtual goods production
Business oriented	Cherry blossoming	Microwork

Source: Author's elaboration

Chapter 3

Third-party Online Gaming Services

3.1 Demand and supply

Online games have become a hugely popular form of entertainment and social interaction. Hundreds of millions of people around the world regularly play online games. Among some players, there is a latent demand to purchase advances in online games for real money. For example, in so-called massively-multiplayer online games (MMOGs), players repeatedly kill hundreds of monsters in order to develop their characters and obtain rare objects. This activity takes place in the context of a community of players, who compete for, collaborate with, and compare each others' virtual possessions. As a result, virtual goods in the game obtain a social status value in the same way as consumer goods do in physical environments. Some players would rather buy those objects to enjoy their benefits than spend time and effort to obtain them through their own play. Some rare objects may not even be obtainable through gameplay any longer. This gave rise to a play-to-player "secondary market" where virtual game assets are traded for real money.

Virtual currencies, items, and characters were first traded for real money in the early online games of the 1980s (Hunter 2006). The practice became widespread in the MMOGs launched in the late 1990s, such as *Ultima Online, EverQuest,* and *Lineage* (Castronova 2005; Huhh 2008). In these games, normal gameplay involved hundreds of thousands of players trading game items, accumulated during months of play, for other game items. The designers intended the games to be like *Monopoly*: no real money would change hands. But around 1999, some players began to put their game goods on auction at ecommerce sites such as eBay. Perhaps surprisingly, they soon received bids from other players. When an auction was completed, payment was carried out using ordinary means, such as check or money order. The two players then met up in the game and the seller handed the auctioned object to the buyer. This way, an exchange value measured in U.S. dollars or Korean Won could soon be observed for virtual goods ranging from characters to gold nuggets (Lehdonvirta 2008). A major object such as a castle could easily be worth hundreds of dollars. The biggest player-to-player trade reported in the media was the 2007 sale of a character in the online game *World of Warcraft* for approximately $9,500 (Jimenez 2007).

Today's surveys suggest that approximately one in four MMOG players engage in real-money purchases on a yearly basis (see the following section). The trade no longer takes place between normal players: commercial suppliers have entered the market. In this report, they are referred to as the third-party gaming services industry, as they provide "gaming services" for a fee. They are third-party, because they are not affiliated with the game publishers. The goods and services that they offer to players fall into two broad categories (Gilmore 2009):

- Virtual goods and currencies. Instead of spending time and effort to earn game currency themselves, players can purchase the currency from the gaming services industry, which spends the effort for them.
- Powerleveling. This is a "player-for-hire" service where a professional player takes control over a normal players' character for a few hours, days, or even weeks, in order to build up the characteristics of the character. Powerlevelers also sell "ready-made" characters.

One industry informant suggests that virtual currency sales account for more than three quarters of the market. Powerleveling and ready-made characters account for most of the rest.

In most games, the publisher of the game does not endorse the secondary market for virtual goods and services, and trading takes place on third-party marketplaces. There are also some secondary markets that are sanctioned by the publisher. In 2005, Sony

Online Entertainment, one of the biggest Western online game publishers, launched a marketplace where game assets belonging to certain of its games can be traded for real money against a transaction fee (Robischon 2007). Other game operators have generally not followed Sony's example. Live Gamer, a company that provides virtual commerce platforms for game publishers, operates Sony's marketplaces today.

More recently, many game publishers have begun to respond to the demand for virtual goods by selling the goods to players themselves (known as the "item payment" or "free-to-play" model). On one hand, this legitimizes the idea of trading virtual goods for real money. It has become the dominant revenue model for online games in Asia and increases the overall virtual goods market size (Lehdonvirta & Virtanen 2010). On the other hand, it also means that significant parts of the value added by the third-party gaming services industry is being co-opted and taken over by the official game publishers. The "primary market" for virtual goods competes directly with the suppliers in the secondary market. However, many games, including *World of Warcraft*, the most popular online game globally, have largely stayed away from this model. There continues to be significant demand for third-party gaming services, as shown in the following section.

The influence of game publishers' revenue models on the opportunity for third-party gaming service providers is summarized in Table 2.

3.2 Market size

The third-party gaming services market has to be understood in relation to the global market for online games. This section first gives an overview of the growth of online game market. The official online game market numbers presented in online game market size estimate section do not take into account the market for third-party gaming services served by gaming studios. This is followed by an analysis of the size of the gaming studio market. The analysis includes an overview of earlier estimates from the literature as well as a new estimate, presented in this report, that uses a new estimation methodology.

3.2.1 Online game market size

Early data on the global online game market is sparse, but one major industry analyst firm suggests that the global market was around $1.45 billion by 2003 (DFC Intelligence 2008). In recent years, KOCCA in Korea has made efforts to analyze and aggregate different sources in order to come up with a more reliable estimate. The sources include estimates from a large number of industry analysts and industry organizations in different countries (KOCCA 2010). KOCCA's analysis indicates that the global market for online games was $12.6 billion in 2009, up from $8.5 billion two years earlier (Table 3). In terms of geographic breakdown, the current market is dominated by East Asia with China as the biggest market accounting for 32% ($4

TABLE 2. *Opportunities for third-party gaming services in different types of games*

Game publisher's revenue model	Opportunities for third-party gaming service companies
Subscription based revenue model	High. The inability of the official game operator to support trade of most forms of virtual products and services creates a large, latent demand to be fulfilled by third-party gaming services. Value creating opportunities limited by different barriers to trade, including efforts by the games operator to curb it.
Virtual goods sales based revenue model	Low. The ability of the official game operator to address the latent demand limits third-party providers' opportunities. The degree depends on the specific design and revenue model of the game, e.g., does it use a separate "earnable currency" and "buyable currency". Some third-party services, such as powerleveling, may remain very valuable.
Sanctioned marketplace	High. The operator demands a relatively high transaction fee from trades conducted on the official marketplace, but this is offset by better security and easier access to customers.

Source: Author's elaboration

TABLE 3. *The global online game market (in millions)*

Year	China	Korea	North America	Europe	Japan	Others (primarily developing countries)	Total
2007	$2,200	$1,700	$1,500	$1,600	$700	$800	$8,500
2008	$2,400	$2,600	$1,700	$2,000	$800	$900	$10,400
2009	$2,900	$4,000	$1,800	$2,000	$900	$1,000	$12,600
2010 Forecast	$3,700	$5,000	$2,200	$2,500	$900	$1,100	$15,400
2011 Forecast	$4,500	$6,000	$2,500	$2,900	$1,000	$1,100	$18,000
2012 Forecast	$5,600	$7,200	$2,900	$3,300	$1,000	$1,200	$21,200

Source: KOCCA (2010)

Notes: 1. The market figures include both revenues derived from business models based on subscription fees for online games and revenues derived from the sales of virtual items and services by the game operator.

2. While the forecasts for the developed markets (Korea, North America, Europe, Japan) are reasonable, the authors believe that the future market growth potential for developing countries under the heading "others" is underestimated. The growth forecasts do not take into account the accelerating growth rate that is likely to be seen in several developing East Asian countries. Several recent industry analyst reports also suggest more rapid growth in these countries (e.g., Niko Partners 2010, Strategy Analytics 2010, IDC 2010).

billion) of the global market, followed by Korea with 23 % ($2.9 billion).

During its early period, the industry had a high growth rate. Data from industry analysts indicate an annual growth rate of around 50% from 2003–2005 (DFC Intelligence 2008). This period could be identified as the phase of early adopters in the online game industry. In recent years the industry has entered a stage in which the early majority has started to play online games, with a global annual growth of around 20%. This is also the growth rate forecast for the next few years (see Table 3).

It should be noted that this change represents a general pattern of the industry, and not the high heterogeneity seen between specific markets. Looking closer at specific regions, a highly diverging growth pattern between developing and developed countries is evident. There is a dual global market structure in which several developing countries increasingly drive the growth of the global online game market, while several of the Western markets have considerably lower growth rates. This is also a theme that can be seen in several recent analysts' reports, in which the rapid growth of developing countries in East Asia is highlighted as important (Niko Partners 2010, Strategy Analytics 2010, IDC 2010). An industry analyst has estimated that the near-term opportunities for further rapid online game market growth in East Asian developing countries are primarily seen in Indonesia, Malaysia, the Philippines, Thailand, and Vietnam (Niko Partners 2010).

3.2.2 Earlier estimates of third-party gaming service market size

Compared to the market size for online games, it is more difficult to measure the size of the secondary market for gaming studios that is not measured by industry organizations, government bodies, or disclosed in company public filings.

In order to estimate the market size, earlier estimates have relied on two methods, 1) *trade platform transaction aggregation* and 2) *industry manager guesstimates*. What could described as a third method has been to derive a market estimate based on a *mixed method* that combines these two methods and earlier results in their aggregation.

The first method was initially the dominating one among researchers and analysts. The method tries to derive aggregate figures from a limited set of transactions taking place at the dominating trade platforms for virtual items.

Edward Castronova (2005, 2006a, 2006b) was the first economist to study the real-money trade (RMT) of game assets. In 2001, he guesstimated the size of the RMT market to $5 million by measuring the daily volume of RMT transactions on eBay for the dominant online game at the time, EverQuest (Castronova 2006a). In 2004, Castronova estimated the total volume of RMT transactions on the dominating global trading platforms eBay and Korean ItemBay at $100 million per year.

As trade volumes increased, what started as a player-to-player phenomenon was soon recognized as a business opportunity. Third-party intermediaries such as IGE emerged to buy valuable virtual goods from players, repackage them, and resell them to players for considerable profit (Dibbell 2006). They acted as market makers and made the trade considerably more efficient and easier than it had been before. As a major market platform, IGE also had information that researchers lacked. In 2004, IGE's president guesstimated the size of the global secondary RMT market as $880 million per year. However, he did not provide a detailed description of his method. The declining market share of IGE and a more fragmented market that followed meant that this form of industry manager guesstimating no longer provides the same reliability.

In 2007, Lehtiniemi and Lehdonvirta estimated that the size of the global primary and secondary RMT market had reached $2.1 billion, based on an aggregation of different sources (Lehtiniemi & Lehdonvirta 2007). This figure was the first to include primary market activity as well as secondary market activity. Primary market activity refers to virtual goods sales directly from game publishers to players. Secondary market activity refers to sales by third parties. In the late 1990s the market consisted almost exclusively of secondary market activity, but more recently, primary market activity has been growing rapidly. Market research firm In-Stat estimates that the primary market size reached $7.3 billion in 2010 (Reisinger 2010). A Korean government agency estimated in 2008 that the value of secondary market trading might have exceeded one trillion Korean Won ($900 million), in Korea alone (Park 2010). This report is mainly interested in the secondary market activity, i.e. the part of the virtual economy of online games that is managed by actors other than the game publishers.

Both of the two earlier methods of estimating the secondary gaming service market are less reliable in the current market environment. Industry manager guesstimates have become less reliable in a market environment that is fragmented without any dominating third-party intermediary company for secondary market transactions. The trade platform transaction aggregation has also become less reliable. The method had certain flaws from the onset, e.g., it did not take into account the part of the secondary market trading that took place outside these platforms, such as direct player-to-player transactions. More importantly, the method has become increasingly uncertain as previous estimates were made at a time when there were only a few dominating retailers in the market. The current market is considerably more heterogeneous and difficult to grasp. It is characterized by a large number of trading platforms with shifting market share numbers. Players access gaming services through a variety of channels: direct marketing, consumer-to-consumer (C2C) platforms, and various intermediaries. Different geographical markets are using different platforms. Developing countries such as China also have a thriving domestic secondary market for their own player base.

3.2.3 Estimating the gaming service market through player surveys

Because of the changes in market conditions detailed above, today, the best approach is to estimate the market size from data derived directly from player surveys rather than intermediate retailers. A lack of credible survey data was previously a barrier for this method. However, the number of suitable surveys, their reliability and geographic coverage has increased in the recent years. This report relies on a selection of surveys conducted by governmental agencies, market analysts and scholars.

Based on data on the number of players using secondary markets and their annual spending (secondary market average revenue per user, ARPU), it is possible to calculate an estimated size of the secondary market and hence the third-party gaming services industry. To improve accuracy, the analysis takes into account the differences in secondary market spending habits in markets with different economic characteristics (e.g., developed versus developing countries). This method also has its disadvantages and uncertainties. Some of these are a result of the method itself; others are related to the empirical data used. For example, while some surveys only cover virtual currency transactions, others also include powerleveling and virtual item sales. The various sources of uncertainty in this method are summarized in Appendix 1.

The estimate is calculated using the following formula:

> Secondary market size in a region = (the number of paying online game players in the region) x (share of players using the secondary market in a region) x (the average amount of money spent on RMT per player per year in the region).

Participation ratio

Participation ratio in the secondary market for gaming services is presented in Table 4 together with survey sources. The surveys indicate that around one in four online game players are buying secondary market gaming services each year, with slightly higher percentages in Korea and China than in the Western market. The results are remarkably consistent across surveys.

Average spending on the secondary market

Compared to the participation ratio, average spending on third-party gaming services is more difficult to get access to though surveys and also more at risk of retrospective misreporting (players are more likely to accurately recall if they have used secondary market gaming services than to accurately recall the exact amount they spent). A Korean government agency survey provides the most reliable data on the subject, but the data had to be modified somewhat in order to arrive at a number of average spending. The survey data did not enable a calculation of average spending directly. Instead, this number had to be derived from a calculation of a weighted average of consumer spending in different spans (share of players spending $0–4, $4–9, and so on). Despite these transformations, the numbers presented should be roughly accurate.

Table 5 presents the estimated annual average spending for developed and developing countries. In order to arrive at an estimate of average spending in developed countries, data from a 2009 Korean governmental survey was used. Based on this data it

TABLE 4. *Percentage of players buying from the secondary market*

Region	Percentage of players buying from the secondary market	Source	Note
Korea	24.2%	KOCCA White Paper on Korean Games (2010)	Survey conducted 2009. N = 772.
China	24.9%	CNNIC (2009a)	Survey conducted in 2009
North America, Europe and Japan	22%	Yee (2005)	
Other regions	24%	Author's estimate	The majority of other significant regions for the secondary market are located in Asia. The participation ratio for these markets is estimated to be roughly the same as for major Asian markets (China, Korea).

Source: Authors' calculations based on sources listed

TABLE 5. *Average amount spent on the secondary market per year*

Region	Estimated annual average secondary market spending (among participating players)	Source and notes
Developed regions: Korea, Europe, North America, Japan	$369	Estimate derived from Korean governmental survey (KOCCA 2010)
Developing regions: China and other developing countries	$87.50	Estimate derived from Chinese governmental survey (CNNIC 2009a)

Source: Authors' calculations based on sources listed

is estimated that an annual average spending is around $369 for players using the secondary market. This data was extrapolated for other developed markets (Europe, North America, Japan) with some minor modifications. For developing countries, survey data from a 2008 CNNIC survey was used, which yielded an estimated average annual spending of $87.50 per player using the secondary market. The lower annual spending in developing countries is an effect of the differences in purchasing strength among developed and developing regions, something that is also reflected in differences between average spending on online games in the official market among developed and developing regions (i.e. the official market for subscriptions and point cards for online games).

Number of paying online gamers

Based on surveys and industry analyst estimates, the number of paying online game players at the end of 2009 is presented in Table 6. Because of the focus on paying online game players, the focus is more on MMOG players and other more dedicated online game players. The estimates are based on data from governmental surveys and industry analysts. The numbers are assumed to reflect the situation in 2009. It is estimated that there were around 121 million online game players in 2009, of which 37 million were from Europe, North America, Japan, and Korea. Some 84 million online game players were from China and other developing markets.

