12-2014

Toward a Patent Exhaustion Regime for Sustainable Development, 32 Berkeley J. Int'l Law. 330 (2014)

Benjamin Liu
John Marshall Law School

Towards a Patent Exhaustion Regime for Sustainable Development

Benjamin Pi-wei Liu*

* Assistant Professor of Law, The John Marshall Law School. I am grateful to Shubha Ghosh, Daryl Lim, Doris Long, Glenn Lunney, Sean Pager, Sarah Rajec, Joshua Sarnoff, and Peter Yu, as well as my colleagues and the participants of the John Marshall faculty work-in-progress presentation, the 2011 Annual Patent Conference at University of Kansas School of Law, the 2012 IP Scholarship Roundtable at Drake University Law School and the 2013 Junior Scholars in Intellectual Property Workshop at Michigan State Law School. My gratitude also goes out to Dean Ralph Ruebner and Dean John Corkery for their support and encouragement, and to Megan Niedermeyer, Tara Capsuto and their Board for their assistance working with this piece. Research Librarian Raizel Liebler and Research Assistant Sophie Yanling Jiang provided outstanding help. All errors and omissions remain my own.

INTRODUCTION

The IT retail center of Beijing, China, lies in a cluster of mid-rise computer malls within the Haidian district. A modest example of one such shopping venue is the "Silicon Valley Computer City"—a six-story building outside the West Gate of the elite Beijing University. Several dozen retail stalls fill each level, further dividing the floor into 100–200 square-foot plots.[1] Parts vendors and repair services, along with floor-to-ceiling stacks of desktops and piles of printers, occupy dimly lit stalls toward the rear of the building.[2] A number of products hawked in "Computer City" appear to be second-hand pieces, refurbishments, or those cobbled together from salvaged parts.[3] Men crouch outside the building; their makeshift signs promise high prices for spent ink cartridges or broken laptops. Inside the façade of Silicon Valley Computer City, two giant red banners remind customers to "Protect Intellectual Property, Boycott Illegal Counterfeits," and to "Implement 'Plastic Control Order,' Repel 'White Pollution.'" The slogans on display certainly tout unassailable policy goals: protecting intellectual property (IP) rights and promoting environmentalism. But the refilled cartridges and salvaged desktop rigs inside the shopping center point to a latent conflict resting between these aspirations:

1. This account is based on the author's visit in the summer of 2011.

2. David Kousemaker devotes the TechTravels weblog to showcasing dramatic photographs of secondary market and electronics-refurbishment operations in Beijing and elsewhere. The phone market he photographed in Beijing is structurally similar to the Beijing Silicon Valley one described here, only bigger. David Kousemaker, *TechTravels: Beijing – Phone Market*, TRAVEL BLOG (Mar. 2, 2010, 1:25 PM), http://techtravels.wordpress.com/beijing-phone-market/.

3. *See, e.g.*, David Kousemaker, *Shenzhen – Hua Qiang Bei*, TRAVEL BLOG (Mar. 12, 2010, 12:11 AM), http://techtravels.wordpress.com/shenzhen-hua-qiang-bei/ (last visited Aug. 15, 2013) (showing a bustling phone market in Shenzhen, China); David Kousemaker, *Shenzhen – Phone Recycling*, TRAVEL BLOG (Mar. 14, 2010, 11:45 PM), http://techtravels.wordpress.com/shenzhen-phone-recycling-3/ (showing imagines of cell phone parts).

What happens when attempts to protect IP rights conflict with goals of sustainable development?

Patent holders have sued commercial refurbishers who make a business out of restoring and selling their proprietary products. While courts generally agree that extensive refurbishment can amount to patent infringement, they recognize that some refurbishment is permitted under the doctrine of patent exhaustion. Exhaustion embodies the notion that legitimate purchasers and downstream users of a patented product may "use or resell the product free of control or conditions imposed by the patent owner," which in theory protects refurbishers from infringement claims.[4] But the distinction between permissible repair and impermissible reconstruction remains elusive. Following 150 years of jurisprudence in this area, the United States Court of Appeals for the Federal Circuit still refuses to draw a bright-line distinction.[5] No international norms exist either: The Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS)—the multilateral agreement which sets the minimum standard of protection in many areas of IP law—allows individual countries to determine the scope of exhaustion doctrine.[6] Designing a working exhaustion doctrine given this flexibility can be daunting for developing countries such as China, where refurbishment is an actively pursued industrial policy (as opposed to a measure for protecting purchaser rights, as it is often perceived in the developed countries).[7]

This Article argues that the current exhaustion doctrine, when applied to the refurbishing industry, fails to balance its mandate of promoting technological progress with the broader program of sustainable development and is therefore unsuitable for countries on the modernization path. First, what constitutes an infringing "making" remains underdetermined. Second, the evidentiary hurdle for proving legal refurbishment is too onerous for the low-margin and under-resourced refurbishing industry. Finally, the all-or-nothing approach to judging infringement fails to account for the nuanced cost-benefit nexus that exists between patentees, refurbishers, and society at large and

4. 1 DONALD S. CHISUM, CHISUM ON PATENTS § 16.03(2)(a) (2008).

5. *See infra* notes 61–65 and accompanying text.

6. Trade Related Aspects of Intellectual Property Rights, art. 6, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, 1867 U.N.T.S. 154 [hereafter TRIPs].

7. Policy documents such as the Outline of National Intellectual Property Strategy highlight the important social framework of China's patent law. Whereas the U.S. Constitution grants Congress the power "to promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries," the guiding principle of the Chinese IP Strategy situations IP protection as "support for the effort to make China an innovative country and develop a moderately prosperous society in all respects." *Compare* U.S. CONST. art. VIII, *with* STATE INTELLECTUAL PROPERTY OFFICE OF THE P.R.C., *Outline of the National Intellectual Property Strategy* (June 5, 2008), http://english.sipo.gov.cn/laws/developing/200906/t20090616_465239.html ("Balance the need for patent protection and the need to protect public interest properly."). For a general discussion of these two, possibly irreconcilable views of patent law, see generally Cynthia M. Ho, *Unveiling Competing Patent Perspectives*, 46 HOUS. L. REV. 1047 (2009).

discourages private ordering. To recalibrate the balance between technological progress and sustainable development, this Article proposes several alternatives to the predominant exhaustion doctrine that are better aligned with the goals of sustainable development.

The argument is organized as follows: Section I identifies several ways the refurbishing industry promotes sustainability and economic development. Section II outlines three aspects of the exhaustion jurisprudence affecting global refurbishment trade: the repair-reconstruction doctrine, the territorial reach of exhaustion, and the enforceability of single-use restrictions. Relevant examples are drawn from the United States, Japan, Europe, and China, which together showcase the range of analytical approaches courts have applied to the refurbishment infringement disputes that are often at odds with the needs of commercial refurbishers. Section III explores the tension between the refurbishing business and the underlying patent policy. Unfortunately for refurbishers, the policy justification for permissible repair applies poorly to them. Section IV details the fallout of this tension, leading to a suboptimal level of refurbishment even where it is legitimate. The last section proposes several alternative exhaustion doctrines developing countries may explore to reconcile patent law with commercial refurbishment.

I.
REFURBISHMENT AS A TOOL OF DEVELOPMENT

Refurbishment can provide significant public benefit in a rapidly developing country, by (1) offering an entry point for technological diffusion and catch-up, (2) mitigating the environmental impact of industrialization through conserving resources, and (3) providing empowering opportunities to entrepreneurs and the public at large.

A. Learning by Repairing

The aftermarket of replacement parts, repairs and services connects developing countries across a technological value chain, linking the street stalls of Ghana with the glass offices of Cupertino.[8] It is not a mere coincidence that many business empires in Asia grew out of the refurbishing industry. Honda Soichiro was the son of a bicycle repairman, who began his career recycling automobile and motorcycle engines before creating the Japanese auto giant that bears his name.[9] Akio Morita and Masaru Ibuka, the founders of SONY, were

8. Richard Grant & Martin Oteng-Ababio, *Mapping the Invisible and Real "African" Economy: Urban E-Waste Circuitry*, 33 URB. GEOGRAPHY 1 (2012), *available at* http://www.tandfonline.com/doi/abs/10.2747/0272-3638.33.1.1#.UdrNVPnVBCY.

9. *Joy of Manufacturing (1936)*, HONDA, http://world.honda.com/history/limitlessdreams/joyofmanufacturing/text/01.html (last visited Aug. 13, 2013).

former radio repairmen.[10] It was therefore no accident that SONY's first breakthrough product was a radio, later disrupting the industry with the famous Walkman model.[11] Chung Ju-yung, the founder of Hyundai, had no prior engineering experience before operating an automobile repair garage.[12] Lim Goh Tong, at one time the richest man in Malaysia with a net worth of $4.2 billion, began as a scrap metal and second-hand machinery trader who salvaged motor parts from discarded heavy equipment.[13]

Since patented products generally embody the most advanced technology, the refurbishment and repair of these products directly transfers tacit knowledge and know-how to developing economies. A viable refurbishment regime is especially important in World Trade Organization (WTO) countries, given that TRIPS effectively foreclosed the historical development path for countries to imitate and hack their way up the developmental ladder.[14] Refurbishing operations mitigate the economic barriers to technology catch-up. They provide income to build a capital base for future industrial upgrades. They also provide new companies a low-cost entry point to leapfrog current technology, thereby speeding the climb up the technological ladder, such as in the case of SONY and Honda.[15] Moreover, these business opportunities connect developing nations to the broader technological ecosystem, offering their budding companies

10. *Akio Morita, Co-Founder of SONY, Dies at 78*, L.A. TIMES, OCT. 3, 1999, *available at* http://articles.latimes.com/1999/oct/04/news/mn-18574 ("Morita co-founded Sony with former Japanese navy colleague Masaru Ibuka in a bombed-out department store in 1946, borrowing $500 to start a radio repair business.").

11. *Personal Audio*, SONY, http://www.sony.net/SonyInfo/CorporateInfo/History/sonyhistory-e.html (last visited Aug. 13, 2013).

12. RICHARD M. STEERS, MADE IN KOREA: CHUNG JU YUNG AND THE RISE OF HYUNDAI, 37–40 (1998).

13. LIM GOH TONG, MY STORY, 23–24 (2004).

14. Llewellyn Joseph Gibbons, *Do as I Say (Not as I Did): Putative Intellectual Property Lessons for Emerging Economies from the Not So Long Past of the Developed Nations*, 64 S.M.U. L. REV. 923, 942–45, 954 (2011) (describing how TRIPS reduced the ability of developing countries to follow the "well-worn path" of development through uncompensated technology transfer); *see generally* HA-JOON CHANG, KICKING AWAY THE LADDER: DEVELOPMENT STRATEGY IN HISTORICAL PERSPECTIVE (2002); William Kingston, *An Agenda for Radical Intellectual Property Reform*, *in* INTERNATIONAL PUBLIC GOODS AND TRANSFER OF TECHNOLOGY UNDER A GLOBALIZED INTELLECTUAL PROPERTY REGIME 653, 658 (Keith E. Maskus & Jerome H. Reichman eds., 2005) ("The thrust of the TRIPS Agreement is to ensure that this process of growth by copying and learning by doing will never happen again.").

15. Robert Davison et al., *Technology Leapfrogging in Developing Countries – An Inevitable Luxury?*, THE ELECTRONIC J. ON INFO. SYS. IN DEV. COUNTRIES, 2000, 2–3 (discussing the leapfrog process generally); *see generally* Yong Geng & Brent Doberstein, *Developing the circular economy in China: Challenges and Opportunities for Achieving 'Leapfrog Development*,' 15 INT'L J. SUSTAINABLE DEV. & WORLD ECOLOGY 231 (2008) ("The paper describes current measures being implemented in China for the long-term promotion of a circular economy, including the formulation of objectives, legislation, policies and measures, so that the country can 'leapfrog' its way from environmentally-damaging development to a more sustainable path."); Jeffrey James, *The human development report 2001 and information technology for developing countries: an evaluation*, 23 INT. J. TECH. MGMT. 643 (2002), *available at* http://inderscience.metapress.com/content/dpde8g5b1j1nxc99/.

economic opportunities through "learning by doing" and studying consumer preferences. Andy Grove, the former Intel chairman, believes that hands-on manufacturing opportunities are ultimately the source of new innovations and the key to the commercialization of future technology[16]—a statement with which scholars of development agree.[17]

To be sure, this policy objective has not been used to influence the boundary of repair versus reconstruction in mature patent regimes. However, even in the United States the benefit of "learning by doing" is acknowledged at least in the experimental-use defense to patent infringement[18] and the exception to manufacture and study a patented drug for FDA approval.[19] At the other end of the spectrum, excessive IP protection may undermine practical learning and innovation through refurbishment. The Digital Millennium Copyright Act (DMCA) has been criticized for its "chilling effect" on software innovation by preventing software developers from studying computer codes through reverse engineering.[20] That the laws of Japan and the United States downplay the

16. Andy Grove, *How America Can Create Jobs*, BUSINESS WEEK, (July 1, 2010) http://www.businessweek.com/magazine/content/10_28/b4186048358596.htm ("Not only did we lose an untold number of jobs, we broke the chain of experience that is so important in technological evolution. As happened with batteries, abandoning today's 'commodity' manufacturing can lock you out of tomorrow's emerging industry.").

17. Nile W. Hatch & David C. Mowery, *Process Innovation and Learning by Doing in Semiconductor Manufacturing*. 44 MGMT. SCI. 1461 (1998); INTELLECTUAL PROPERTY RIGHTS, DEVELOPMENT, AND CATCH-UP 412 (Hiroyuki Odagiri et al. eds., 2010) (noting that machines and equipment contributed to catch-up because they "provided opportunities for 'learning by using'"); *see also* Gibbons, *supra* note 14, at 956 ("An industry in a developing country which is developed from independently reverse engineering a product and the associated manufacturing process has gained more than one that merely received an instruction manual, foreign advisors, and a prefabricated factory.").