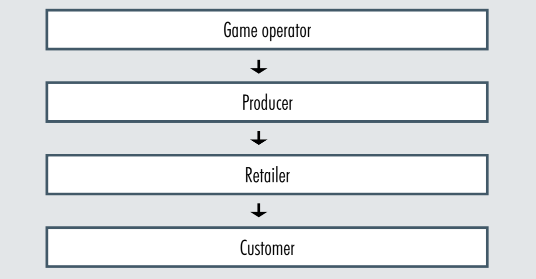
The secondary RMT market size

Based on the above figures, the total global secondary market size is estimated to have been approximately $3.0 billion in 2009 (Table 7). Except for transactions that took place between purely non-professional gamers, this figure is also the same as the gross revenues of the third-party online gaming services industry. The data does not allow the share of non-professional sales to be estimated, but it is probably not significantly large. China is the single biggest market for third-party gaming services, with an estimated market of $1,510 million. Globally, third-party gaming services revenues are around one fourth of the revenues of the game industry itself (estimated at $12.6 billion in 2009).

3.3 Business models

Various kinds of companies are involved in the third-party gaming services industry, specializing in different functions. A distinct value chain can be seen emerging from the relationships between these companies, distinguishable into primary and supporting activities according to the internal value chain model. The primary activities are depicted in Figure 2. These are discussed in more detail below.

Figure 2. *Basic value chain in the gaming services industry*



Source: Author's elaboration

TABLE 6. *Number of paying online game players*

Country/Region	Number of paying online game players (millions)	Source	Note
Korea	7	IDC (2007)	IDC estimated that there were 5.769 million paying online game players in 2006. This report made a conservative estimate that as of 2009 this had increased to around 7 million players. Because of the focus on paying users, the number is not including a large number of casual online game players that are not paying for their online games.
China	69	CNNIC (2009b), IDC and CGPA (2004–2009)	Data based on CNNIC survey of MMOG players.
North America, Europe, and Japan	30	Think Equity (2009), MMOG charts (2010), DFC Intelligence (2008, 2010)	Number based on aggregated data and estimates from industry analyst reports.
Other developing markets	15	Niko Partners (2010), IDC (2007, 2010)	Conservative estimate based on aggregated data from Niko Partners, IDC, and Pearl Research for major developing markets (e.g., Indonesia, Malaysia, the Philippines, Thailand, and Vietnam). The data has been adjusted to take into consideration only paying online game players

Source: Authors' calculations based on sources listed

3.3.1 Retailers

Retailers are companies that market the products and services of the third-party gaming services market to the consumers. They reach out to gamers through websites, search engine advertising, and in-game advertising. They process orders, screen fraudulent orders (customers not intending to pay), manage logistics (stocks and delivery), manage

TABLE 7. *Global secondary market size*

Country/Region	(A). Number of players (millions)	(B). Share of players using the secondary market	(C). Annual spending on the secondary market (millions)	Secondary market size (A×B×C). (millions)
Korea	7	0.24	$369	$620
Europe, North America, Japan	30	0.22	$369	$578
China	69	0.25	$87.50	$1,510
Other developing countries	15	0.24	$87.50	$315
Total global market	121			$3,023

Source: Author's calculations based on *Table 4, Table 5, and Table 6* payments, and take care of customer relationships. Some retailers have even built up goodwill among the customers that could be equated with brand value. Examples of retail websites are listed in Appendix 2.

The first retailers were located in the same countries as the initial customers, that is, the United States, Korea, and other wealthy gaming nations. They had their own production capability or sourced the products from local players. As the market grew, they increasingly outsourced production to low labor cost countries, especially China. Due to the lack of language and marketing skills, the Chinese producers were unable to market their goods directly to consumers. But gradually, actors in developing countries developed the necessary skills and took over the retail sector. Even once-dominant U.S.-based retailer IGE has moved its customer service functions to the Philippines. One driver behind this change has probably been the increasing legal pressure put on U.S.-based retailers by game operators.

Perhaps the most typical retailer today is a Chinese company located in a regional capital. According to an informant in the industry, eight of the largest Chinese retailers have estimated yearly revenues in excess of $10 million, with an additional 50–60 firms with over $1 million in revenues. They employ university educated customer service and management staff with good language skills. They source their production from producers in rural and suburban China (some sources also suggest South-East Asia). The sourcing relationships can be very fluid. One retailer can have a network of thousands of small gaming studios that the retailer contacts when needed through the Tencent QQ instant messaging system. Retailers also maintain extranet "buy sites" where orders listed by the retailer can be fulfilled by any producer.

In the case of virtual currency, retailers do not always deal directly with producers. There are some wholesalers that act as intermediaries between producers and retailers. Their role seems to be to deal with fluctuations in demand. They may also simply be commodity speculators that are attempting to buy low and sell high as prices fluctuate.

Marketing the goods and services of the gaming services industry is a significant challenge. Since they usually lack endorsement from the game operator and are subsequently also shunned by the mainstream gaming media, the retailers have to use various alternative and sometimes even innovative techniques to reach their target group. Advertising in in-game chat channels is a typical technique, but as it significantly detracts from the gaming experience, both gamers and operators detest it. One innovative but also somewhat distracting technique seen in *World of Warcraft* is arranging a large number of dead bodies on the ground to spell the address of the retailer's website.

Perhaps the most important advertising channel for retailers is search-engine advertising, such as Google AdWords. The size of the market and the degree of competition is reflected in the very high prices of search terms related to virtual goods trade. For example, advertisements on the search term "wow gold" can cost as much as $6–8 per click. Because of the high customer acquisition costs, retailers often take a loss on the first sale. They rely on repeat purchases elicited through direct marketing (instant messaging, in-game communications, and email) for profits. That fact suggests that the retailers should be highly focused on customer relationship management and they should consider the customer database their most valued asset. This may also explain the apparent trend towards consolidation in the retail sector. The hundreds of retail websites one can find on the web are in practice operated by a much smaller number of actual companies.

3.3.2 Producers

The popular term "gold farmer" refers to a game laborer who plays an online game in order to produce virtual currency that can be sold for real money. The first "gold farms", offices where multiple farmers sit at rows of computers and earn wages by producing virtual currency, probably evolved from gaming cafés. Although gold farmers have captured the attention of the Western gaming public, today they represent only a small part of the production sector in the third-party gaming services industry.

The main competitor to gold farms comes from automated bot farms. Bot farms use arrays of computers that each run several instances of the game, each controlled by a program known as a bot. Perhaps only a tenth of the staff of a manual farm is needed to monitor the bots. Another source of competition are criminal hacker groups that break into players' and gold farmers' game accounts, steal the currency, and sell it for real money to wholesalers and retailers. One industry expert suggests that manual farms produce 30 percent of the virtual currency sold by retailers, bot farms produce 50 percent, and hacker groups "produce" 20 percent by stealing it from other players.

In contrast to virtual currency, powerleveling services are produced exclusively by manual producers. Current bot technology is not sophisticated enough to do powerleveling in the games that are popular at the moment. It is possible for manual powerlevelers to use bot-like technologies to automate some parts of the process, however. Hacker groups are not able to do powerleveling, although they might offer used accounts for sale.

Producers can be individuals or companies. Perhaps the most typical producer is a company in suburban China. Their employees are young males with disadvantaged backgrounds and no occupational skills. These "playborers" are examined in more detail in section 4. Because of the lack of language and business skills, the producers are not able to effectively market their products directly to customers, especially high-value foreign customers. Their access to the market takes place mostly through the retailers.

3.3.3 Game operators

The online game operators (also referred to as the game publishers) provide the platforms and contexts where the virtual goods are produced, used and consumed. Without an online game maintained by an operator, there is no demand for game currency or powerleveling. Producers thus have to buy the game from the operator and pay the monthly subscription fees. The game design and business choices of the operator have a large influence on the third-party services market. Most game operators do not endorse the third-party services and even actively oppose them. This is discussed in more detail in section 3.4.

3.3.4 Supporting activities

Besides these primary activities, there are also some supporting activities that deserve to be mentioned:

- The criminal hacker groups that steal currency from accounts also sell these hacked accounts to some manual and automated farms, to be used in currency farming or in-game advertising. These so-called "black accounts" are sold for much less than new accounts purchased from the game operator, but may have a shorter lifespan before they are detected and closed by the operator. In some games, generating account keys ("CD keys" or "product keys") can also be used to create black accounts artificially.
- Online games usually have dedicated servers for different countries or regions. Farmers and powerlevelers need to be able to play on the servers where their customers are, not on the servers of their own country. Access to, for example, U.S. game servers may be blocked from Chinese IP addresses. To overcome this, the producers need supporting infrastructure in the United States.
- Chinese individuals and companies cannot easily accept electronic payments from abroad. Some financial intermediaries are necessary to organize the payment flows.

3.4 Regulatory framework and industrial policy

The third-party gaming services industry operates at the crossroads of a number of international ICT policy and regulation issues, many of which are still evolving. These include consumer rights in digital services, online gambling, regulation of electronic payment services, and taxation of virtual transactions. This section focuses on the most direct challenge to the industry: whether the business model of harvesting and selling virtual goods for real money is and should be legal at all.

3.4.1 Negative externalities from trade of artificially scarce assets

Real-money trade (RMT) of game items and currencies is highly controversial. On one hand, trade is a social good, and RMT is particularly valuable to players for whom time is scarcer than money. On the other hand, RMT can cause a variety of negative externalities to other players and game publishers. These negative externalities are discussed by, among others, Castronova (2004, 2005) and

Lehdonvirta (2005). Some of the first negative externalities discussed were the following:

1. RMT breaks the fairness of the game. If powerful characters can be bought for real money, the playing field is no longer level, but favors wealthy players. This decreases players' enjoyment.
2. RMT can break the "achievement hierarchy" of the game. Game characters and other virtual possessions can be seen as visible evidence of players' achievements in the game. RMT breaks the link between possessions and achievement, thus lessening the possessions' information value for the player community.

In recent years these objections have become somewhat moot, however, as many game operators have themselves started to sell virtual currencies and goods to their players. One way to rationalize this is that not having real-money trade tilts the playing field in favor of time-rich players. In the operators' eyes, the third-party industry thus becomes something akin to a competitor. But third-party gaming services producers are also accused of creating other negative externalities:

3. Game laborers can monopolize game content. Professional players can be so effective in harvesting scarce game content that they practically monopolize it, making it hard for ordinary players to get their hands on the most valuable resources.
4. Automated bot players run by gaming services producers can degrade other players' social experience.
5. In-game advertising degrades the play experience.
6. Secondary markets create incentives for cybercriminals and scammers. Virtual goods are among the most sought-after commodities in the general hacking scene (Krebs 2009). This forces game publishers to spend more on security and increases their customer service costs (although one retort is that indeed any market where goods can be resold is an incentive for crime).

These issues affect different games differently, but in many cases the net social value of secondary market trading is probably negative. Interestingly, some gaming services retailers have begun to advertise that they refrain from in-game advertising and only use "ethical" sources for their products, that is, manual farms instead of automated bots or goods that are outright stolen—although there does not seem to be any real way to verify this.

3.4.2 Contractual and legal regulation of virtual goods trade

As a consequence of the issues highlighted above, the legality of secondary market trading as well as the whole third-party gaming services industry is frequently questioned. This topic has been examined by, among others, Fairfield (2005), Duranske (2008), Lastowka (2010), and Lehdonvirta and Virtanen (2010). The following summary draws especially on the latter.

Publishers of Ultima Online, the first game to attract a significant secondary market, welcomed secondary market trade. A few publishers permit it on strictly controlled marketplaces (for example, non-U.S. players are not permitted to trade in EverQuest 2). The great majority of publishers are strictly against secondary market trade. Their Terms of Service (TOS) and End-User License Agreements (EULA) prohibit secondary market trading. Players (consumers and professional players) have to click to accept these terms as a condition for entering the game. This is intended as a contractual prohibition against trading activities.

The contractual prohibitions are not a very effective deterrent in practice. Players and gaming service providers who break the prohibition can be difficult to detect. Even when detected, they face no harsher punishment than the closure of their game accounts. Third-party gaming services producers treat creating new accounts as a normal business cost. Game publishers can try to seek stronger remedies from courts, but recent cases in the United States and Europe suggest that courts may not always be willing to honor their clickable contracts and license agreements, which are seen as highly one-sided. The gaming services industry goes on in a legal dark-grey area.

In Korea, special purpose legislation has been created to attempt to curb the negative effects of virtual goods secondary markets. The Game Industry Promotion Act (Act no. 7941, enacted on April 28, 2006) was amended towards this end in 2007. The amendment makes it illegal to trade virtual goods for real money if the goods are either 1) used as an instrument in a game of chance, such as a virtual card game, or 2) obtained through exploiting security holes, using automated bot characters, or other "abnormal" play. Those violating the law may be sentenced to a maximum of five years in prison or a fine not exceeding 50 million Korean won ($45,000). Trade pertaining to assets obtained through normal gameplay was left unregulated.

In 2009, the Supreme Court of Korea affirmed the rule by acquitting two virtual goods retailers from charges on the basis that the virtual currency they sold was not shown to be obtained through any means other than normal gameplay. This is interesting from a development perspective, because it suggests that "manual" gaming services providers that employ people to play games are on a better legal ground in Korea than automated "bot farms" that use machines for the same job. Both may still be in breach of contract with the game publishers, however.

In China and Vietnam, the legal status of the third-party gaming services industry is ambiguous. In China, the Bank of China has issued several communications pertaining to virtual currency trade. Some communications suggest that secondary market trade is considered illegal, while primary market sales (publishers selling virtual currency to users) are permitted. The authors' efforts to get regulators and policy makers to comment on virtual goods trade for this report were unsuccessful. The online game industry itself is a regulatory hot potato in these countries, being seen as an innovative growth industry to be supported on one hand, and a social problem to be dealt with on the other (Box 1). Informants suggest that third-party gaming services companies have not seen regulation as a problem in practice. This probably reflects the fact that they remain small and inconspicuous companies, operating in large part through the informal economy.

BOX 1. *The political economy of the Vietnamese and Chinese online game market*

The success of third-party gaming services providers in a country is to some extent linked with the development and regulation of the domestic game publishing industry. The same infrastructure that enables the growth of the online game market is essential for the establishment of gaming studios. A growing domestic market also fosters new players and playing skills. The surveys and interviews conducted for this report suggest that most Chinese gaming studio workers have a background in online game play and are significantly motivated by their interest in online games. This box will therefore briefly examine the political economy of online game regulation in a developing country context, taking Vietnam and China as case examples.

In Vietnam, the online game market is in its infancy, but shares many of the factors underlying the growth of the Chinese market. Internet broadband penetration and market size in relation to total population are currently at the same level as in China 2–3 years ago. Further broadband penetration is supported by the 2010–2020 ten-year plan in ICT. Demographic conditions are very favorable in Vietnam, with a median population age of only 27.4 years. On the other hand, online games in Vietnam are currently under increasing regulatory pressure. It is still uncertain which direction the regulatory policy will take in the years to come. During the fall of 2010, regulators were effectively halting all new operating permits of online games to review the situation. Before this, regulation regarding the virtual economy of online games had been increasing.

The Vietnamese regulatory situation resembles the online game industry's early years in China (Ernkvist & Strom 2008). In the Chinese case, the process has thus far resulted in a set of stricter regulations, especially regarding online game playing among youth, internet café operations, and aspects of games that could be regarded as related to gambling. At the same time, regulators have recognized the industry as rapidly growing and economically important. As the economic importance of the industry has increased, rivalry between government ministries over the jurisdiction over the industry and its various business permits has surfaced. For example, there has been open rivalry between the Ministry of Culture (MOC) and the General Administration of Press and Publication (GAPP) in this area (Wang & Murphy 2009).

Due to a number of factors, the online game industry is vulnerable to these forms of political regulation. Because of the nature of the medium, it is often subject to the jurisdiction of ministries from a range of fields, including those regulating cultural content, publishing, and Internet security. As a medium having a significant influence on youths and young adults, youth organizations with relations to the ruling party (such as the Communist Youth League of China) are also often involved in efforts to influence content and regulation of the medium according to their objectives.