18. Although the United States observes a narrow experimental use exception to patent infringement, many commentators have explored the relationship between experimental use and technological development. *See, e.g.*, Rebecca S. Eisenberg, *Patent and the Progress of Science: Exclusive Rights and Experimental Use*, 56 U. CHI. L. REV. 1017, 1022 (1989); Ted Hagelin, *The Experimental Use Exemption to Patent Infringement: Information on Ice, Competition on Hold*, FLA. L. REV. 483, 486, 512 (2006); JANICE M. MEULLER, *The Evanescent Experimental Use Exemption from United States Patent Infringement Liability: Implications for University and Nonprofit Research and Development*, 56 BAYLOR L. REV. 917, 921 (2004); Katherine J. Strandburg, *What Does the Public Get? Experimental Use and the Patent Bargain*, 2004 WIS. L. REV. 81, 83 (2004); *see also* Madey v. Duke Univ., 307 F.3d 1351 (Fed. Cir. 2002) (setting out the experimental use defense generally).

19. 35 U.S.C. § 271(e)(1) (2010). The legislative intent of the exception was to permit makers of generic drugs to study and experiment with the patented drugs in order to develop data for FDA approval without fear of patent infringement. H.R. Rep. No. 98-857 at 45–46 (1984), *reprinted in* 1984 U.S.C.C.A.N. at 2678–79 ("The purpose of 271(e)(1) and (2) is to establish that experimentation with a patented drug product, when the purpose is to prepare for commercial activity which will begin after a valid patent expires, is not a patent infringement.").

20. *Unintended Consequences: Twelve Years under the DMCA*, ELECTRONIC FRONTIER FOUNDATION (Mar. 3, 2010), https://www.eff.org/es/wp/unintended-consequences-under-dmca (collecting DMCA claims against reverse engineers); Dan L. Burk & Julie E. Cohen, *Fair Use Infrastructure for Rights Management Systems*, 15 HARV. J. L. & TECH. 41, 76 (2001) ("Although the DMCA includes a provision allowing circumvention of rights management systems for reverse engineering purposes, the provision is quite narrow and does not cover the range of reverse

developmental importance of refurbishment should not discourage developing countries like China or Brazil from exploring this approach within the flexibility offered by TRIPS.[21]

B. Promoting Resource Sustainability

Refurbishment-and-reuse practices advance the sustainability goals and resource needs of developing countries, conserving significant resources and reducing pollution.

Industry associations state that "rebuil[t] automotive parts re-use[] 88% of the raw material from the original parts, and rebuil[t] engines consume 50% of the energy required to produce a new engine."[22] It has been estimated that the reuse of a computer system offers potential energy savings between five and twenty-times greater than possible savings through recycling.[23] Refurbishing ink cartridges "keeps some 84,000 tons of industrial-grade plastics and metals out of landfill."[24] Refilling and reusing an ink cartridge also reduces the risk that the residual ink in a discarded cartridge will leak and contaminate the soil or water. Extending the service life of existing products also reduces the rate of resource depletion.[25]

Governments recognize these benefits. The Chinese Circular Economy Law, promulgated in 2008, explicitly acknowledged the environmental benefits of encouraging refurbishment.[26] In the United States, procurement guidelines for government agencies encourage the use of refurbished and recycled

engineering activities that would be legitimate under current judicial formulations of fair use.").

21. TRIPs, *supra* note 6, art. 6 ("For the purpose of dispute settlement under this Agreement, subject to the provisions of Articles 3 and 4 nothing in this Agreement shall be used to address the issue of the exhaustion of intellectual property rights.").

22. Brief for Automotive Aftermarket Industry Association et al. as Amici Curiae Supporting Petitioner, 4, Bowman v. Monsanto Co., 133 S. Ct. 1761 (2013) (No. 11–796).

23. Eric Williams & Yukihiro Sasaki, *Strategizing the End-of-Life Handling of Personal Computers: Resell, Upgrade, Recycle*, *in* COMPUTERS AND THE ENVIRONMENT: UNDERSTANDING AND MANAGING THEIR IMPACTS 191 (Ruediger Kuehr & Eric Williams eds., 2003); *see also* Eric Williams et al., *Environmental, Social and Economic Implications of Global Reuse and Recycling of Personal Computers*, 42 ENVTL. SCI. & TECH. 6446, 6447 ("Thus, extension of lifespan through reuse is a strategy that can be particularly effective at mitigating life cycle impacts.").

24. Brief for Automotive Aftermarket Industry Association et al., *supra* note 22.

25. Hitesh Soneji, *Connected Consequences: Resource Depletion and North-South Inequities of the Global Material Intensity of the Internet and Mobile Telephony*, 3 (July 29, 2009), http://www.lumes.lu.se/database/alumni/07.09/thesis/Soneji_Hitesh.pdf

26. Circular Economy Promotion Law of the People's Republic of China (promulgated by the 4th Session of the Standing Committee of the 11th National People's Congress of the People's Republic of China, Aug. 29, 2008, effective Jan. 1, 2009), art. 1, *available at* http://www.amcham-shanghai.org/NR/rdonlyres/4447E57558FD4D8EBB0F65B920770DF7/7987/CircularEconomyLaw English.pdf [hereinafter "Circular Economy Law"]. Article 1 of the Circular Economy Promotion Law states: "[t]his [l]aw is formulated for the purpose of promoting the development of the circular economy, improving the resource utilization efficiency, protecting and improving the environment and realizing sustainable development."

products.[27] It should be noted that some countries support the Basel Convention that bans the exportation of spent equipment to developing countries due to the fear that unregulated disposition of electronic products (through practices such as acid bath or wire burning) causes severe pollution.[28] This is mainly due to the action of e-waste disposers, not refurbishers. Moreover, legitimate refurbishment operations help combat the e-waste problem—reusable equipment in the waste stream increases the profitability of collection programs overall, thereby increasing the commercial attractiveness of the reuse-recycle business generally while encouraging responsible treatment of non-renewable waste by off-setting its cost.[29]

Brand manufacturers have implemented their own recycling programs to combat the e-waste disposal problem and to drain the starting material away from the secondary market.[30] The result is mixed. For example, only 400 ink cartridges were collected during the first year Canon began collecting spent ink cartridges in China.[31] Even when there is a collection program in place, original equipment manufacturers (OEMs) of ink cartridges generally do not refill their cartridges. OEMs may find the sale of extensively reused products challenging, raising issues of quality control, supply-chain control, price erosion, increased competition, and customer confusion.[32] Thus, ink-cartridge OEMs physically shred their recycling collection for material extraction rather than reuse. These programs are generally decomposable operations, with ink cartridges turned into

27. *See* 40 C.F.R. § 247.11 (2012); *Comprehensive Procurement Guidelines – Toner Cartridges*, U.S. ENVIRONMENTAL PROTECTION AGENCY, http://www.epa.gov/waste/conserve/tools/cpg/products/nonpaperoffice.htm#toner.

28. *HP Policy Position: Social and Environmental Responsibility*, HEWLETT-PACKARD (2013), http://www.hp.com/hpinfo/abouthp/government/ww/pdf/Pillar_SER_May_2013.pdf ("To avoid illegal dumping of electronic waste, HP does not allow the export of electronic waste from developed to developing countries for recycling, and engages with governments to help improve national and international legislation governing the movement of electronic waste, such as the Basel Convention on the Control of Transboundary Movements of Hazardous Waste and Their Disposal."); *Dell Takes Strong Stance Against Exporting E-Waste*, DELL (May 12, 2009) http://www.dell.com/learn/us/en/uscorp1/press-releases/2009-05-12-export-policy?c=us&l=en&s=corp&cs=uscorp1.

29. Boma Molly Brown-West, *A Strategic Analysis of the Role of Uncertainty in Electronic Waste Recovery System Economics: An Investigation of the IT and Appliance Industries*, 55-56 (May 14, 2019), http://msl.mit.edu/theses/BrownWest_B-thesis.pdf (noting that the presence of resalable equipment in the mix of recycled products is vital to the profitability of the e-waste recycling business).

30. *Id.* at 191.

31. Xiong Haiyan (熊海燕), Jianeng yi nian huishou mo he jin 400 ge huanjing wuran lingren danyou (佳能一年回收墨盒仅400个, 环境污染令人担忧), JINHUA SHIBAO (京华时报), (June 15, 2006), http://it.people.com.cn/GB/42891/42893/4475455.html.

32. Hari Vasudevan et al., *Remanufacturing for Sustainable Development: Key Challenges, Elements and Benefits*, 3 INT'L J. INNOVATION MGMT. & TECH. 84, 85-86 (2012) (listing the challenges of remanufacturing). Some ink cartridge manufacturers overtly criticize the quality of refilled cartridges. *See, e.g.*, *Printer Ink Cartridge Refill: A Bargain?*, HEWLETT-PACKARD, http://web.archive.org/web/20130403094134/http://www.hp.com/sbso/product/supplies/printer-ink-refill (last visited Aug. 16, 2013) (presenting HP's quality objection against refilled cartridges).

cement, or disposable cameras turned into plastic pellets.[33] In any event, it is in the interest of OEMs to minimize the secondary market.[34] Legitimate commercial refurbishment reduces the risk of illegal waste disposal and promises greater environmental benefits than an OEM-operated recycling program, consistent with studies showing that reuse and refurbishment offer greater environmental benefits than recycling.[35]

Refurbishers have unsuccessfully raised the environmental benefits of their operations as a defense to patent infringement claims in the United States and Japan.[36] Should the threat of patent infringement cast a shadow over the legitimate refurbishing industry, it is likely to drive more waste stream toward the unscrupulous waste operators. This chilling effect extends beyond the patented products. For example, a patent may cover 1% of the computer monitors in the marketplace. However, a refurbisher, or his patent attorney, has to research the patent coverage or evaluate the various refurbishing processes against the doctrine of permissible repair for every computer monitor that comes out of a crate of discarded electronics in order to avoid liability. The significant investments in money and time made legal services strain the ability of the secondary market to sort the incoming waste stream and hinder the repair of unpatented items in the waste stream. If the risk of infringement is sufficiently high, refurbishing operations may leave the business altogether, even if there are significant noninfringing products to be refurbished.[37] It also reduces the incentive for manufacturers to recapture and recycle the waste they generate because they no longer need to share the market with their own previously sold products.

33. Hewlett-Packard, for example, breaks down its ink cartridges into plastic pellets as raw material in the manufacturing of ink cartridges. *See Environment Videos*, HEWLETT-PACKARD, http://www8.hp.com/us/en/hp-information/environment/eco-videos.html#.Udt6XvnVBCY. HP Print Cartridge Recycling Tour (last visited Aug. 16, 2013) (demonstrating the process of shredding collected cartridges into raw plastic and metal materials).

34. A vibrant used product market will inevitably transfer some market share from the new sales market. Thus, OEMs do not have adequate incentives to sell used products. V. Daniel R. Guide, Jr. et al., *Matching Demand and Supply to Maximize Profits from Remanufacturing*, 5 MANUFACTURING & SERV. OPERATIONS MGMT. 303 (2003); Atalay Atasu et al., *Remanufacturing as a Marketing Strategy*, 54 MGMT. SCI. 4(10): 1731 (2008).

35. Eric Williams & Yukihiro Sasaki, *Energy Analysis of End-of-life Options for Personal Computers: Resell, Upgrade, Recycle*, ELECTRONICS AND THE ENV'T 187–192 (2003); Sartaj Sahni et al., *Reusing Personal Computer Devices – Good or Bad for the Environment?*, IEEE INT'L SYMP. ON SUSTAINABLE SYS.& TECH. 17–19 (2010; Mizuki Sally Hashiguchi, *Recycling Efforts and Patent Rights Protection in the United States and Japan*, 33 COLUM. J. ENVTL. L. 169, 170 (2008) ("Recycling a single ink cartridge can conserve three quarts of oil and approximately 2.5 pounds of plastic."); *Just the Facts*, GRASSROOTS RECYCLING NETWORK, http://www.grrn.org/miller_waste/lexmark-facts.html (last visited Aug. 16, 2013).

36. Hashiguchi, *supra* note 35, at 180–189 (noting that Grand Panel in *Canon Inc. v. Recycle Assist Co.* "acknowledged the significance of environmental conservation" but "the case's impact on the recycling industry did not persuade the [c]ourt to change its conclusions").

37. *See infra* notes 213–217, and accompanying text.

C. Stimulating the Economy

In *Stealth of Nations: The Global Rise of the Informal Economy*, journalist Robert Neuwirth delved into the undercroft of economic activities and brought back tales of self-reliant entrepreneurs who drive bottom-up economic development.[38] At an estimate of $10 trillion a year, the informal economy, in the aggregate, dethrones China as the second largest economy in the world and employs half of the world's workers.[39] The secondary market, enabled by second-hand and refurbished goods, forms an important pillar of support to the informal economy.

The refurbishing industry is, first and foremost, a for-profit business activity aimed to meet the needs of growing economies. By one account, America's biggest export category to China is "scrap and trash."[40] This is the feedstock of China's refurbishing and recycling industry. The Silicon Valley Computer City and the refurbished mobile phone market are manifestations of the refurbishment business that targets China's vast "good enough" market.[41] But lest one think refurbishment is limited to fly-by-night operations, national policy makers have targeted repurposed and refurbished equipment for developing, for example, the semiconductor industry. SEMI, a global trade association of the electronic industry, reported:

Through national government policies, such as $586 billion National Economic Stimulus plan, and the 2008–2020 National Technology Development Planning program—and regional investment plans by provincial governments—China will invest billions over the next several years into repurposing and refurbishing 200 mm and 300 mm fabs, utilizing primarily used and refurbished equipment.[42]

Similarly, analysts estimate that the global market for refurbished medical devices will top $4.4 billion dollars by 2016.[43] The refurbishment business provides economic opportunities ranging from multi-million dollar semi-conductor fabs to cellphone refurbishing booths.