The political interest is closely coupled with the economic interest. The current economic size and operational income of leading online game companies makes the industry economically attractive for governmental ministries in various ways. The extensive regulation in China, often expressed in vague terms, means that online game companies have incentives to use their connections to improve the speed and likelihood of regulatory acceptance (Ernkvist & Strom 2008). These economic incentives are especially significant in the online game industry, because of its high sunk costs in the form of high development costs of online games. As a service that is closely tied to the rapid changes in technology and user demand, it is vital for an online game to receive timely regulatory approval in order not to fall behind competition.

3.5 Case study: Purchasing virtual currency for World of Warcraft

World of Warcraft (WoW), published by Blizzard Entertainment, is currently the leading global online game with over 12 million active player accounts as of 3Q 2010. U.S. players pay a monthly subscription fee of $16.99 to Blizzard. As a leisure activity, it is not a casual, irregular activity for most players. Many players spend a significant amount of time each week in WoW; surveys indicate an average weekly playing time of 21 hours for this category of online games. As a leisure activity, it also has many social dimensions with long-term online friendship and social bonds formed in the game.

David is a fictional WoW player. He is 34 years old, lives on the East Coast of the United States, has a busy job, and an above-average income. He has played World of Warcraft for six months and became part of a guild that carries out quests in the game together and spends time chatting. It has become something like a circle of friends for him. Recently, David had to work longer hours at the office. As a result, he could not progress in the game as fast as the other avatars in his guild. This creates both social stress for David (not performing as well as his peer group) as well as a practical impediment to play, because the game is designed in such a way that only avatars of approximately the same level can play together.

David is well aware that Blizzard disapproves of players buying virtual gold for real money. He also knows that many players disapprove of it, perceiving it as a sort of cheating. Yet he feels that many of the activities necessary to progress in the game are highly repetitive and work-like, and not at all exciting. David has often noticed advertisements that offer the game currency for real money, or offer to play his character up to a certain level for a fee. He decides to give it a try. David uses Google to search for "world of warcraft gold". A large number of search results and advertisements come up. He clicks on a site titled "WoW Goldmining" (real example with a fictional name).

A gaming services retail company based in Changsha, China operates the site. The retailer belongs to a handful of large retailers that each have close to 500 employees. Most of the employees are young and university educated. Some of them see the employment as an opportunity to learn about trading and developing IT skills. In this sense, it is a first stepping-stone for a planned job in another industry for these employees.

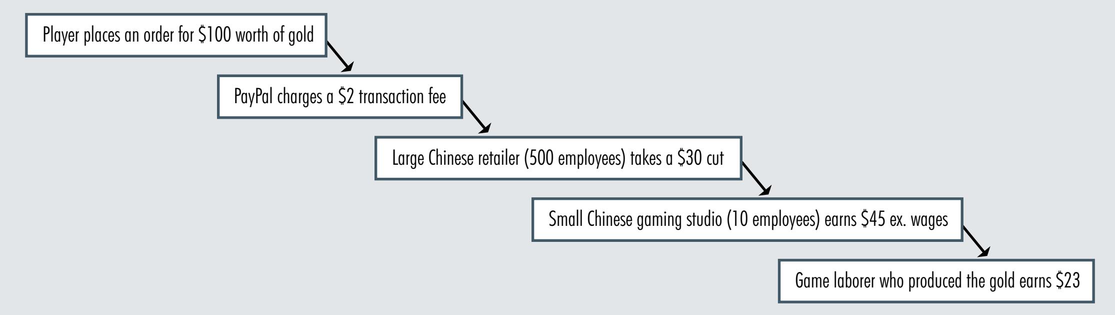
The retailer has been rather successful and growing its revenues on a yearly basis. It is focused on the Western market and has built up a customer service center that can handle requests in English around the clock. However, business has become more difficult during 2010 due to the lack of new content in *World of Warcraft* and the game operators' constant efforts to curb secondary market trading.

David places his order for WoW gold though the retailer's website and pays through PayPal. PayPal takes a transaction fee of approximately two percent from this amount (Figure 3). When the retailer has received the order, their customer service staff conducts an anti-fraud check and clears it for delivery. The order is then forwarded to the retailer's logistics department, which checks if the virtual currency is in stock. The logistics department logs into some game accounts and determines that gold for this server is out of stock. It places an order on the company's Chinese language buy site, promising to pay $68 for the gold requested by David.

The owner of a gaming studio in suburban Changsha responds to the request. A cybercafé owner established the studio in the fall of 2008. It has 10 employees who usually work over 60 hours per week, playing WoW to earn virtual gold (most of them also play some WoW on their free time, using their own characters). As a small gaming studio, it has benefited from a network with five other gaming studios that collaborate to handle demand spikes and other problems. Lately, Blizzard Entertainment closed a large number of the studio's accounts citing a terms of service violation and caused a spike in costs. The game laborers at the studio are on a low monthly salary plus performance-based bonuses. The owner logs into his WoW account and delivers the gold to the account designated in the buy site. A 21-year-old immigrant worker from Western China, who earned approximately $23 for the corresponding work, originally harvested the gold he delivers.

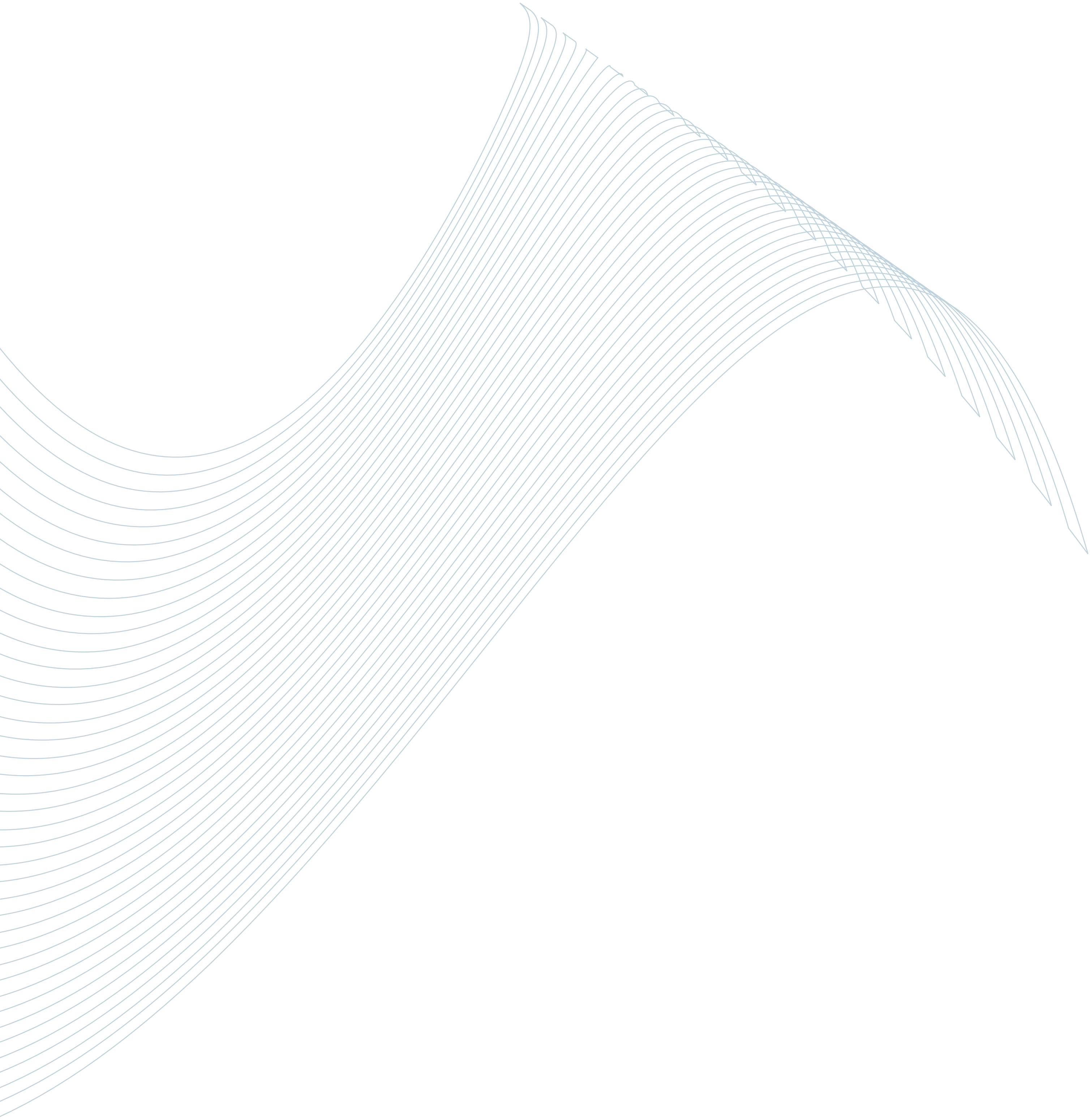
As soon as the retailers' logistics staff confirms the delivery from the gaming studio, they deliver the

Figure 3. *An order of World of Warcraft gold for $100*


Player places an order for $100 worth of gold
PayPal charges a $2 transaction fee
Large Chinese retailer (500 employees) takes a $30 cut
Small Chinese gaming studio (10 employees) earns $45 ex. wages
Game laborer who produced the gold earns $23

Source: Author's estimate based on survey and expert interviews.

gold to David. There are two possible delivery methods. The retailer and David can agree on a time and place in the game world where the retailer's logistics staff member will virtually meet David's character and hand over the gold, or the gold can be delivered using the in-game mail service. David chooses the latter. Once he gets the gold, he spends it on equipment repairs and some consumable potions that allow him to make faster progress in the game. In the following months, the retailer's customer relationship management department occasionally contacts David through e-mail, MSN instant messaging, and even voice chat programs, offering discounts on additional gold purchases and introductory prices on power-leveling services.



Chapter 4

Microwork

4.1 Demand and supply

Since the 1990s, the widespread adoption of ICTs has made it easier for companies and public agencies to outsource tasks and business processes into different geographic locations. For example, American hospitals use medical professionals in the Philippines to transcribe doctors' statements into text. The geographic distribution of tasks and processes allows organizations to benefit from local differences in labor costs and skill specializations. In traditional Business Process Outsourcing (BPO), clients contract with BPO companies that rely on their employees to carry out the work. Since the early 2000s, a new model called "crowdsourcing" has emerged alongside the traditional BPO model. It entails outsourcing tasks traditionally performed by employees or contractors to a large group of people (i.e. a crowd) through the Internet (Howe 2008). Typically this is done by issuing an open call for contributions on a website.

Most early examples of crowdsourcing are extensions of marketing campaigns. For example, Fiat asked consumers to submit design improvements and create marketing material for Fiat Nuevo 500 (Kleemann et al. 2008). The campaign resulted in 170,000 designs, 20,000 comments on specific features, and 1,000 suggestions for accessories. While the campaign was a great success from a marketing point of view, it is not known whether Fiat actually implemented any of the suggestions. Also, contributors were not paid for their efforts. Many projects where firms solicit individuals for contributions are better classified as consumer co-production or co-marketing rather than as crowdsourcing, because they center on tasks that would not be performed by an employee or a contractor.

In other cases, companies approach the crowd as a genuine workforce rather than as potential customers. For example, Amazon used crowdsourcing to identify duplicate product pages on its massive e-commerce site. It developed a website where people could look at product pages and get paid a few cents for every duplicate page they correctly identified. Other tasks that companies outsource to anonymous Internet users include market research, data input, data verification, copywriting, graphic design, and even software development. This has given rise to a market for *paid crowdsourcing*. A market study estimated that over the past ten years, over one million workers have earned \$1–2 billion via crowdsourced work allocation (Frei 2009). The estimate is based on worker headcounts and gross payment figures disclosed by ten companies that facilitate crowdsourcing. The advantages that companies seek when using crowdsourcing instead of their own employees or traditional outsourcing are cost savings and the ability to adjust rapidly to changes in the volume for work.

Unlike Amazon, most companies lack access to a large pool of potential workers. They seek workers through *task marketplaces:* websites where companies or persons post requests and individuals looking for work respond. One of the first task marketplaces was created when Amazon opened its crowdsourcing website for use by other companies. The resulting service is called Amazon Mechanical Turk. Companies in need of crowd workers can post requests on the Mechanical Turk either manually or through an application programming interface (API). Today, there are probably over a hundred task marketplaces on the web. Most of them have been opened in the last few years. In China, task marketplaces are known as *witkey* (威客) sites, and there are dozens of Mandarin language ones on the web.

Task marketplaces can be roughly divided into two categories: those specializing in professional services and those catering for "microwork". The former group consists of sites such as Elance, Guru, and 99designs that facilitate large, complex tasks, such as software development and graphic design projects. The latter is exemplified by Amazon Mechanical Turk, which carries a large number of very simple tasks that can be completed in minutes or seconds, such as verifying whether two images are of the same product or transcribing a line of handwritten text.

Purchasing professional services through a crowdsourcing marketplace is not necessarily very different from purchasing them from traditional contractors. It involves preparing a call for bids, interacting with the bidders, and choosing a winner. The marketplace usually facilitates payment transactions. In contrast, purchasing microwork can be very challenging. First, tasks such as transcribing audio interview recordings into text must first be transformed into a form that can be disseminated to multiple workers over the Internet. This typically involves breaking the work down to suitably sized "microtasks", constructing a user interface that workers can use to complete the microtasks, integrating quality assurance into the process, and recombining the completed microtasks into a final deliverable. While in theory there is a huge amount of repetitive everyday work in offices and homes around the world that could be outsourced to microworkers, the bottleneck is transforming it into a suitable form. Second, it can be a logistic challenge to identify a sufficient number of suitably skilled workers to complete an assignment within a desired timeframe and budget. For tasks with strict deadlines, it may be necessary to tap several marketplaces and work sources simultaneously.

Consequently, microwork is today emerging as a separate concept from crowdsourcing, rather than a subset of it. Microworkers can be sought through task marketplaces, but they can also be sourced from elsewhere, including a company's own existing staff, or the players of an online game. The innovation in microwork is in the transformation of information work into micro-sized units, similarly to how Taylorism and scientific management transformed manufacturing work in the late 19th century. The resulting microtasks and tools can then be optimized for maximum productivity, as well as distributed to new and innovative labor sources, crowdsourcing platforms being one. The key conceptual differences between crowdsourcing and microwork are summarized in Table 8.

4.2 Market size

The total revenues of the microwork startups interviewed for this report did not exceed $10 million in 2010. This suggests that the total value of the whole microwork market in 2010 was probably not more than double-digit millions. Some leading technology companies, such as Amazon, eBay, and Intuit are already using microwork as part of their business processes. Companies in other industries, such as insurance and document archival, have only recently started some pilot projects. Since microwork is a relatively recent phenomenon, it is more pertinent to assess future market potential rather than current size.

To assess the future market potential of the microwork industry, it is useful to note that microwork services are partially a substitute for traditional digital BPO outsourcing services, and also partially a

TABLE 8. *Differences between crowdsourcing and microwork*

	Task size	**Source of workers**	**Workers' tools**	**Skills**
Crowdsourcing (Howe 2008)	From tiny tasks (2–30s) to large projects (days or weeks)	Open calls	Workers may require external tools	Basic computing skills to language skills and professional skills
Microwork	Tiny tasks (2–30s)	Open calls, staff members, subcontractors, BPO providers, online games	All tools and information embedded into worker's User Interface (UI)	Basic computing skills to language skills

Source: Author's elaboration and Howe (2008) subset of the paid crowdsourcing market. Analysts' estimates of the size and development of these markets may therefore give some indications of the potential of the microwork market.

The amount of money earned by crowdsourcing workers has been estimated at $1–2 billion over the past 10 years and the yearly revenues of the crowdsourcing platform operators at approximately $500 million in 2009 (Frei 2009). The crowdsourcing market is said to have experienced rapid growth in recent years.

Global exports resulting from the offshoring of IT services and business processes were estimated at $92 billion–$96 billion in 2009 (UNCTAD 2010, p. 49). Approximately 60 percent of this is information technology offshoring and 40 percent is BPO. Much of the offshored work is software development and similar tasks that cannot be addressed through microwork, but some of it is pure data input and labeling that that could easily be addressed by microworkers.