38. ROBERT NEUWIRTH, STEALTH OF NATIONS: THE GLOBAL RISE OF THE INFORMAL ECONOMY (2012).

39. Colin C. Williams & Jan Windebank, *Regional Variations in the Nature of the Shadow Economy: Evidence from a Survey of 27 European Union Member States*, *in* HANDBOOK ON SHADOW ECONOMY 177 (Friedrich Schneider ed., 2011).

40. Jodie Allen, *America's Biggest Trade Export to China? Trash*, U.S. NEWS (Mar. 3, 2010), http://www.usnews.com/opinion/blogs/jodie-allen/2010/03/03/americas-biggest-trade-export-to-china-trash.

41. Orit Gadiesh et. al., *The Battle for China's Good-Enough Market*, HARV. BUS. REV. (Sept. 2007), http://hbr.org/2007/09/the-battle-for-chinas-good-enough-market/ar/1.

42. *China IC Industry Development Targets Renewed and Repurposed Fabs*, SEMI (Mar. 8, 2010), http://www.semi.org/en/Press/CTR_034926.

43. Krishanu Bhattacharjee, *The Market Outlook for Refurbished Medical Devices to 2016*, 32 (2011), http://www.clinica.co.uk/pdfdownload?name=The+Market+Outlook+for+Refurbished+Medical+Devices+to+2016.pdf&filename=00179/The_Market_Outlook__179970a.pdf.

The robust demand for refurbished products in turn employs laborers at the lower end of the economic ladder. Adam Minter, a scrap-industry reporter and blogger in Shanghai, notes anecdotal evidence of 20% annual wage increases for semi-skilled scrap metal sorters who now enjoy wages that exceed those of a Chinese college graduate.[44] The same story is replicated in other developing countries: Electronics retrofitters in Nigeria find their income sufficient for all basic needs and consider their job "prestigious and high-tech," while in Ghana, the workers note "a certain level of satisfaction with their incomes."[45]

In addition, the refurbishment industry lowers barriers to accessing welfare-enhancing technologies. The vibrant trade in refurbished medical equipment promises to bring advanced medical technology to developing countries with less technical sophistication.[46] Charities, such as the International Medical Equipment Collaborative (IMEC), provide impoverished countries with discarded or retired medical equipment that volunteers refurbish.[47] In the communications field, the availability of mobile technology is transforming developing countries in Africa.[48] The availability of cheaper refurbished cell phones deepens cell phone penetration, putting technologies into the hands of those new to mobile phones, those on low incomes, manual workers, and those under eighteen, thereby fostering a new generation of technologists and opening up new possibilities.[49]

44. Adam Minter, *The aging face of what we think of when we think of Chinese labor*, SHANGHAI SCRAP (Dec. 15, 2010), http://shanghaiscrap.com/2010/12/the-aging-face-of-what-we-think-of-when-we-think-of-chinese-labor/.

45. Andreas Manhart et al., *Informal e-waste management in Lagos, Nigeria – socio-economic impacts and feasibility of international recycling co-operations*, ÖKO-INSTITUT E.V. 31 (June 2011), http://www.oeko.de/oekodoc/1371/2011-008-en.pdf ("Even apprentices who do not have any regular income yet, are mostly positive about their career perspectives and are looking forward to start their own business."); Siddharth Prakash & Andreas Manhart, *Socio-economic Assessment and Feasibility Study on Sustainable E-Waste Management in Ghana*, 34 (Aug. 2010), http://www.oeko.de/oekodoc/1057/2010-105-en.pdf (noting that in Ghana, "workers were not overly positive about their working conditions, but still indicated a certain level of satisfaction with their incomes.").

46. KRISHANU BHATTACHARJEE, THE MARKET OUTLOOK FOR REFURBISHED MEDICAL DEVICES TO 2016: REGULATORY ENVIRONMENT, OPPORTUNITIES, AND MARKET FORECAST 62–71 (2011) (discussing the refurbished medical device market in Brazil, Mexico, South Africa, Russia, and India).

47. *About Us*, IMEC, http://www.imecamerica.org/about-us/ (last visited Aug. 16, 2013).

48. Tolu Ogunlesi, *Seven Ways Mobile Phones Have Changed Lives in Africa*, CNN (Sep. 14, 2012), http://www.cnn.com/2012/09/13/world/africa/mobile-phones-change-africa; Warren A. Kaplan, *Can the ubiquitous power of mobile phones be used to improve health outcomes in developing countries?*, U.S. N.I.H. NAT'L LIBR. MED. (May 23, 2006), http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1524730/ (arguing that mobile technology improves health in Africa); John-Harmen Valk et al., *Using Mobile Phones to Improve Educational Outcomes: An Analysis of Evidence from Asia*, IRRODL (Mar. 2010), http://www.irrodl.org/index.php/irrodl/article/view/794/1487 (arguing that mobile technology improves education in Africa); Jenny C. Aker & Isaac M. Mbiti, *Mobile Phones and Economic Development in Africa*, 24 J. ECON. PERSP. 207 (2010), *available at* http://sites.tufts.edu/jennyaker/files/2010/09/aker_mobileafrica.pdf.

49. Take Romania, one of the lowest GDP countries in Europe, for example. A survey shows

II.
THE PATENT BARRIERS TO REFURBISHMENT, A PRIMER

Despite its virtues, the business of refurbishment can run afoul of patent law. In theory, the doctrine of patent exhaustion should free purchasers of patented products from infringement liability. In his patent treatise, Chisum provides a typical statement of this doctrine: "An authorized sale of a patented product exhausts the patent monopoly as to that product. Thus, a purchaser of such a product from the patent owner or one licensed by the patent owner may use or resell the product free of control or conditions imposed by the patent owner."[50]

This permissive statement, also known as the "first sale doctrine" in the United States, masks three legal distinctions that hinder the refurbishment of patented products.[51]

First, a refurbisher can only repair, not create, a product. Under the first-sale doctrine, an unrestricted sale of a patented item ends the patentee's control over that particular item. Therefore, a subsequent owner may repair the item without interference from the patentee. However, he cannot work an item so completely that it amounts to an infringing making.[52] The distinction between permissible repair and impermissible reconstruction gives rise to the repair-reconstruction doctrine. Second, refurbishment may also be subject to geographical limits. Under the law of national exhaustion, only products originally sold in the United States may subsequently be resold in the United States without infringement. Japan and China, on the other hand, permit the refurbishment and resale with their borders of products previously sold anywhere in the world. Third, a patentee may condition the sale of the product on a contractual restriction against use or transfer.[53] The enforceability of such restraint is ambiguous and varies among jurisdictions. It is also unclear whether a breach of the restriction triggers patent remedies in addition to remedies under contract law.

that 16.6% of mobile phone customers use a second-hand handset, and 93% of the respondents cite price as the reason for purchasing a second-hand mobile phone. James Goodman, *Return to Vendor: how second-hand mobile phones improve access to telephone services*, FORUM FOR THE FUTURE at 10–1, Nov. 2004, http://www.kiwanja.net/database/document/document_phone_recycling.pdf. This is truer in Africa, where landline infrastructure is less reliable. *Id.* at 4–5.

50. DONALD S. CHISUM, CHISUM ON PATENTS § 16.03(2)(a) (2008).

51. It is possible to exhaust the rights in a product through exercise of the patent other than an authorized sale, and therefore the first sale doctrine is a narrower concept. However, most refurbishment disputes involve the authorized transfer of patented goods to purchasers.

52. Aro Mfg. Co. v. Convertible Top Replacement Co., 365 U.S. 336, 346 (1961) ("[R]econstruction of a patented entity, comprised of unpatented elements, is limited to such a true reconstruction of the entity as to 'in fact make a new article.'").

53. Scholarship of exhaustion tends to focus on the conduct of the purchasers and their privy. *See, e.g.*, Mark D. Janis, *A Tale of the Apocryphal Axe: Repair, Reconstruction, and the Implied License in Intellectual Property Law*, 58 MD. L. REV. 423 (1999).

The following subsections detail how the repair-reconstruction doctrine, the national exhaustion doctrine, and the conditional sales doctrine each obstructs the refurbishing industry, using the law of United States as the primary illustration as well as looking to significant variations outside the United States. While this is not meant to be an exhaustive cross-country survey, the comparative method showcases the wide range of approaches countries have adopted.

A. The Repair-Reconstruction Doctrine

The term "refurbish" is "a convenient neutral term without legal significance, intended to connote neither 'repair' nor 'reconstruction.'"[54] The act of refurbishment ultimately results in either repair (a species of permissible use) or reconstruction (a species of impermissible making). The challenge to the refurbisher is that "the difference between a repair and a reconstruction is a difficult question that must be resolved case by case."[55] Federal Circuit Judge Newman concedes that "it is not always clear where the boundary lies: How much 'repair' is fair before the device is deemed reconstructed."[56] Federal Circuit Judge Gajarsa similarly describes the test: "we know a reconstruction when we see it."[57] Mark Janis, in his seminal survey of the repair versus reconstruction jurisprudence in 1999, critically observed: "Courts long ago abandoned all efforts to cabin the repair-reconstruction dichotomy within a rigid framework of rules. Instead, they rest their decisions on 'the exercise of sound common sense and an intelligent judgment.'"[58]

According to Janis, the current test is based on "spentness": Refurbishment is permissible as long as the product still retains some useful life, which is indeterminate and better off replaced with a test based on the intention of the parties.[59] The literature of repair and reconstruction doctrines across countries reveals an even more dizzying array of treatments.[60] The approaches rejected in

54. Jazz Photo Corp. v. Int'l Trade Comm'n, 264 F.3d 1094, 1098 n.1 (Fed. Cir. 2001) ("We use 'refurbish' as a convenient neutral term without legal significance, intended to connote neither "repair" nor 'reconstruction' of the used cameras.").

55. Standard Havens Prods., Inc. v. Gencor Indus., Inc., 953 F.2d 1360, 1376 (Fed. Cir. 1991).

56. Mallinckrodt, Inc. v. Medipart, Inc., 976 F.2d 700, 709 (Fed. Cir. 1992); *see also* Arthur J. Gajarsa et al., *How much Fuel to Add to the Fire of Genius? Some Questions About the Repair/Reconstruction Distinction in Patent Law*, 48 AM. U. L. REV. 1205, 1222–23, 1231 (1999).

57. Gajarsa et al., *supra* note 56,. at 1222; *see also* FMC Corp. v. Up-Right Inc., 21 F.3d 1073, 1078 (Fed. Cir. 1994) ("To the extent that FMC requests us to provide some type of bright-line test for determining whether reconstruction has taken place in those cases where all of the replacement under investigation has taken place at the same time, we decline to do so on the basis that this case does not present us with such a scenario.").

58. Mark D. Janis, *A Tale of the Apocryphal Axe: Repair, Reconstruction, and the Implied License in Intellectual Property Law*, 58 MD. L. REV. 423, 426 (1999) (quoting Goodyear Shoe Mach. Co. v. Jackson, 112 F. 146, 150 (1st Cir. 1901)).

59. *See generally id.*

60. Several prior studies report the law of patent exhaustion in different countries. *See*

one country can be the accepted approach in another. While a listing of country treatment may seem bewildering, the gamut of judicial logic can be sorted into a taxonomy of four distinct fault-lines: (1) whether the ultimate legal inquiry is to prove *repair* or to prove *reconstruction*; (2) whether the subject of analysis is the *character of the process* or the *identity of the product*; (3) whether the proofs are drawn from *the totality of circumstances* or *physical features*; and (4) whether any physical components are elevated into *essential elements* or not. The more a court focuses on "making," on the identity of the product, on the totality of circumstances, and on essential elements of the product, the more likely it is to find impermissible reconstruction in refurbishing situations.

1. The Ultimate Legal Inquiry: Repair or Making?

The outcome of the repair-reconstruction test may depend on whether one is looking for repair or reconstruction. It seems counterintuitive—after all, both are part of the same repair-reconstruction test. But the reality is that litigation procedure necessarily places these two concepts on an unequal footing.

In the United States, the courts frame the procedural issue as whether the third-party commercial refurbisher can show permissible repair. Since the restoration of a patented product necessarily makes an article covered by the claims of the patent, so the reasoning goes, patentees can always prove infringement in the technical sense (prima facie infringement). The real issue becomes whether the evidence produced by the accused refurbishers satisfies the affirmative defense of permissible repair. Such is the legal framework the Court of Appeals for the Federal Circuit applied in *Jazz Photo Corp. v. U.S. Int'l Trade Commission*, concerning a long-running dispute between Fuji Photo Film Co. and a group of camera refurbishers.[61] Fuji asserted a portfolio of design and utility patents covering its disposable cameras in the International Trade Commission (ITC) against refurbishers outside the United States. These refurbishers collected used single-use cameras, loaded them with new film, sealed the back cover with tape and repackaged the single-use cameras in a new sleeve under their own brand.[62] Although the ITC found the process infringing, the Federal Circuit disagreed and held that this reloading operation qualified as permissible repair in principle.[63] This process undoubtedly restored the broken or used cameras to some semblance of functionality, and judges examining this process understandably saw "permissible repair." Nonetheless, the Federal

generally Mineko Mohri, *Repair and Recycle as Direct Patent Infringement?*, *in* SPARES, REPAIRS AND INTELLECTUAL PROPERTY RIGHTS 59 (Christopher Heath & Anselm Kamperman Sanders eds., 2009); Shubha Ghosh, *The Implementation of Exhaustion Policies*, ICTSD Issue Paper No. 40 (Nov. 2013), https://blog.smu.edu/towercenter/2014/01/02/shubha-ghosh-the-implementation-of-exhaustion-policies. See also AIPPI's report based on a survey conducted in 2008 investigating the operation of exhaustion law in thirty-five countries. *Exhaustion of IPRs in cases of recycling and repair of goods*, AIPPI, https://www.aippi.org/download/commitees/205/SR205English.pdf.