Besides substituting existing crowdsourcing and offshoring arrangements, microwork can also be expected to expand the market, because tasks that are currently not economically feasible at all can become economically feasible when transformed to microwork. Microwork platforms that offer on-demand application programming interfaces may find new customers among the millions of small and medium sized online businesses.

Based on this simple review it is not possible to put forward any exact figures as estimates of future microwork market potential, but the size of the neighboring markets as well as the potential to expand the market suggests that the microwork market could be worth several billion dollars within the next five years, as the technology matures.

4.3 Business models

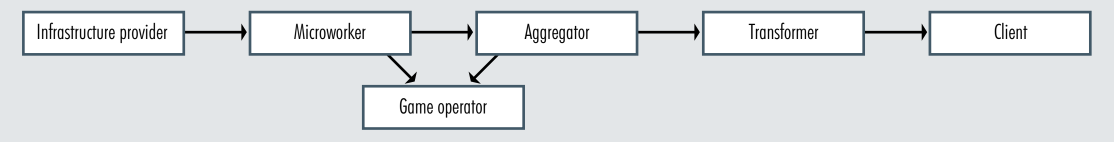
Various different kinds of companies are involved in the microwork industry, specializing in different functions. Although the industry is still young, a distinct value chain can be seen emerging from the relationships between these companies (Figure 4).

4.3.1 Transformers

Transformers are the ultimate link in the value chain before the client. Their role is to take the clients' problems and transform them into forms that can be addressed by microworkers. Different transformers specialize in different industries and problems. They know their potential clients well and understand the clients' business processes. They are good at networking and marketing. As the public face of the whole value chain, they give presentations and interviews to increase awareness of the industry's services. They are located in countries of high labor cost, as this is where their clients are most likely to be found.

The transformers are also highly proficient in technology and innovation, because reducing business problems into microtasks that can be distributed over the Internet is technically challenging. As the industry matures, the technology for transforming common tasks such as content moderation and audio transcription is likely to be commoditized, and thus become available to organizations with no special technical skills. However, expanding the market by finding ways to bring new problems into the scope of microwork will remain a technology intensive function. Some notable transformers are CrowdFlower, which serves e-commerce companies, CastingWords, which specializes in audio transcription, and Microtask, which specializes in form processing and archive digitization. Transformers have also been referred to as "work parsers".

Figure 4. *Basic value chain in the microwork industry*



Source: Author's analysis.

4.3.2 Work aggregators

Work aggregators provide transformers with the actual workforce needed to complete the tasks. They are able to distribute microwork to thousands of workers. Different aggregators provide different kinds of workforces. For some types of microwork, demand occurs in peaks and tasks are time sensitive, which necessitates a large stand-by workforce. For other types of microwork, demand is more constant over time, allowing it to be satisfied with a smaller force or a large force of low-intensity workers. Language skills and demographics of the workers are also important characteristics of the workforce, as is obviously price.

Different aggregators have very different approaches to building a workforce. The most conventional aggregators are traditional BPO companies and call centers that simply hire a large number of employees and provide them with computers. When employees are not engaged in other work, they can be directed to complete microtasks. A more novel approach to aggregating workers is crowdsourcing. Crowdsourcing platforms, also known as work exchanges and task marketplaces, list available tasks on a website and allow any Internet user to complete a task of their choice against compensation. The pioneering task marketplace is Amazon Mechanical Turk. Other task marketplaces include LiveWork, ShortTask, and Clickworker.

A hybrid between the crowdsourcing and traditional BPO models are aggregators that use an open call on the Internet to recruit workers to a standing virtual workforce. These "cloudworkers" use their own computers and Internet connections to do the work, but do not get to choose the tasks that they work on. Cloudworkers are typically used for telemarketing and customer service tasks, but can also be used for microwork. Some companies that provide cloudworkers are LiveOps and West at Home.

Some of the latest and most innovative work aggregators to enter the workforce market come from the online game industry. In essence, online gamers are being used as microworkers and compensated in virtual game currency. To understand how this is possible, it is necessary to provide some background. Today's online game market is extremely competitive, which is pushing the monthly subscription fees for games towards zero. The most popular online games let players use the game for free, and instead earn revenues by selling virtual currency to the players. The players buy virtual goods and value added services inside the game using virtual currency. The billing solution that allows game publishers to offer these "microtransactions" to the players is usually provided by another company, a monetization services provider.

Monetization services providers typically allow players to pay for their purchases using a large variety of payment methods, ranging from credit cards to mobile payments. This is necessary in order to facilitate payments from different demographics and countries. Two monetization services providers, Gambit and TrialPay, have recently added the option of paying for a purchase with work. If a player selects this option, they are presented with a set of microtasks. After completing the tasks, the player is rewarded with an amount of virtual currency. The monetization provider then pays the game publisher in conventional currency. This allows people who cannot afford the prices or lack access to payment methods to obtain virtual goods and make full use of the features of a game or a community.

A key capability that all work aggregators share is the ability to not only contact a large number of people, but also to channel payments or other compensation to the workers in a cost efficient way. Channeling monetary payments to foreign countries and especially developing regions with little financial infrastructure is a considerable challenge. Amazon Mechanical Turk only pays out to U.S. bank accounts and in gift certificates redeemable at Amazon online stores. In contrast, U.S.-based non-profit organization Samasource aims to deliver digital work to women, refugees, and youth living in poverty in developing countries. It has built a network of partner offices in India, Pakistan, Haiti, Uganda, and Kenya through which it distributes payments to workers. The partners are typically Internet cafés run by local entrepreneurs, who provide all the equipment and training that workers need to start earning.

Txteagle is a for-profit aggregator that likewise targets developing countries. It provides workers with tasks that can be completed on a mobile phone, and rewards the workers with airtime minutes through partnerships with local mobile operators. Through 220 different mobile operators it can accommodate workers in 80 countries, the majority of which are developing nations. Since mobile phones are the primary means of telecommunication in many developing regions, airtime minutes are a valuable form of compensation for many potential microworkers. However, the range of tasks that can be completed on a mobile phone that cannot display graphics is limited.

4.3.3 Infrastructure providers

After the microworkers themselves, a final link in the value chain is the infrastructure providers that provide the workers with the hardware, connectivity, and financial services necessary to carry out the work. These consist of such companies as Internet cafés and mobile operators. Most part-time microworkers in developed countries probably use their own computers and home Internet connections to carry out the work, but in a developing country setting, it is more common to use a mobile phone or access the Internet from an Internet café. The availability of such facilities depends on local demand as well as the general infrastructure of the region (electricity and communication networks). If suitable infrastructure is not available or is too expensive to use, earning through microwork is not possible. If infrastructure is available, microwork can probably promote its further development by generating demand and paying customers.

4.4 Regulatory framework and industrial policy

Miriam Cherry (2009, 2010) provides thorough early analyses of the policy and regulatory issues relating to crowdsourcing and microwork from the perspective of U.S. and international employment regulation. Employment regulation in general is concerned with such issues as minimum wages, discrimination and equal opportunity, workplace safety and compensation for injuries, unionization, and privacy. For example, should employees bear responsibility for repetitive strain injuries (RSI) suffered by microworkers? Existing regulations are mostly borne out of the needs of traditional factory and office work settings, and as a result are sometimes difficult to apply to work that is conducted over the Internet with no relation to a physical workplace. The lack of a physical location may also cause uncertainty as to which country's laws should be applied. However, microwork is not unique in this respect. Telecommuters and mobile staff members have become commonplace in developed countries already since the 1990s, and employment law is changing to facilitate them.

Cherry identifies two other issues that present a much bigger challenge in interpreting microwork through employment regulation. One is the question of whether microworkers are to be viewed as employees or mere independent contractors. Employment relationships typically impose much heavier responsibilities on the employer than contractor relationships. Not surprisingly, microwork aggregators such as Amazon Mechanical Turk typically declare that their workers are independent contractors.

On one hand, it is hardly satisfactory that professional microworkers are excluded from the protections afforded to other workers. It increases their vulnerability and most likely distorts the job market. In a related decision, the U.S. Internal Revenue Service in 2008 ruled that manual greeters for the Electric Sheep Company in the virtual world *Second Life* were employees, rather than independent contractors.

On the other hand, current crowdsourcing and task marketplace-type microwork aggregators could probably not operate at all if they had to form full employment relationships with each worker. Low transaction costs are vital in facilitating low-value transactions. The regulatory burden could include dealing not only with tax authorities, but also with insurance companies and occupational health services. The workers' diverse domiciles further complicate the issue. This may be an area in which attention from policy makers is needed to facilitate the growth of the market.

Another question identified by Cherry is where to draw the line between work and leisure, or volunteering. The question is important, because volunteering is typically excluded from employment regulations, such as minimum wage requirements. Microwork and other productive digital activities are sometimes ambiguous in this respect. Examples of ambiguity include completing microtasks to earn virtual game currency, completing microtasks to support a third party, such as a venture or a charity (sometimes known as "crowdfunding"), or contributing content to a commercial site with a promise of a potential future payoff.

The informants also pointed to some specific regulatory topics. In the area of worker discrimination, our informants suggest that microwork is virtuous in the respect that employees do not necessarily even know the gender, race, and other personal characteristics of their workers. Neither employment decisions nor compensation can thus be based on any other factor than measured productivity. The flipside of this is that employees may not be in the position to enforce regulations that pertain to these characteristics, such as rules against the use of child labor. Microwork is obviously far from the dirty and dangerous menial tasks that child labor is usually associated with, so there is hardly need for alarm. Some microtasks are not very different from the unproductive leisure activities that young people engage in online anyway. Still, virtual child labor may be an issue that needs to be addressed in the future, especially if the number of workers sourced from online games and paid in virtual currency continues to increase.

4.5 Case study: Using human workers to optimize an online retail search engine

Major online retail and auction sites such as Amazon, eBay, Taobao, and Rakuten offer selections that consist of millions of different stock-keeping units. Providing a search engine allowing customers to find and purchase what they want from a large selection is crucial to success for these sites. To make products show up in search results, it is often necessary to annotate them manually with relevant labels. Humans can also help improve the accuracy of search algorithms by labeling search results in a way that reflects how well they correspond with the search query. These tasks are important, because inefficient search engines can cost thousands or millions of dollars in missed sales and make it difficult for consumers to find what they need. Since product inventories are constantly changing, this work has become a standard part of the supply chain for some online retailers.

Human labeling of products and search results is time consuming, but the demand for it occurs in peaks and the work needs to be completed fast in order to maximize sales. Many site operators thus seek to outsource this work. One company that they can turn to is CrowdFlower, a start-up founded in 2007 by Lukas Biewald and Chris Van Pelt. According to the company's self-introduction, "CrowdFlower uses crowdsourcing to harness a round-the-clock workforce that spans more than 70 countries, multiple languages, and can access up to half a million workers to dispatch diverse tasks and provide near-real time answers." According to Biewald, the company's revenues for 2010 are "single digit millions" and it has "contracts for tens of millions next year". CrowdFlower is located in San Francisco, near many of its potential clients, and its executives frequently give presentations in technology industry events.

When CrowdFlower gets an assignment from a client, it needs to transform the requested work into a form that can be carried out by microworkers. For example, for one major online retail/auction site, CrowdFlower provides an API that the client uses to transmit source data and retrieve results from CrowdFlower's server automatically. It has created a UI that displays fragments of the source data (search queries and search results) in a web browser and provides buttons for labeling the fragments appropriately. This UI is presented to the microworkers. Workers click on the buttons to provide their responses, and are presented with a new task after every click. CrowdFlower's server infers the best solution to each task from the workers' responses, and passes the results to the client. A large part of CrowdFlower's work is quality control. Workers who fail to respond correctly to at least 70 percent of periodic screening questions are prevented from contributing further to the assignment in question. At the same time, CrowdFlower constantly optimizes the UI and instructions and examples are provided to the workers in order to enhance accuracy and productivity.

During September 2010, the online retail client gave CrowdFlower four different search labeling assignments. CrowdFlower broke these assignments down to 178,955 fragments. Each fragment was distributed to several different workers to facilitate statistical inferences. This resulted in a total of 1,541,814 tasks to be completed by workers. CrowdFlower specializes in the marketing, transforming, and quality control functions, so it has no direct contact with the actual microworkers. Instead, it uses various work aggregators as a labor source. In September 2010, CrowdFlower used the services of six different work aggregators to satisfy the requests of the retail client. One of these sources was Amazon Mechanical Turk. Another was Samasource, a non-profit organization that delivers digital work to women, refugees, and youth living in poverty in developing countries. Two others were Gambit and TrialPay, which assign microtasks to online gamers. CrowdFlower chooses which labor sources to use for each assignment by assessing factors such as cost, language and other skill requirements, age restrictions, and work content that may be objectionable in certain cultures.

Leila Chirayath Janah founded one of CrowdFlower's main work aggregators, Samasource, in 2008. Samasource's client-facing functions are based in San Francisco, and it provides not only work aggregation but some microwork transformation services as well. It has provided services to LinkedIn, Intuit, and the U.S. State Department. Its typical tasks include content moderation and converting scanned documents into digital form. When Samasource receives work requests from CrowdFlower, it distributes the requests (which are essentially links to pages on CrowdFlower's web server) to its international network of delivery centers. The delivery centers are simple offices that contain multiple computers connected to the Internet. A worker who gets paid for each task they complete operates each computer. The centers are monitored by Samasource staff, but owned and operated by local entrepreneurs.

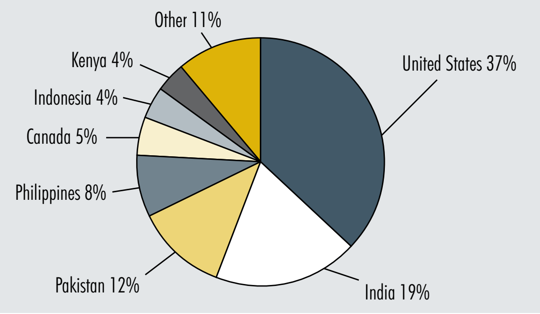
For instance, one delivery center is located in a refugee camp in Dadaab, Kenya. The workers there are mostly refugees from the neighboring war-torn state of Somalia. According to Samasource, training provided by Samasource staff allows even refugees who have never seen a computer before to earn money as microworkers. Many Somalis understand English and are thus able to take on search labeling tasks originating from CrowdFlower's American clients. Lack of cultural knowledge nevertheless causes difficulties in search related tasks and limits the quality of the contributions.

Other two work aggregators that CrowdFlower taps into, Gambit and TrialPay, are companies that provide monetization services for online games and communities. They help online game publishers earn money from games that can be played for free on the Internet. When Gambit receives work requests from CrowdFlower, it puts them in a queue. Every time a player playing one of Gambit's partners' games indicates that they need more virtual currency, Gambit displays one of the microtasks to the player. After completing the task, the player is rewarded with virtual currency. The player then uses the virtual currency to purchase new virtual items and services inside the game or online community. Gambit compensates the game publisher in real money for the virtual currency disbursed.

Overall, the six aggregators provided the retail client with labor from approximately 6,000 workers in 50 countries during September 2010. Over a third of the work came from the United States. Other large contributors were India, Pakistan, and Philippines, which reflects the fact that this work required proficiency in English. Workers in Kenya provided approximately four percent of the work. The country distribution of the work is shown in Figure 5.

The total amount of money disbursed by CrowdFlower for this work was $8,797.15, or approximately half a cent per microtask. This equals only approximately $0.70 per worker per month, which reflects the fact that most workers completed only a small number of tasks. Those who completed more tasks could earn significantly higher payouts. According to data provided by CrowdFlower, the

Figure 5. *Distribution of CrowdFlower's search labeling work by country in September 2010*



Source: CrowdFlower.

average payout in the four different assignments was between $0.15 and $1.15 per hour (Table 9). CrowdFlower's payout includes both the work aggregator's revenue share as well as the worker's compensation, so the actual amount of money that reaches the worker can be much lower. In the case of Amazon Mechanical Turk, the aggregator takes approximately 10 percent of the payout and relays 90 percent to the worker. In the case of Samasource, the aggregator takes approximately 15–30 percent of the payout, 30 percent goes to the local infrastructure provider (delivery center) and workers get approximately 40 percent. Based on these figures, it can be calculated that the workers in Kenya earned a total of something like $140 from these assignments during the month.

Gambit and TrialPay give their workers none of the actual payout, but compensate them in virtual currency, so the value experienced by the worker is largely subjective and depends on the individual. Of the $8797.15 disbursed by CrowdFlower, 28 percent was directed towards virtual currency payments and 72 percent towards national currencies.

TABLE 9. *Number of participating workers and average hourly payout in four assignments during September 2010*

Assignment	**Workers**	**Average payout/hour**
1	657	$1.15
2	235	$0.15
3	5,230	$0.47
4	1,422	$0.41

Source: CrowdFlower

Chapter 5

Other Segments of the Virtual Economy

5.1 Cherry blossoming

Companies, brands, artists, and publishers are increasingly turning to the Internet to reach new customers and fans. Worldwide spending on Internet advertising totaled $65 billion in 2008 (IDC 2009). But the best kind of publicity is not advertising. Comments, blog posts, and forum entries by individual consumers greatly influence the buying decisions of their peers. Even more influential are recommendation engines, rating sites, toplists, and similar systems on other websites that aggregate consumer opinions to provide buying advice to visitors. On social networking systems such as Facebook and Twitter, the number of connections, followers, or fans that a brand or individual has works as an indicator of their popularity and desirability, and helps them appear more often in search results. In the digital world, consumer endorsements such as these have direct economic value.

In recent years, a market has emerged for various kinds of consumer endorsements. For example, an individual who owns a Facebook account can be paid $0.10 to become a fan of a particular artist. The typical value chain of this activity is as follows. A publisher or brand owner asks a social media marketing agency to improve the brands' or artists' visibility. The marketing agency, either directly or through an intermediary, contacts a large number of people having accounts in the social media service(s) in question. Often this contacting takes place through the very same crowdsourcing marketplaces that are part of the microwork value chain. In other cases, an intermediary has built a standing reserve of individuals ready to take assignments via email or other direct channels. Finally, the individuals complete the assignment and are paid by the agency, possibly through the intermediary or the task marketplace. The payment may also take place in credits or virtual currencies. Some intermediaries operating in this area are Subvert and Profit, Bulkfans and Usocial.

This activity could be called "cherry blossoming" after the Japanese term for paid fans or spectators (*sakura*). Since cherry blossoming involves users recommending brands or products for money, it decreases the information value of recommendation engines and rating systems. It may not be illegal, but it certainly goes against the intentions of the designers of the systems, and provides no added value to any of the other users. Thus, although cherry blossoming is in many ways similar to microwork, the crucial difference is that it is directed towards overcoming artificial as opposed to natural scarcities.

5.1.1 Case study: Improving the visibility of an online store

This is an actual case with fictional details added and company names changed. AirMobile is a new British online store for mobile phone accessories. There are already numerous established online stores in the accessories market, so consumers looking for phone accessories online are unlikely to ever bump into AirMobile. AirMobile uses search engine advertising to attract consumers, but since there are many advertisers in this market already, the cost of attaching ads to relevant search terms is high: a single click on the phrase "phone accessories" costs $3.50 on Google AdWords. Since AirMobile's target group is mostly on Facebook, it could also buy some Facebook ads, which are slightly less expensive. But the problem with both types of ads is that their effect is more or less temporary: after the advertising budget is spent, the company is just as invisible online as it was when it started.

AirMobile learns that in order to start showing up in Facebook searches automatically, it would have to have a large number of people liking it. Facebook displays search results in the order of popularity. This is similar to how Google orders search results based on the number of other pages linking to them. The usual way to attract a large number of likes and links is to build one's online reputation over time, contributing interesting content, and possibly using occasional advertising campaigns. AirMobile does not have the patience or skill to do this by itself, so it hires AZ Consulting, a small social media consulting agency, to improve its online visibility.

The objective of the social media visibility campaign is set at 250 Facebook likes. AirMobile will pay the consultant a lump sum, negotiated down to $3000, when the goal is met, and otherwise participate in no way in the execution. AirMobile assumes that over the next several weeks, AZ Consulting will produce some interesting content for its Facebook page and engage people in conversation. But the consultant is busy with other projects and decides to use a shortcut. It visits the website of ShortTask.com, a California-based crowdsourcing platform with over 125,000 registered workers. The consultant uses PayPal to deposit $50 on its ShortTask account, and announces the following task on the site:

> *Easy! Facebook Like*
>
> *Step 1. Login to your Facebook account (you must have one to complete this task)*
>
> *Step 2. Go to this Facebook page: http://www.facebook.com/AirMobileAccessories*
>
> *Step 3. Click on the "Like" button there.*
>
> *Step 4. Copy and paste your Facebook username in the field below so that we can confirm that you have completed the task.*

The reward for the task is set at $0.10, and the task is made available in 290 copies. Over the next few days, thousands of individuals who regularly complete tasks on Shortask.com for some additional income see AZ Consulting's task, and eventually all 290 copies of the task are taken up by a worker. The workers are mostly from India, Bangladesh, and the Philippines. 276 likes appear on AirMobile's Facebook page, so some workers did not complete the task properly. Instead of manually going through each username to find the culprits, AZ Consulting decides to just pay all of the 290 workers who took up the task. For larger projects, AZ Consulting could ask a programmer to write a script that checks the completions automatically. Each of the 290 workers gets $0.10 deposited on their ShortTask account. Once they have earned $50 or more, they can request the money to be paid out to their PayPal account.

After two weeks, the consultant tells AirMobile via email that the goal of the project has been met. AirMobile is now slightly more likely to show up in searches, thanks to its fabricated popularity.

5.2 User-created virtual goods

In recent years there has been much discussion regarding new, easily accessible entrepreneurship opportunities relating to content production for new online marketplaces. The first prominent discussions related to 3D virtual worlds. More recently, authors have highlighted other so-called two-sided marketplaces that bring together customers and independent producers. Examples of the latter include the Facebook application interface and iPhone App Store.

Entrepreneurship opportunities in 3D virtual worlds have mostly focused on the leading virtual world platform *Second Life*, and to a lesser degree, *Project Entropia*. Both these virtual worlds provide a virtual currency that is exchangeable into U.S. dollars, making it possible for its users to earn real world currency. In addition, Second Life facilitated an unprecedented degree of user generated 3D content and scripts that add functionality to the creations. The initial growth of these two virtual worlds also led to the announcement of a number of other platforms, several of them in developing countries (e.g., *HiPiHi* in China). The virtual economy of these platforms enables entrepreneurial ventures in the creation of virtual goods for sale, development of virtual land and real estate, virtual tourism, and various other services. Second Life gained considerable attention for its entrepreneurial opportunities in the business press and academic journals during 2006 and 2007. However, many such earlier studies were primarily based on individual examples and focused on potential future opportunities (e.g., Ondrejka 2007). The fact that *some* of the underlying characterizing factors for real-world entrepreneurship and economy were present in Second Life did not automatically mean that it becomes a breeding ground for large-scale entrepreneurship opportunities (Evans 2007). More recent data indicates that large-scale entrepreneurship opportunities on the platform have largely not been realized. 3D virtual worlds still struggle to break out from their niche market status; leading Second Life had stagnant participation during Q2 2010.[2]

A recent study surveyed entrepreneurship in both Second Life and Project Entropia (Kieger 2010). The study's method and relatively limited number of participants mean that it cannot be seen as a general representative study of entrepreneurship conditions on these platforms. Nevertheless, it provides a better understanding of some of the characterizing features of virtual world entrepreneurship. For both platforms, the degree of experience of the specific virtual world and perception of "fun" were relevant for launching a new venture in the virtual world. Entrepreneurs had examined the specific market segment they had entered in the virtual world and defined a business strategy, indicating that entrepreneurship recognition is an important aspect of virtual world entrepreneurship. As a result, the ability to rapidly respond to and adapt to these changes was an important entrepreneurial precondition for virtual world entrepreneurship. There was a high degree of environmental uncertainty and turbulence for virtual world entrepreneurship, a result of the changes in regulation of the game imposed by its operator as well as the rapidly changing economy, user bases and technology of the virtual world itself.

Second Life's operator Linden Lab provides their own statistics of what they define as unique users with a positive monthly flow of dollars. According to Linden, the positive flow was gained through content creation or other services in the game. There were around 66,000 users with a positive flow in August 2010, but the majority earned less than $50. The number of unique users with a positive flow of more than $100 in a month was limited to 6,900 users. This number has been declining during 2010.

The economic market for content creation and individual services in virtual worlds is still relatively limited. Growth of the market for virtual world entrepreneurship has stagnated, raising questions concerning the future potential of the market in the short and medium term. As a result, entrepreneurship in virtual world platforms is unlikely to provide development opportunities and employment in developing countries on a larger scale.

5.3 Other two-sided marketplaces

The global market for social networking services (SNS) was estimated to be 830 million users in October 2009 (SK Communications 2010). Facebook is the leading SNS platform with 500 million active users as of August 2010. Facebook is also an example of the convergence of technological platforms for SNS with 150 million users accessing the service from their mobile phones. Notable Chinese SNS platforms include Tencent QQ (68 million users in late 2009), Baidu Space (63 million users), and Kaixin001 (25 million users). Other notable SNSs from developing countries include Russian Vkontakte with 23 million users and South Korean Cyworld with 21 million users (SK Communications 2010).

Facebook recently implemented a virtual currency in its platform, offering new opportunities for individual entrepreneurs to profit from the microtransactions of virtual items and services on the platform (Shafer 2010). The credit also offers new opportunities for the non-profit sector and charity by enabling a new fundraising tool directly to users. Several large SNS application developers come from developing countries, but they are predominantly mid-sized developers from technology clusters in larger cities.[3] The location advantages provided by these technology clusters are likely a reflection of a combination the technological skills, business networks, and economies of scale involved in the business of SNS application development.

The global market for smartphone applications is dominated by Apple's mobile operating system (iOS) with a cumulative number of more than 6.5 billion application downloads as of September 1, 2010.[4] With a software development kit that is relatively accessible in terms of technological skills and a standardized payment platform, a large number of individual developers have become successful entrepreneurs on the platform. Low development costs have been crucial and individual innovative developers with lower overhead costs have had a competitive advantage over many larger companies (Bloomberg 2010). A list of top 50 applications in Asia reveals a large presence of developers from Indonesia, Malaysia, Philippines and India (e27 2010). Several app developers from developed countries are also outsourcing a large part of their app development efforts in order to reduce costs.

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[2] Second Life reported 805,000 monthly repeat logins during the quarters. Of these accounts, around 493,000 participated in the games economy through the economic transactions of the games currency.

[3] China could serve as an example of this. Two of the top 10 Facebook application developers measured monthly active users (MAU) comes from Hong Kong (Pencake Limited and 6Waves). For the SNSs RenRen.com and Kaixin.com from Mainland China, many of the dominating developers are from Beijing (Rekoo and Tong Chi-Star Technology) and Shanghai (Five Minutes and Kai Ying Network Technology).

When two-sided marketplaces like Facebook and iTunes App Store first emerged, they presented a significant entrepreneurial opportunity for developers, with low entry barriers and low skill and resource requirements compared to, for example, traditional video game development. In this sense they could be seen as part of the virtual economy that emerges on top of digital services. However, the startups that rose from obscurity to exploit this opportunity, such as Zynga and Playfish, have since become large companies with valuations of hundreds of millions to billions of dollars. The "viral loops" in platforms like Facebook that allowed the products of these companies to reach millions of users for free have since been largely closed and replaced with paid advertising. For these reasons, this market is now increasingly dominated by established players and starting to resemble traditional digital content business.

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[4] Application development for other smartphone operating systems has also been growing rapidly, most notably Android. According to one estimate from May 2010, Android had the second highest global market share of Smartphone operating systems (26%) after Apple's iOS (40%) (AdMob Mobile Metrics, **http://metrics.admob.com/** (accessed March 7, 2011)).

Chapter 6

Development Potential of the Virtual Economy

In the previous sections, the report introduced the main areas of the virtual economy and described the different business models that are used in them. In each of the areas it was found that at least some part of the economic activity physically takes place in developing countries. This suggests that they have potential implications for the development of local economies and ICT infrastructure. In this section, the report examines this development potential of the virtual economy in more detail. For each of the areas, the report first examines what is known about their current implications for individual workers: skills that they require, wages that they pay, and career development opportunities that they offer. The report then assesses the potential for income growth and local economic development in the future by analyzing income distribution, entry barriers, and upgrading strategies in the value chains.

6.1 Third-party online gaming services

6.1.1 Worker demographics, skills, wages, and career development

The sociology of work of gaming studios is relatively unknown. Some visits to gaming studios have been reported in the press and media, but conclusions have been drawn from a very small sample of gaming studio establishments. Despite the rapid change and heterogeneous market for gaming studio services, these few cases have become representative of the general view of gaming studios (Nardi and Ming Kow, 2010). Recent reports from the industry also indicate that the classical view of the sociology of work of gaming studios is changing. Rather than a large number of workers playing online games on their computers, the largest majority of gaming studios are now bot farms consisting of a large number of computers on which management oversees automated bot programs.

In order to analyze the current sociology of work in this field, the authors decided to attempt a survey study of gaming studio workers. The result is the first published survey in this field. Respondents were recruited with the help of an industry expert in China, using the different communication channels that intermediate retailer companies use to contact gaming studios. The questionnaire covered a wide range of topics (Box 2).

The results must interpreted carefully due to the small sample size (N = 26) and the fact that the sampling method is not nationally representative in China, let alone globally. Nevertheless, it provides interesting indications in light of the lack of any previous quantitative studies in the field. Future efforts with a larger survey using more stringent methodology could provide more reliable results concerning this large shadow industry.

Geographic location

Table 10 shows that most of the gaming studios in our sample came from ChangSha, the capital of the Hunan province in China, and Beijing. Because our survey was not drawn from a nationally representative sample, it is difficult to draw far-reaching conclusions regarding locational aspects. However, it seems that most gaming studios are close to some of

BOX 2. *Sociology of work topics covered by the survey*

Geographic location of gaming studios
Size of gaming studios
Gender distribution
Prior activities before starting gaming studio work
Skill formation from gaming studio work in past and future career
Perceived problems related to gaming studio work
Relatives' views on gaming studio work
Working hours
Salary levels

TABLE 10. *Geographic location of surveyed gaming studios*

City	**Number**
ChangSha	12
Beijing	9
ZheJiang	1
Chongqing	1
HuaiHua	1
Nan Chang	1
ShangHai	1
N=26	

Source: Authors' survey

the major cities with few examples from rural areas. Access to the necessary technological infrastructure places some restrictions on the location. The expert interviews also indicate that other factors such as local "guanxi", or informal networks of influence, have an important role in localization decisions.

Size of establishments and gender composition of workforce

The survey results suggest that gaming studios are highly heterogeneous, both in terms of size and in terms of gender composition (Table 11). This makes it difficult to describe the size or gender composition of a "typical" gaming studio. The survey had 12 responses for questions about the number of employees and 9 responses for its gender composition. The sizes of the gaming establishments in the survey were in the range of 10–200 workers.

Established views of gaming studios as male dominated workplaces are not always correct. While three of the smaller gaming studios in the survey had an all-male staff, all gaming studios with 100 or more employees reported a more gender diverse

TABLE 11. *Size and gender diversity of gaming studios*

Number of workers	**Number of male workers**	**Number of female workers**	**Percentage of male workers**
200	NA	NA	NA
200	150	50	75%
200	200	100	66%
150	100	50	66%
140	70	70	50%
100	60	40	60%
30	NA	NA	NA
20	20	0	100%
20	20	0	100%
15	15	0	100%
10	2	8	20%
10	NA	NA	NA
N = 12			

Source: Authors' survey

TABLE 12. *Gaming studio workers' prior occupations*

Prior activity before starting gaming studio work	Student	Unemployed	Working
Number of respondents	1	6	9
Percentage of respondents	6%	38%	56%
N = 16			

Source: Authors' survey

workforce, with 50–75 percent male workers. There was also a smaller gaming studio with a female majority; it was reported that only 20 percent of workers were male.