61. 264 F.3d 1094, 1105 (Fed. Cir. 2001).

62. *Id.* at 1189.

63. *Id.* at 1110–11.

Circuit maintained the finding of infringement to those infringers that failed to adduce any evidence to meet the requisite burden of proof.[64]

U.S. judges have also invoked the concept of "akin to repair" to protect purchasers who modify a patented product from infringement claims.[65] The "akin to repair" concept, while not directly relevant to third-party commercial refurbishment, reveals the tendency of U.S. courts to see permissible repair because it is what they seek.

By contrast, courts in the United Kingdom ask whether an act of "making" has taken place, according to *United Wire Ltd. v. Screen Repair Services Ltd. and Others*, a case involving the refurbishment of a patented sifting screen used in the oil industry.[66] In *United Wire*, a third-party commercial refurbisher sold reconditioned screens by attaching new mesh to frames recovered from the patentee's product (not unlike refurbishers placing new film into empty camera bodies recycled from Fuji's single-use cameras). The trial court treated the case as a repair of the sold screen. The Court of Appeal reversed and explicitly rejected an analysis based on the repair argument where no separate, independent right of repair existed.[67] Lord Bingham explained the ambiguity of repair thus:

For repair may involve no more than remedial action to make good the effects of wear and tear, involving perhaps no replacement of parts; or it may involve substantial reconstruction of the patented product, with extensive replacement of parts. Both activities might, without abuse of language, be described as repair, but the latter might infringe the patentee's rights when the former did not.[68]

Instead, the correct test is "whether, having regard to the nature of the patented article, the defendant could be said to have made it."[69] The evidence showed refurbishers combining parts, including the previously sold frame, into a new working product just as they would have done had the frame come from a parts vendor.

64. *See, e.g.*, Fuji Photo Film Co., Ltd. v. Jazz Photo Corp., 394 F.3d 1368, 1374 (Fed. Cir. 2005) (upholding liability against "those remanufacturing facilities for which discovery was refused or where the evidence offered was found incomplete or not credible" due to an unwillingness to "exculpate unknown processes from the charge of infringing reconstruction").

65. Wilbur-Ellis Co. v. Kuther, 337 U.S. 422, 425 (1964) (holding that the modification of unpatented components of a canning machine to accommodate different can sizes is "akin to repair"); Hewlett-Packard Co. v. Repeat-O-Type Stencil Mfg. Corp., 123 F. 3d 1445, 1452 (Fed. Cir. 1997) (holding that modifying unpatented printer cartridge plastic caps to provide refillable capacity is akin to repair); Surfco Hawaii v. Fin Control Systems, Ltd, 264 F.3d 1062, 1066–67 (Fed. Cir. 2001) (holding that modifying surfing board fin to provide a safer rubber edge is akin to repair); Husky Injection Molding Systems Ltd. v. R & D Tool & Engineering Co., 291 F.3d 780, 787–88 (Fed. Cir. 2002) (holding that modifying injection mold and carrier plate of a patented injection molding system is akin to repair).

66. United Wire Ltd. v Screen Services (Scotland) [2001] RPC 24.

67. *Id.*

68. *Id.*

69. *Id.*

Chinese courts take the "making" inquiry up a notch with the notion of "akin to making" in a line of cases involving the refilling of liquor bottles under design-patents protection. Even though the bottle refillers neither repaired nor reconstructed the patented bottles, the court held that the act of salvaging the bottles from trash, cleaning them, and refilling them with liquor provides the bottles a second life that is "akin to making" and infringed the patent rights of the company that originally manufactured and used the bottles.[70] This analysis contrasts sharply with the "akin to repair" analysis in the United States and highlights the importance of the judicial distinction between the concepts of repair and reconstruction: U.S. courts begin their analysis from repair and expand the safe harbor to situations that are "akin to repair," while Chinese courts begin their analysis from reconstruction and expand the prohibition to situations that are "akin to making."

Like the young woman/old maid perceptual illusion, the repair-reconstruction test resolves itself as one or the other to different observers.[71] Those looking for permissible repair, like judges in the United States, are able to find permissible repair. Those looking for impermissible making, like the judges in the United Kingdom and China, similarly find impermissible making. Each would insist that his or her view is correct to the exclusion of the other, while both outcomes are equally supported in their own terms.

2. The Subject of Analysis: Process or Product?

The doctrinal moniker of "repair-reconstruction test" implicitly ascribes a process as its subject, and courts in the United States adopt the process-oriented approach by examining the steps of the refurbishment. But courts in Japan and Germany look first to the product itself both before and after refurbishment, given that patent exhaustion limits infringement immunities to the owners of the product. In this way, the "repair/reconstruction test" can be reframed as a product-based test of whether the refurbished product retained its original identity or received a new commercial identity through a new creation.[72] As it turns out, the choice to focus on the *process* of refurbishment or the differences in the *product* before and after the act of refurbishment can lead to different case outcomes.

A process-oriented doctrine examines the continuous flow from the pre-refurbished state to the post-furbished state. This method of analysis gave rise to a metaphysical discussion in *Fuji v. Jazz Photo* as to whether the refurbishment

70. Benjamin P. Liu, *Remade in China: What Does Recycling Tell Us About the Chinese Patent System*, 82 UMKC L. REV. _____ (2014) (detailing the Chinese bottle refill cases).

71. The young woman/old maid perceptual illusion is a famous optical illusion in which some observers see a young woman while others perceive an old woman, within the same image.

72. Although U.S. courts do not explicitly perform a product-based analysis, the repair-reconstruction doctrine and related defenses have been referred to as "product-based infringement immunities." Amber Hatfield Rovner, *Practical Guide to Application of (or Defense against) Product-Based Infringement Immunities under the Doctrines of Patent Exhaustion and Implied License*, 12 TEX. INTELL. PROP. L.J. 227, 227 (2004).

process should be characterized as four, eight, nineteen or more steps, or whether the number of steps even matters.[73] The *Fuji* court reasonably thought that it did not, but the court's answer is pre-ordained by its process-centric preoccupation which avoided the real issue: how does one distinguish one continuous repair process from another continuous reconstruction process? Like Zeno's tortoise paradox, the spent stock material inches along the scrolling conveyer belt, ever-extending the zone of permissible repair. There is never a clear defining moment when one more step crosses over to impermissible reconstruction. Therefore, an analysis focusing on the refurbishing process favors the conclusion of permissible repair.