Prior activities before starting to work at the gaming studio

Asked about their prior activities before starting as gaming studio workers, over half of the respondents indicated that they had been working (56%), over one third had been unemployed (38%), and a small proportion had been students (Table 12). This indicates that gaming studios provide job opportunities for unemployed young adults and attract youth that are not in education.

Skill formation and gaming studio work

One important question is the potential role of gaming studio work in capacity formation towards other activities. When asked if the skills gained from gaming studio work had been helpful in their current or past activities, around half responded positively (Box 3). In the detailed elaborations, one respondent cited developing relationships and another cited skills in international business. When respondents were asked if they perceived the skills they gained from gaming studio work as helpful in their future careers (Box 4), slightly fewer than two thirds responded positively. In the detailed elaborations, one respondent cited skills usable in online game promotion work, while another saw the skills they gained as useful in pursuing a career in within the gaming services industry.

Taken together, these answers indicate that many gaming studio workers see their work as a source of positive skill formation towards future careers. This provides a different picture than that of workers who only pass their time in gaming studio work without future goals or plans.

BOX 3. *Perceived value of skills derived from gaming studio work in earlier and current life*

Have some of the skills that you have learned working at the gaming studio been helpful in some other work or activities you have been engaged in?
Yes: 7
No: 8
N = 15
Some responses:
"I develop relationships in my work."
"yes, in the international business trade"
"yes, it's better to learn more"

Source: Authors' survey

BOX 4. *Perceived value of skills derived from gaming studio work for future career*

In the future, do you perceive that the skills that you have learned as a gaming studio worker will be helpful to you in other work or activities that you want to engage in?
Yes: 9
No: 6
N = 15
Some responses:
"yes, my mind was activated in my work"
"yes, on-line game promotion"
"yes, I can begin my own career in this industry."
"yes, it can help develop my career"

Source: Authors' survey

Problems faced by gaming studio workers

The survey identified some potential problems and concerns that gaming studio workers face in their work and asked them to grade them on a 0–4 point scale with '0' if the issue is currently not a problem, '1' if the issue is a small problem, '2' for a moderate problem, '3' for a major problem, and '4' for a problem that makes it impossible for them to continue their gaming work.

Based on 15 responses, issues perceived as major problems included 1) working hours and 2) negative views from family and relatives. The earnings level was also perceived as problematic, but to a lesser degree. Most workers saw other players' views as a small or moderate problem.

Of these four factors, the earnings level is a problem that gaming studio work shares with many other jobs in developing countries. The other issues are, at least to some degree, specific to the sociology of work in gaming studios.

Negative views from family and relatives regarding gaming studio work

Severity of problem: Major

More than a fourth of the respondents perceived negative views from family and relatives as a major problem for their work. While the sample is too small to draw far-reaching conclusions, the finding suggests that further attention on this topic is merited. Online gaming is a new activity in many East Asian developing countries, and online game play has a bad reputation among many parents. The reasons are likely to be multifaceted. It is known from earlier game and media studies that various forms of social fears often accompany a new medium (Williams 2003). Online game playing is seen as a time consuming activity, and in East Asia it is often consumed within the "third place" of the internet café—which is itself seen as a threat that takes resources and time away from studies and more "serious" activities (Golub & Lingley 2008, Ernkvist & Strom 2008). Within authoritarian states, there are also several biases against online gaming that seem to have other underlying reasons, including the need to control new media and its content. The most reliable survey data on this topic suggests that around half (49%) of the Chinese public in 2007 identified online games as a form of content they thought should be controlled. The number has gone up from 16% in the previous survey of 2005, indicating that the perception for the need to control online games has increased among the Chinese public over time (Liang 2007). Informants suggest that such views are a problem for gaming studios as well as the game industry itself, as they make it more difficult to recruit workers.

Working hours

Severity of problem: Major

Working hours were identified as a problem by most of the respondents. From our survey and earlier studies, it is known that gaming studio workers work very long hours. One of the difficulties with playborer activity could also be that work and free time become mixed up, providing few options for relaxation and time off. This is an aspect of the mix between leisure activity and work that has not been thoroughly researched. Some accounts of field studies also indicate that workers consume alcoholic drinks during working hours, which could be a way to attempt to deal with long working hours. Considering that most of the playborers are young adults, the long working hours are a a potential barrier for family formation.

The present survey asked specifically about the weekly working hours of the respondents, using five response categories: 0–10 hours, 11–20 hours, 21–40 hours, 41–60 hours, and 60 hours or more. The results are presented in Table 13. The largest group of workers (38%) worked more than 60 hours a week, indicating that concern over overworking is certainly warranted. Few worked 41–60 hours, which could be considered a fairly normal Chinese full-time working week with some overtime. A relatively large group was working only 11–20 hours (31%). A possible explanation is that these people use gaming studio work as part time job alongside other activities. Future studies should try to study the overworkers and part-timers separately, as their problems and conditions probably differ.

Earnings level

Severity of problem: Moderate to Major

The earnings level of gaming studio workers has been a matter of dispute in earlier studies (Heeks 2008). Earnings must obviously be set in relation to

TABLE 13. *Average weekly working hours of gaming studio workers*

	0–10 hours	11–20 hours	21–40 hours	41–60 hours	60 hours or more
Number of respondents	1	5	3	1	6
Percentage of respondents	6%	31%	19%	6%	38%

N = 16

Source: Authors' survey

the hours worked. Many gaming studios seem to have adopted a compensation system that combines a fixed basic income with a performance based payment scheme. Salaries vary considerably depending on the position of the gaming studio worker.

The present survey asked specifically about the respondents' hourly earnings level (Table 14). The results show considerable variance. The majority reports earning 4–10 RMB ($0.6–1.2) per hour. A few earn considerably more, in the range of 30–88 RMB ($4.6–$13.4) per hour.

Currently, the minimum wage for part-time work in Beijing is 11 RMB ($1.7) per hour. While it is slightly less in some other parts of China, this still implies that the earnings levels of the majority of gaming studio workers are close to or below the

TABLE 14. *Hourly earnings of gaming studio workers*

Respondent number	Hourly earnings in RMB, low to high	Hourly earnings in dollars, low to high
1	¥4	$0.6
2	¥5	$0.8
3	¥5	$0.8
4	¥6	$0.9
5	¥7	$1.1
6	¥8	$1.2
7	¥10	$1.5
8	¥10	$1.5
9	¥30	$4.6
10	¥30	$4.6
11	¥88	$13.4
Average wage	¥18	$2.7

N = 11

Source: Authors' survey
Note: One outlier that was regarded as unlikely was omitted.

minimum wage. This does not account for the fact that gaming studio workers often enjoy benefits, such as lodging and food. Yet, the survey responses indicate that perceived problems concerning playborers' earnings levels are real and warrant further attention.

Being viewed negatively by other online game players

Severity of problem: Small to Moderate

In previous literature, negative views from other players are sometimes put forward as an adverse working condition for gaming studio workers (Nardi & Ming Kow 2010). The activities of gaming studio workers are seen in unfavorable light by many other players in the online gaming world. This is probably due to the fact that in many cases gaming studio workers disrupt the gaming experience of other players, monopolize virtual resources, and are responsible in producing a service that many players regard as cheating. The present survey suggests that these views are not a major problem for the playborers themselves, however.

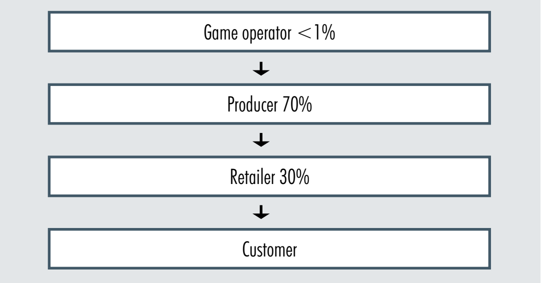
Nardi and Ming Kow argue that the negative views Western players in particular are based not only on actual disruptions to gaming experience, but also on a bias stemming from a tendency to contrast the "notion of clean/orderly/high-tech/high-culture EuroAmerican societies through a depiction of their putative opposites constructed in the imaginary of the Chinese gold farmer" (2010). In other words, they connect the issue to cultural prejudice and racism. It is true that popular understanding of playborer activity is based on very limited information. Studies such as the present survey help paint a more realistic picture of playborer activity, in good and in bad.

6.1.2 Distribution of income

It was estimated above that the total gross revenues of the global gaming services industry were approximately $3.0 billion in 2009. A key question from a development perspective is how this income is distributed between different links in the value chain. If most income is accrued by links outside the developing country or links that employ only highly skilled workers, then the development impact of the industry is limited. In contrast, if a significant amount of income is accrued in poor areas or by links that employ less-educated workers, then the development impact is greater.

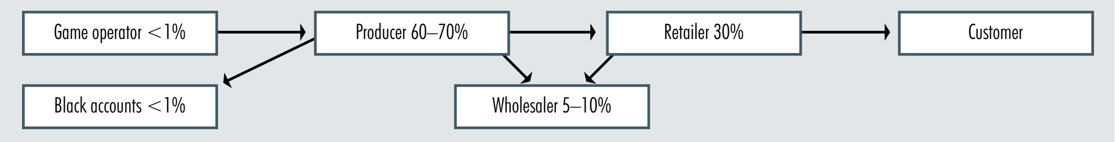
There are several ways to measure the income of a link. One is to measure the value it adds to the chain: the price of its outputs to the next link minus the price of its inputs from the previous link. Using this approach, this report can examine what share of revenues obtained from the final customer is accrued by each link. Figure 6 and Figure 7 show estimated revenue shares of each link in the Chinese powerleveling and gold farming industries based on information obtained from our informants. These should

Figure 6. *Revenue shares in the Chinese powerleveling industry*



Source: Author's elaboration.

Figure 7. *Revenue shares in the Chinese gold farming industry*



Source: Author's elaboration.

only be taken as rough estimates. Gilmore (2009) presented somewhat different estimates; the proportions are likely to fluctuate according to changes in supply and demand.

The figures suggest that the majority of revenues in the third-party gaming services industry are accrued by the producers. If the revenue share of the producers is 70 percent, then the total gross revenues of the gaming studios were approximately $2.1 billion in 2009. In the powerleveling industry, the producers are gaming studios that employ game laborers. In the gold farming industry, game laborers carried out approximately one third of the production. This analysis suggests that the gaming studio industry has significant development impact by directing revenues to functions that provide employment to low-skilled workers.

6.1.3 Costs and profitability

The revenue share analysis presented above provides only a partial view of the income distribution in the value chain. It does not take into account differences in the cost structures of different links. The informants suggest that although the gaming studios capture the largest share of gross revenues in the powerleveling industry, the gaming studios also have the highest operating costs. Table 15 illustrates the approximate monthly operating costs of a typical medium-sized gaming studio in suburban China. Consequently, gaming studios operate with very low profit margins, certainly lower than retailers. Gaming studios also pay much lower wages to their workers than retailers. If income distribution by profitability and wages is measured, then the development impact of the industry seems more limited than what the raw revenue shares suggested. The retail companies and their university-educated workers occupy the most profitable positions in the industry.

The survey asked about the general operational costs of gaming studios (Table 16). The question received few responses (N = 3), probably because most ordinary workers are not in a position to have such information. Nevertheless, the data gives some insight into what the operational costs might look like for a gaming studio. Only small gaming studios (10–20 workers) answered this question. Operational costs for larger establishments might be different.

Workers' wages are the largest operational cost for the respondents, representing approximately one third of total costs. Other operational costs including technological infrastructure, physical infrastructure, and general administrative costs take up 15–20 percent each.

6.1.4 Number of people employed

The number of people employed by the industry is of direct development interest. Earlier employment

TABLE 15. *Monthly operating costs of a medium-sized gaming studio in suburban China*

Type of operating cost	**Cost in RMB**	**Cost in dollars**
50–80 m^2 office space and sleeping quarters, rent	¥1,000–2,000	$150–300
Depreciation of 10 computers (purchase price 2,000–3,000 RMB ($303–455) each, economic lifetime 3 years)	¥550–830	$80–125
Internet connection	¥1,000–2,000	$150–300
Electricity	¥1,000–2,000	$150–300
Wages for 20 game laborers (800–2300 RMB ($121–349) per month each)	¥16,000–46,000	$2,400–7,000
Food for 20 workers	¥9,000–18,000	$1,350–2,700
Total	¥28,550–70,830	$4,280–10,725

Sources: Heeks (2008), Authors' survey and expert interviews

TABLE 16. *Operational cost structure of surveyed gaming studios*

Type of cost	Company 1 (20 workers)	Company 2 (10 workers)	Company 3 (10 workers)	Average
Technological infrastructure (PCs, broadband, etc.):	20%	15%	15%	17%
Physical infrastructure (land, housing etc.)	15%	15%	20%	17%
Workers salaries	40%	20%	35%	32%
General administrative and overhead cost	5%	15%	30%	17%
	N=3			

Source: Authors' survey

estimates range from 100,000 to one million (Heeks 2008); however, the methods used to generate these estimates are not documented and they are probably simply educated guesses. Using the figures presented in this report, it is possible to calculate a reasoned estimate, although the accuracy of the estimate is still limited by the significant uncertainties in the base figures.

Based on the figures presented in the sections above, it is possible to estimate how much of the gross revenues of the gaming services industry are spent on game laborers' wages. The calculations presented in Table 17 indicate that approximately $300 million were spent on such wages in 2009. By dividing this number by one laborer's yearly wages, it is possible to estimate how many full-time equivalent game laborers were employed by the industry. Table 18 suggests that the number or game laborers is approximately 100,000, using Chinese wages. In addition, the retail and management functions of the industry directly employ perhaps a few tens of thousands of skilled workers (customer service staff, studio managers, IT support, and accounting).

TABLE 17. *Estimate of spending on wages in the third-party gaming services industry in 2009 (millions)*

Gross revenues	**$3,023**
Gross revenues from currency and items (85%)	$2,570
Producers' share of revenues (65%)	$1,670
Manual gold farm revenues (30%)	$501
Amount spent on game laborers' wages (33%)	*$165*
Bot farm revenues (50%)	$835
Amount spent on game laborers' wages (3%)	*$25*
Hacker groups' criminal revenues (20%)	$334
Gross revenues from powerleveling (15%)	$453
Producers' share of revenues (70%)	$317
Manual powerleveling (100%)	$317
Amount spent on game laborers' wages (33%)	*$105*
Total spent on game laborers' wages:	$295

Source: Authors' analysis

6.1.5 *Competition, entry barriers, and changing business conditions*

To understand why different links in the value chain differ in their profitability and wage-paying ability, entry barriers in the different sectors of the industry are examined. Economic theory suggests that a company enjoying high profits should soon find its profitability eroded by competitors entering the market and pushing prices downward. If a company manages to sustain significant above average profitability over time, this suggests that there are some kind of barriers that prevent new companies

TABLE 18. *Estimate of the number of game laborers employed in 2009*

	Monthly wages (RMB)	Monthly wages (dollars)	Yearly wages (RMB)	Yearly wages (dollars)	Laborers employed full-time
Upper limit wage estimate	¥2,300	$349	¥27,600	$4,181	70,587
Lower limit wage estimate	¥800	$121	¥9,600	$1,454	202,936
Average wage estimate	¥1,550	$235	¥18,600	$2,818	104,741

Source: Authors' analysis

from entering the market. Typical entry barriers are high capital requirements and rare skills and technologies that not everyone has access to.

From the available data, the report can identify at least the following barriers of entry to the retail sector of the Chinese gaming studio industry:

1. Familiarity with online games, gaming services, and their associated terminology and culture.
2. Communication and language skills. When selling to foreign customers, it is necessary to be able to provide foreign-language customer service through instant messaging and in some cases over voice communications.
3. Marketing skills. Typical advertising channels for acquiring new customers are search engine keyword advertising and in-game advertising. Especially the former requires specialized skills.
4. Establishment of customer relationships. A Google AdWords advertisement under the keyword "wow gold" can cost $6–8 per click for the retailer. Because of the high cost of advertising, retailers typically take a loss on the first sale to a new customer. They rely on repeat sales to their existing customer base for profits.
5. Ability to receive online payments from abroad.
6. Some business skills. For example, understanding exchange rate risk.
7. Some returns to scale may also be present, because our informants suggest that large retailers control the majority of the market. Returns to scale act as a barrier for small entrants.

The barriers listed above will certainly limit viable entries to the retail sector. Consequently, companies that do possess the required resources enjoy limited competition and higher profitability. Their workers likewise command higher wages due to possessing special skills that not everyone in the job market has.

In contrast, entry barriers to the production sector are low. A one-man game studio can be set up in a cyber café with rental equipment. Large retailers maintain "buy sites" where anyone can become a supplier to the retailer. The only skills required are gaming skills, and approximately 66 million Chinese played online games in 2009. Consequently, competition in the production sector is fierce, and profits and wages are low.

6.1.6 Changes in business and market conditions over time

Industry expert interviews and some recent reports gave the impression that the gaming studio business and market conditions had changed over time. The survey asked respondent gaming studios to compare their current business situation with the situation one year ago, requesting them to grade how different aspects had changed over time.

In the survey, 12 gaming studios responded, giving a fairly good general picture. While most issues had remained roughly the same compared with the situation for one year ago, the survey indicated a slight increase in the following areas:

- Skills and education of available workers
- Competition from other gaming studios
- The use of automated bot programs in the online games
- Access to financing

6.1.7 Upgrading strategies

Upgrading strategies are ways in which actors in the value chain can increase the scope and value added of their activity, and thus potentially increase the value captured. In line with the scope of this report, the focus of this section is primarily on upgrading strategies for gaming studios, but upgrading strategies for other actors in the value chain are discussed. Different forms of upgrading strategies have been identified in the literature; this report uses a framework of six upgrading strategies in developing countries adapted from Mitchell, Coles and Kean (2009). In Table 19 these different upgrading strategies are described, with indications of how they have been used among gaming studios, along with an estimate of the potential impact of the upgrading strategy (small, moderate, and significant). All upgrading strategies are present to some extent among gaming studios. When it comes to impact, process upgrading seems to be the most significant strategy, followed by horizontal coordination.

Besides these upgrading strategies available for gaming studios, there are also several upgrading opportunities available for other actors in the value chain. A few of the more significant ones are worth mentioning.

In recent years, some game publishers have assumed functions up the virtual goods value chain by starting to sell virtual goods directly to players. This has already had a negative influence on the value captured by gaming studios; our expert interviews indicate that the opportunity for the secondary market to capture value in this market is significantly reduced. The effect differs from game to game, but the influence of this publisher upgrading strategy on the third-party industry is one of its largest downside risks in the years to come.

At the same time, an upgrading strategy available to third-party retailers is to use their customer base and experience to integrate downwards into operating online games themselves. For example, *Emperor Online* is an online game launched in South Korea in 2010 by IMI, a company behind *Itemmania*, the country's leading third-party virtual goods trading platform. There are also several examples of game point card distributors in China purchasing licensing rights to online games and starting to operate them. However, none of these cases have thus far seen widespread adoption and existing efforts have been only moderately successful.

Another upgrading strategy available to retailers is inter-chain upgrading, where accumulated logistics and service skills are used to diversify into other products and services. For example, many retailers have started to sell game time codes (codes needed to play a game that charges for time played) besides actual virtual goods. As new forms online entertainment emerge, more such upgrading opportunities might appear.

In the future, several additional upgrading opportunities might become possible. The growth of online games on mobile devices might enable new opportunities for gaming studios with an organization and business model different from the current one. Online games have also become more integrated with social network platforms such as Facebook. It is possible that gaming services providers could functionally expand to provide services for other activities on the platform, such as services that are related to how people handle their wider social network and optimize its potential. The integration of standardized virtual currencies on social network sites (e.g., Facebook Credits) might also enable gaming studios to offer products and services directly through the official payment channels of these networks.

6.2 Microwork

6.2.1 Worker demographics, skills, wages, and career development

There are no comprehensive studies of the demographics of microworkers, but a partial picture can be constructed by examining the demographics of the workers of individual work aggregators. Ipeirotis (2008, 2010) has conducted surveys to examine the workers at Amazon Mechanical Turk, colloquially known as "turkers". In 2008, 76 percent of the respondents were from the United States and 8 percent from India. In 2010, the proportion of U.S. respondents has fallen to 47 percent and Indians have increased to 34 percent. The remaining 19 percent are from 66 different countries. This change probably reflects the fact that in 2008, Amazon only channeled payments to U.S. bank accounts, whereas it recently also started to channel payments to India.

TABLE 19. *Upgrading strategies for gaming studios*

Type of upgrading strategy	Indications of use among gaming studios	Estimate of impact (small, moderate, significant)
Horizontal coordination — Different forms of coordination and networking horizontally in the value chain	Some reports of gaming studios collaborating with other gaming studios in the production and sales of virtual currencies and services. Seems to be more common among smaller firms. The horizontal coordination enables them to have a better bargaining position with retailers and to reap some economies of scale. Horizontally integrated gaming studios can provide better volume and responsiveness, i.e. take up quality control functions from wholesalers and retailers, and thereby capture more value.	*Moderate to significant.* There are large potential upgrading benefits, but they are difficult to estimate with present data.
Vertical coordination — Different forms of coordination and vertical networking in the value chain	Some sources indicate that gaming studios have extremely fluid relationships with wholesalers and retailers, while some indicate that there is also coordination and long-term vertical relationship building.	*Moderate*
Functional upgrading — Increase in the scope of activities performed by actors in the value chain	Few reports of gaming studios expanding into retail; some examples of gaming studios trying to skip the intermediate step and sell directly to customers. Interviews indicate that this has been difficult to pursue as producers lack the language, logistics, and service resources of the larger retailers. Many gaming studios have expanded their range of offerings, e.g., from only virtual currency acquisition and sales to powerleveling services. However, survey indicates that most gaming studios are functionally specialized.	*Moderate*
Process upgrading — Production process improvements and innovation that increases volume or reduces cost	The use of macros and bot programs is a form of process upgrading that has had a significant impact on the producers' productivity. However, this development has also had negative influence on employment opportunities in the gaming service sector. Research on the most effective playstyles and pathways is also common among producers. Powerleveling services are less affected by process upgrading than virtual currency production.	*Significant*
Product upgrading — Improvement in the product or service quality	Relatively few. Virtual currencies are rather standardized. Powerleveling is a service with variable quality (time to achieve a certain level, reliability of service, etc.).	*Small*
Inter-chain upgrading — Use of skills and experience developed in one value chain to engage with another, more profitable value chain	On the company level, few reports of the use of skills and experience developed in gaming services to engage in other electronic trade, including international trade Several signs of upgrading at the individual level with some gaming studio workers aiming to use their skills to enter other business sectors	*Moderate*

Source: Authors' elaboration

Other aggregators reach workers in other countries. For example, Samasource currently has workers in India, Pakistan, Haiti, Uganda, and Kenya, and plans to move to South Africa.

Ipeirotis's surveys suggest that both U.S. and Indian turkers are somewhat younger and poorer than the general population, yet better educated. The education may simply reflect their younger age.

There are also interesting differences between the countries. U.S. turkers are two-thirds female, while Indians are two-thirds male. In India, the majority is single, while in the United States the majority is married. When asked about their motivations for microwork, U.S. turkers are more likely than Indians to say that it is a way to kill time and obtain supplementary income, while more Indians say that it is their primary source of income. A typical U.S.

turker is thus perhaps a housewive killing time online, while a typical Indian turker might be a student or other bachelor relying on microwork for their livelihood.

The skill requirements in microwork tend to be low (Eagle 2009). At the most basic level, microworkers only need the ability to use a mouse, a touch screen, or other pointing device in order to, for example, point to geographical features in an historical map archive that is being digitized—an actual project currently undertaken by Microtask Ltd. In principle, not even literacy is necessary for such tasks, although in practice, the user interface may require it. Some tasks completed over mobile phones require only the ability to speak and listen, such as providing feedback to a speech recognition algorithm that is being tested. In practice, such tasks may be scarce, however. Assignments requiring some level of proficiency in the English language are probably most common today. For example, CrowdFlower has dealt with assignments requiring English, French, German, Thai, Spanish, and Portuguese.

Microwork, like all business process outsourcing, aims to deliver value by exploiting local differences in labor costs and the availability of suitably skilled labor. The emphasis in microwork tends to be on cost rather than skills. In principle, there could be a microwork assignment that consists of specialized tasks that only persons trained in a specific discipline, such as law, can complete. Among populations with rising education standards, such an application is not unimaginable. For now, however, all the current microwork vendors focus on assignments with very low skill requirements.

Like Taylorism and scientific management in the 19th century, microwork is prone to criticisms relating to de-skilling and commodification of work. Basic computer skills are a very valuable skill set to learn, but beyond that, it is difficult to see how experience in extremely simple microtasks could develop skills that could be used in higher value added tasks. Companies in the field are aware of this issue, and at least Txteagle has promised to offer workers some kind of a career development path. From a development perspective, this is a key issue to follow.

A somewhat related issue is that like repetitive manufacturing work, monotonous microwork may in the long term be detrimental for the workers' psyche and motivation. Companies in the field are acutely aware of this issue. A basic solution is to make work less monotonous by alternating the types of tasks presented to workers. A more advanced idea pursued by at least Microtask Ltd is to use game mechanics to turn sets of microtasks into more engaging constructions. If successful, this "gamification" would turn work into something resembling an exciting game. It could also introduce a social element into microwork, through such constructions as high score lists, competitions, and collaborative game modes. In some ways, this is what companies such as Gambit and TrialPay are already doing by channeling microtasks to actual online gamers. It seems that if the gaming element in the work is exciting enough, no actual monetary payment is necessary to get workers to contribute. How far this is true is an unknown factor with important ramifications for the future of the industry.

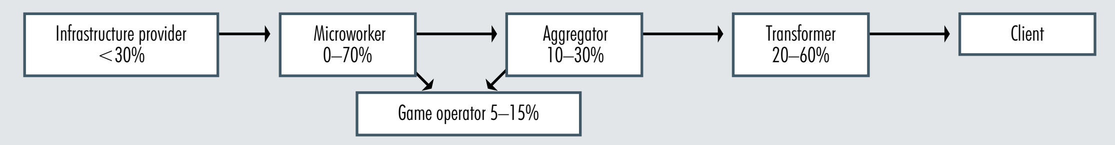
6.2.2 Distribution of income

It was estimated above that the microwork industry has the potential to reach multi-billion dollar revenues within the next few years. As with the gaming services industry, it is important from a development perspective to assess how these revenues are distributed among different links in the value chain. This is especially important in microwork, as the top links in the value chain are mostly located in developed countries.

Figure 8 shows the approximate revenue share captured by each link from revenues obtained from a final customer. The estimates are based on information obtained from the informants. At best, a microworker can hope to capture as much as 70 percent of what the client pays. But in some cases, the microworker is not paid any money at all; instead, the worker is compensated with virtual currency in an online game.

As most of the companies in the industry are still very young and growing, there are wide discrepancies in income distributions from one company and project to another. As the industry matures, competition can be expected to cause the distributions to converge. The current percentages and cost structures are not very useful as indicators of what such mature distribution might look like. A better idea of the different sectors' future outlook may be

Figure 8. *Typical revenue shares in the microwork industry*



Source: Authors' analysis.

obtained by analyzing their competition and entry barriers.

6.2.3 Competition, entry barriers, and changing business conditions

Analyzing what barriers, if any, prevent new actors from entering different sectors of the microwork industry allows us to assess how fierce competition is likely to be in those sectors. From a development perspective, an ideal sector has sufficiently low barriers to allow poor and uneducated people to participate. However, if the barriers are too low, competition may lead to a "race to the bottom", which in the worst case results in wages falling to a level that no longer contribute to economic development.

Becoming a transformer that accepts assignments from clients and transforms them into microtasks involves several significant barriers. Transformers need to have significant technology and innovation capabilities in order to solve the technical problem of transforming mundane tasks into microwork. This is probably the main bottleneck in the whole industry. Moreover, transformers need business-to-business sales and marketing capabilities, which means that they are often located near their clients in developed countries.

Aggregators' main entry barriers are access to sufficient numbers of workers and access to payment infrastructure that reaches the workers. Too small a number of workers are not marketable to transformers and clients. They also need a level of technological proficiency to be able to distribute microtasks to their workers. Higher value-added aggregators also have skills in quality control.

Workers themselves have very few entry barriers. Indeed, one of the main aims of microwork transformers is to create work that can be addressed by almost anyone. Basic ICT infrastructure and access to a work aggregator are the main external barriers. Suitable skills, discussed above, are the main internal barrier. Some niche types of work, such as tasks involving a language spoken by few people, have higher entry barriers, but such jobs are also probably correspondingly fewer.

Based on this tentative analysis, it seems that transformers probably enjoy the biggest economic rents in the industry, while workers are likely to face extreme price competition that pushes their wages down. In the next section, the report considers whether workers are able to improve their position by using potential upgrading strategies.

6.2.4 Upgrading strategies

Upgrading strategies are ways in which an actor in a value chain can increase the scope and value added of their activity, and thus improve their profitability. For example, an individual microworker could invest in their own computer hardware to avoid having to pay rent to a cybercáfe owner, thus capturing a larger segment of the value chain. Other than this, however, any actual cases of upgrading on the part of microworkers are not known as of yet. Some speculations are offered below.

An upgrading strategy that agricultural producers have used and microworkers could perhaps benefit from is horizontal coordination: forming a group or collective that acts as a single agent in the market. In theory, this increases the producers' bargaining power towards their buyers. Coordination could also allow microworkers to take up some of the quality and volume assurance functions from their aggregator, or even supplant their aggregator entirely. This would again allow them to capture a larger segment of the value chain.

In the future, the commodification of transformer technology may allow aggregators to expand into the transformer role and accept assignments directly from clients. Transformers and ICT infrastructure providers might seek to expand into the workers' territory by integrating increasingly intelligent features into the technology, reducing the functions for which human intelligence is still needed. The complete replacement of human workers still remains science fiction, however.

6.3 Other segments

6.3.1 Cherry blossoming

Online marketing is a large and continuously growing market, so in principle, cherry blossoming could be involving an increasing number of people. But if manual gaming services producers are in the grey area, cherry blossomers are unambiguously unethical. Moreover, since one Facebook or other account holder can only recommend one brand once, and there are a limited number of brands, cherry blossoming is not likely to provide significant income even to users in developing countries. For these reasons, its development potential is not analyzed further in this report.

6.3.2 Microcontent production and other two-sided marketplaces

Tools for designing virtual goods for online hangouts and small games and applications for social networking sites and mobile phones are constantly getting easier to use. Operators of two-sided marketplaces such as the Second Life XStreet and iPhone App Store are also competing in making their markets increasingly easy to enter and earn revenues on for developers. Nevertheless, these earning opportunities still require advanced skills such as programming and graphic design to make use of, which severely limits their development potential among the world's poorest countries and populations. In this sense, virtual goods design and application development remain part of the traditional digital economy rather than the "virtual economy" of scarcities exploitable almost with time and effort only. Indeed, most of the producers in these industries are located in the Western world, in contrast to the gaming services and microwork industries. For these reasons, the development potential of these areas is not analyzed further in this report.

Chapter 7

Conclusions

7.1 Market opportunities

The "digital economy" of online services and abundant digital contents that developed in the late 1990s has given rise to new kinds of entrepreneurship and earning opportunities. However, exploiting these opportunities has required advanced skills and technologies that place them outside the reach of developing countries and poor and uneducated people. More recently, a "virtual economy" of digital scarcities that do not require advanced skills to exploit has started to emerge from digital services. Basic ICT infrastructure and the expenditure of time and effort rather than professional skills are often sufficient to turn these scarcities into income. Commercially active areas of the virtual economy today include various kinds of gaming services, microwork, and small marketing related tasks, such as "liking" a brand's Facebook page for a small payment.

It is difficult and not necessarily meaningful to attempt to examine the economic impact of this so-called virtual economy as a whole. This report focused on two concrete areas, gaming services and microwork. The choice of focus was based on apparent commercial significance and development potential. These two areas are in themselves large and diverse. Gaming services consists of such concrete activities as harvesting virtual items and currencies in online games and acting as a hired pilot for online game characters in place of their owner. Microwork ranges from simple data input and pattern recognition tasks to content moderation and search engine evaluation.

The gaming services industry's revenues were estimated in this report as $3.0 billion per year. This figure is the amount of money spent by online gamers on third-party, sanctioned, and more often unsanctioned virtual goods and services globally. The figure does not include the amount of money consumers spent on virtual goods and value-added services sold by the game operators themselves. Market research firm In-Stat, estimates that the latter figure is $7.3 billion in 2010 (Reisinger 2010).

In 2007, Lehtiniemi and Lehdonvirta estimated the global virtual goods market size, including sales by game operators (primary market) as well as sanctioned and unsanctioned third parties (secondary market), at approximately $2.1 billion. Compared to this, it seems that the market opportunity for gaming services has grown significantly. The whole online gaming market has grown rapidly during this period, and gaming has expanded to new platforms such as social networking sites and mobile phones.

At the same time, there are significant uncertainties in the future market opportunity for third-party online gaming services. The most rapidly growing areas of digital gaming are online social games, casual games, and mobile games. In-Stat suggests that these account for the majority of the primary market virtual goods revenues today. In contrast, the third-party gaming services industry's revenues continue to be generated mostly from the MMOG segment, and the genre's megahit title, World of Warcraft. It seems that the industry has so far been unable to establish any significant business in social games and mobile games, although some trade is known to have taken place. Little is known about the third-party gaming services industry's R&D efforts in this area.

The microwork industry is a much more recent addition to the virtual economy. Task marketplaces such as Amazon Mechanical Turk have existed for over five years, but the "transformer" companies that convert client work into microtasks, and thus feed the markets with new work, have only existed for a few years. The number of dollars spent on microwork services is probably no more than double digit millions in 2010, although there is no clear-cut line between microwork and more complex digitally distributed work tasks. Based on market size figures from neighboring markets as well as microwork's potential to expand the existing markets by making previously unfeasible tasks economically feasible, this report concluded that the market could be worth billions of dollars within the next five years, as the technology matures. Still, there is currently little knowledge about how much work there is that will turn out to be addressable by unskilled microworkers; for example, how much of traditional BPO involves simple data entry tasks.

Ultimately, the growth and sustainability of the virtual economy's market opportunities depends on the sustainability of the scarcities on which they are based. The findings suggest that the scarcity that maintains the gaming services industry is threatened from multiple directions, by automatization as well as by the game operators themselves. Microwork is based on the natural scarcity of effort, and therefore seems to be on stronger footing. But in the long run, repetitive tasks that need to be assigned to humans will grow fewer as artificial intelligence develops. The microwork industry must therefore continuously innovate to expand the scope of microwork to new sectors. In contrast, some game industry experts suggest that games will always need to have some degree of artificial scarcity designed into them, in order to provide challenge and reward. Even if game publishers increasingly sell out parts of this scarcity to generate revenues, a hard core must always be retained for a game to feel like a game.

7.2 Development potential

The market size figures presented in the previous section could be compared with, for example, the size of the global coffee market, which many developing countries are highly dependent on. The coffee market is worth approximately $70 billion per year. However, of the $70 billion, the developing countries that produce the coffee beans capture only $5.5 billion (Osorio 2002). The market potential of the virtual economy likewise equals development potential only to the extent to which gains from the market are successfully captured in developing countries and eventually reach workers. The value chain analyses presented in this report examined this issue from two perspectives. First, this report looked at the revenue shares and entry barriers of different links in the gaming services and microwork value chains. The revenue share analysis indicates how much of the total revenues of the chains are captured by links in developing countries. Entry barrier analysis furthermore indicates how profitable the links are likely to be. Second, the report looked at upgrading strategies, or possibilities for producers to move up in the value chain and increase their scope and value added in the future.

The findings suggest that both in the gaming services as well as the microwork industry, producers can capture as much as 70 percent of the revenues obtained from end customers. Compared to the global coffee industry, the virtual economy thus seems to have a much better development impact. However, analyses of entry barriers suggest that it is very easy to become a producer in these industries, indicating that price competition is likely to be fierce. All this suggests that even though the producers' revenue shares are high, their actual profit margins and workers' incomes are very low, and likely to remain so even as the markets expand. Market expansion will provide earning opportunities for a larger number of workers, but the incomes of individual workers might not grow, and in the worst case might even fall. This situation is sometimes known as "immiserising growth" (Kaplinsky & Morris 2001). These conclusions are rather tentative, however, and the situation may be different in specific market niches.

The tentative analyses of potential upgrading strategies suggest that in both industries, producers can benefit from horizontal coordination, which in practice means that individual workers and production companies form larger collectives. This can improve their bargaining position towards buyers, and allow them to expand both upwards as well as downwards in the value chain. One method of downward expansion would be that producers invest in their own computer infrastructure instead of renting it. Upward expansion entails taking up additional value-adding functions, such as volume guarantees and quality control. For example, a large and well-coordinated group of microworkers could become their own work aggregator, selling work directly to transformers. However, our findings suggest that producers' upward expansion ability is limited by at least skills and education, particularly language and business skills.

The more mature gaming services industry shows a higher level of horizontal coordination between producers than microwork. Instead of being individual contractors, game workers are often banded together in gaming studios of several dozen workers, headed by an ex-worker. Notably, intermediary roles between producers and customers have also been gradually taken over by educated customer service workers in China and the Philippines instead of the West. What a decade ago was entirely a developed country phenomenon is now run from developing countries. The microwork industry could follow a similar pattern where higher value added functions gradually move to developing countries.

In summary, our value chain analyses suggest that the most profitable positions in the virtual economy are those closest to the customers. Producers are not in a good position to increase their profits in the future, although their business helps to fund the development of local ICT infrastructure. A better prospect for producers can be found in upgrading their business to encompass a larger scope of value added. Not much is known about how this happens in practice in the virtual economy and what stumbling blocks it might involve.

7.3 Scope for interventions

One of the goals of development studies is to identify ways in which social and economic development can be supported, enhanced, and accelerated. These can take the form of interventions to remove obstacles and bottlenecks, disseminate knowledge, and develop capacities. This final section draws conclusions concerning the scope for possible interventions in the virtual economy.

The distinguishing feature of the virtual economy is that it is based around *digital scarcities* that require time and effort as opposed to advanced skills and resources to exploit commercially. This affords a comparative advantage to developing countries with low labor costs. Within the virtual economy, different sectors have reached different stages in capturing the economic potential of these scarcities. One implication is that interventions should focus on sectors with market growth opportunities that are still emerging, and hence retain the plasticity for intervention programs to have a significant impact. From this perspective, the microwork industry is currently the most promising area for intervention. However, in the virtual economy, scarcities can be eradicated as well as entirely new ones created, as technology advances. This demands flexibility from intervention programs.

7.3.1 Third-party gaming services

Third-party gaming services may seem like a good target for interventions, given that it is a large and successful industry. Gaming service production could be introduced to least-developed countries. Ways to expand the market to social games, mobile games, and other platforms could be explored as a means to further increase its economic development impact. However, the problem with services for overcoming artificial scarcities is that it can be very difficult to say when their net social value is positive and when it is negative. Whilst providing value for their customers, in some cases they are causing negative externalities to other players and publishers. This is reflected in the industry's legal status. Sanctioned markets for game assets are limited.

At the same time, one clearly positive thing about the gaming services industry is that it has activated thousands of young people from very modest backgrounds to create employment for themselves as digital entrepreneurs. Some of them have subsequently branched out to other fields of ecommerce. A more typical career path for these youth would likely have been much less entrepreneurial and ambitious. If the circumstances and motivations that lead to this remarkable mobilization were understood better, it could prove a powerful tool in efforts to bring about similar activation elsewhere. Informants suggest that reasons for why Chinese youth—as opposed to, for example, Indian youth—rose to become gaming services entrepreneurs should be sought in the strong online gaming subculture in China. Indeed, cultural factors and subcultures in particular have been implicated in studies on high-tech entrepreneurship before (Florida 2002). The instrumental role of cultural products such as games in forming this culture is a worthwhile research question.

7.3.2 Microwork

When the question is about interventions that directly leverage the virtual economy to bring about development results, it is safest to limit the scope to sectors that are based on natural scarcities. In the microwork sector, interventions could be aimed at either the demand side (enabling more demand) or the supply side (how to address the demand from developing countries). As the market grows, interventions could also be aimed at helping developing country actors capture a larger share of the value chain, as they have successfully done in the gaming services industry.

In the demand side, a handful of transformers are working on the problem of expanding the scope of digital problems that can be addressed through microwork. Their success will have a significant impact on the demand for simple microwork. These are for-profit start-up companies such as Microtask and CrowdFlower. They have been able to raise funding from private capital markets for this purpose. What obstacles remain and how this process could possibly be accelerated could be worked out with the practitioners.

In the supply side, there are various hurdles of varying height in connecting producers in developing countries to the global demand for microwork. Depending on country, these include at least typical factors such as funding, regulation, financial infrastructure, technical infrastructure, and training. The need for standardization might also be considered. These issues could be further explored with practitioners. An additional area to consider are upgrading strategies: 1) what kinds of interventions could help developing country actors capture a larger part of the microwork value chain for themselves, or 2) develop higher value-added services to supply to the chain (e.g., business intelligence). One possible enabler in capturing a larger part of the value chain could be open source software that can be used to perform simple quality control and transformation tasks. In the context of least-developed countries, such software should probably take the form of a mobile application.

Besides the existing forms of microwork, future services for overcoming natural scarcities in the virtual economy could also be considered. There are currently few services aimed at individual consumers as opposed to corporations, but these could include, for example, services for organizing and labeling personal photo albums and other personal data collections, which are good growth markets because new digital devices are being constantly adopted. The main bottleneck is again the transformation step, which requires new technology. In the gaming space, it is possible to imagine, for example, a publisher using digitally enabled blue-collar workers to replace poorly performing computer controlled characters in order to improve the gaming experience. One intervention could simply be to open a dialogue between the development community and the digital services industry on ideas for future services that provide real jobs in the virtual economy.

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Appendix 1.

Sources of uncertainty in the gaming services market estimate

The player survey method of estimating the size of the third-party gaming services market suffers from the following sources of uncertainty:

1. Misreporting the use of secondary market channels. As a grey area activity, it is likely that players could underreport the usage of secondary market in surveys. Because the usage of secondary gaming services might have negative influences on their game accounts (e.g., account banning) if discovered by the game's official operator, some players might be reluctant to reveal that they have used the secondary gaming service market. The degree of underreporting might be different depending on the survey design, survey body, and the region.

2. Retrospective misreporting of secondary gaming service expenditures by players. Players might retrospectively misreport their use of secondary gaming in online games. In surveys, players are often asked to give retrospective accounts of their expenditures for the last month or last year. Hindsight biases and other cognitive factors might affect the accuracy of such accounts, creating effects of either underreporting or over reporting. The exact effect of this in the online game market is unknown and needs further study. Underreporting of expenditures compared to actual expenditures is most likely. This assumption is based on the similarities of this phenomena in the online game market compared to gambling markets in which this effect has been studied more extensively. It might be objected that the gambling market might be different in some respects that render industry comparison of this specific effect unreliable. Yet, several studies have found similarities between the design of the virtual economy of online games and the mechanisms underlying gambling. In the gambling literature, one of the more extensive studies of this subject found that monthly retrospective reporting was underreporting daily reporting of gambling expenditures that were almost 50% higher (Blaszczynski, Ladouceur, Goulet & Savard, 2008).

3. Different markets for gaming services depending on type of online game and its business model. Traditionally, MMOG games have more dedicated "hardcore" players than more casual online games with a higher propensity to consume virtual goods and services. These casual online games have increased their share of the market over time as online games have reached beyond the hardcore market.

Also, the secondary market is larger in games where all the gaming services are provided by third parties as opposed to the official operator. In so-called free-to-play or item payment based games, the third party industry faces competition from the official game operator. This business model is especially common in Asia where it is dominant, but it has also been growing in importance in North America and Europe.

The result is what could be labeled a "mixed" online game market compared to a few years ago, with different business models and a more heterogeneous player base. The data in this report is focused mostly on MMOG games.

4. Empirical reliability and lack of survey data regarding average user spending on the secondary market. The surevy data regarding the number of paying players and the share of players using third-party gaming services are relatively reliable. However, currently there are few surveys yielding reliable data regarding the amount of money users spend on the secondary market. This report used governmental surveys from Korea and China and extrapolated the spending data from Korea to other developing countries. It is possible that the Korean numbers are not generalizable to other developing countries. Differences in methodology and design between surveys have some implication on the degree to which they can be compared. Future surveys with more reliable and harmonious design and coverage of more geographic regions will decrease this source of uncertainty.

Appendix 2.

Examples of third-party websites selling virtual game currency

Name of company	**Webpage address**	**Company location** ***(as stated on the webpage, might be different in reality)***
Koala Credits	*http://www.koalacredits.com/* (accessed Mar. 4, 2011)	Hong Kong
Bank of Wow	*http://www.bankofwow.com/* (accessed Mar. 4, 2011)	China
IGE	*http://www.ige.com/* (accessed Mar. 4, 2011)	United States
Guy4Game	*http://www.guy4game.com/* (accessed Mar. 4, 2011)	Canada, China, United States
MOGS	*http://www.mogs.com/* (accessed Mar. 4, 2011)	United States
OffGamers	*http://www.offgamers.com/* (accessed Mar. 4, 2011)	Malaysia
Belrion	*http://www.belrion.com/* (accessed Mar. 4, 2011)	Singapore, China, US, India
EpicToon	*http://www.epictoon.com/* (accessed Mar. 4, 2011)	
ELYGAME	*http://www.elygame.com/* (accessed Mar. 4, 2011)	China
WeeGold	*http://www.weegold.com/* (accessed Mar. 4, 2011)	China
G4S	*http://www.game4shop.com/*(accessed Mar. 4, 2011)	United States
gameSavor	*http://www.gamesavor.com/* (accessed Mar. 4, 2011)	
JPITEMS	*http://www.jpitems.com/* (accessed Mar. 4, 2011)	United States
GoldCEO	*https://www.goldceo.com/* (accessed Mar. 4, 2011)	United States
MyMMOshop	*http://www.mymmoshop.com/* (accessed Mar. 4, 2011)	United States, Ireland, Australia
Mmosale	*http://www.mmosale.com/* (accessed Mar. 4, 2011)	Hong Kong
OGPAL	*http://www.ogpal.com/* (accessed Mar. 4, 2011)	United States
D2pair	*http://www.d2pair.com/* (accessed Mar. 4, 2011)	China
GoLeveling	*http://www.goleveling.com/* (accessed Mar. 4, 2011)	China
Helper 4 Gamers	*http://www.helper4gamers.com/* (accessed Mar. 4, 2011)	United States

Source: Author's analysis

About *info*Dev

*info*Dev is global development financing program among international development agencies, coordinated and served by an expert Secretariat housed at the World Bank Group, one of its key donors and founders. It acts as a neutral convener of dialogue, and as a coordinator of joint action among bilateral and multilateral donors—supporting global sharing of information on ICT for development (ICT4D), and helping to reduce duplication of efforts and investments. *info*Dev also forms partnerships with public and private sector organizations who are innovators in the field of ICT4D. *info*Dev is housed in the Finacial and Private Sector Development (FPD) Vice Presidency of the World Bank Group.

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