In contrast, a test focusing on the end product favors a court finding impermissible construction. Mark Janis noted this identity test in older U.S. cases before *Aro I*.[74] Today, the product-identity approach is exemplified by the reasoning of the Japanese Supreme Court in *Canon KK v. Recycling Assist* concerning an ink-cartridge patent where the ink formed an air barrier.[75] In *Canon*, refurbishers refilled empty printer ink cartridges and performed incidental manufacturing steps to aid the process, including cleaning out dried ink particles and drilling holes in the ink chambers.[76] The Supreme Court recognized infringement "when an article sold . . . by the patentee is modified or its parts are replaced, and because of this a new instance of the patented article having a new identity is created."[77] It concluded that "new patented products which lack the identity from the original products were created." According to Toshiko Takenaka, who analyzed *Canon* closely, the Supreme Court framed the key inquiry as "whether the recycled products are identical to the products legally sold by the patent owner and its licensees."[78] Likewise, in the 2005 *Flugelradzahler* case, the German Federal Supreme Court framed the issue as "whether the measures taken maintain the identity of the specific patented product . . . or are the equivalent of the creation of a new product."[79] This

73. Fuji Photo Film Co. Ltd. v. Jazz Photo Corp., 249 F. Supp. 2d 434, 446–47 (D.N.J. 2003) ("Whether these refurbishment procedures are counted as four, eight or nineteen 'steps' is a matter of semantics, as virtually any step can be divided into multiple 'sub-steps.' The legal issue is whether the totality of the refurbishment procedures are of such a nature that they preserve the useful life of the patented article, or whether they in fact recreate the article after it has become spent.").

74. Janis, *supra* note, at 448–49.

75. Saikō Saibansho [Sup. Ct.] Nov. 8, 2007, Heisei 18 (jyu) no. 826 (Japan), *available at* http://www.courts.go.jp/hanrei/pdf/20080111155502.pdf [hereinafter Recycle Assist Co.].

For a translation of this decision, see C. Augustine Rakow, *Translation of Japanese Supreme Court Decision Announcing Reconstruction Limitation on International Patent Exhaustion:* Recycle Assist Co., Ltd. v. Cannon, Inc., 15 CASRIP NEWSLETTER 1 (2008), *available at* http://www.law.washington.edu/Casrip/Newsletter/default.aspx?year=2008&article=newsv15i1RecAssist.

76. *Id*.

77. *Id*.

78. Toshiko Takenaka, *Exercise of Patent Rights Under Japanese Anti-Monopoly Prevention Law: A Comparative Law Perspective*, *in* COMPETITION LAW AND INTELLECTUAL PROPERTY, A EUROPEAN PERSPECTIVE 285, 287 (Giandonato Caggiano et al. eds., 2012).

79. Federal Supreme Court, Flügelradzähler, 4 May 2004. Case No. X ZR 48/03, 2004GRUR

product-based test asks judges to juxtapose discrete pre- and post-refurbished ink cartridges. This side-by-side comparison accentuates their differences and leads the legal analysis down the path of impermissible reconstruction.

In this sense, the choice of examining the process versus the product is a choice between continuity and break, between incrementality and abruptness, and between repair and reconstruction. Conceptually the process-based "repair-reconstruction test" and the product-based "identity" test are two statements of the same doctrine. In practice, they can lead to different outcomes.

3. The Content of Proof: Physical Attributes or Totality of Circumstances

Another distinction among repair-reconstruction decisions turns on the content of the proof required. U.S. courts ostensibly limit examination to the physical characteristics of the repair-reconstruction process, including the steps of restoration and the extensiveness of replacement.[80] However, many decisions inside and outside the United States discuss the totality of circumstances that admit market and social considerations beyond mere physical attributes.[81] This is especially prevalent in jurisdictions using the product-identity test, given the breadth of what makes up the identity of a product.

The first strand is evident in the U.S. Supreme Court decision in *Aro Manufacturing Co. v. Convertible Top Replacement Co.* (*Aro I*). There, the plaintiff patented a convertible automobile top structure and licensed the patent to manufacturers of convertible cars. A third-party supplier was sued for contributory infringement for selling the unpatented fabric element designed to replace the worn original fabric and act as a repair to the convertible top frame. The majority explicitly eschewed a repair analysis based on multiple factors in favor of examining physical transformations such as the "replacement of individual unpatented parts."[82] The fabric wore out over time, but the structure remained sound.

The Federal Circuit followed the same reasoning in *Dana Corporation v. American Precision Company, Inc.*[83] There, the Federal Circuit limited the analysis exclusively to the physical refurbishment process and found no difference between the repair of a single broken clutch for a customer and the commercial rebuilding and sale of clutches using parts collected from broken clutches.[84] The identity of the refurbishers (purchasers versus a third-party

758, 36 IIC 963 (2005) (Ger.).

80. Janis, *supra* note, at 479–85 (tracing the rejection of the "economic" approach in the United States).

81. Mohri, *supra* note 60, at 66.

82. *Aro I*, 365 U.S. 336, 346 (1961).

83. Dana Corp. v. American Precision Co., Inc., 827 F.2d 755, 759 (Fed. Cir. 1987) ("[U]se of the production-line method cannot convert what Dana concedes is permissible repair to impermissible reconstruction.").

84. *See id.* at 758–59 (citing Wilbur-Ellis Co. v. Kuther, 377 U.S. 422 (1964) and General Electric Co. v. United States, 572 F.2d 745 (1978)); *see generally* Janis, *supra* note, at 480–81.

business), the scale of the operation, and the customs of the marketplace did not enter the calculus. The *Fuji v. Jazz* case also relied on this reasoning and permitted the eight-step (or nineteen-step) process as repair, even though (1) the refurbisher had to practice the film loading process patent in its entirety, (2) the price charged by the patentee was calibrated for a single-use, and (3) the product was a single-use camera that the consumer had no expectation of repairing or reusing. *Dana v. American Precision* and *Fuji v. Jazz* may have supported a finding of reconstruction in favor of the patentee had they been decided under the totality of circumstances.[85]

Nonetheless, the totality-of-circumstance test still lingers here in the United States and is alive and well elsewhere. Although the *Aro I* majority declined to adopt the multiple-factor test, Judge Brennan advocated a multiple-factor test in a concurrent opinion.[86] The Federal Circuit occasionally applies this approach, such as in the case of *Sandvik Aktiebolag v. E.J. Co.* The *Sandvik* case concerns the refurbishment of a carbide drill tip, which was left with a specific geometry after it had been used and worn.[87] The Federal Circuit held that it was permissible repair to resharpen a worn tip, but not to retip a damaged drill bit. In reaching this conclusion, the court identified a list of factors including: "whether a market has developed to manufacture or service the part . . . and objective evidence of the intent of the patentee."[88]

Likewise, the Japanese Supreme Court in *Canon* considered "the totality of the circumstances including the attributes of the patented article, the content of the patented invention, the manner in which the article was modified or its parts replaced, as well as the actual conditions of the commercial transaction, etc."[89] Chinese courts took the totality of circumstance to the other extreme in the bottle-recycling cases mentioned earlier. Although the bottles did not undergo any physical alteration, their economic resurrection from the trash heap, and their second life as refilled bottles, convinced Chinese judges to rule against the bottle refillers.[90] In 2013, the U.K. Supreme Court endorsed the totality-of-circumstance test in *Schütz v. Werit*, a case relating to a container for holding bulk liquid comprising a plastic bottle nestled inside a metal cage.[91] Lord Neuberger, writing for the court, permitted the refurbisher to replace a damaged plastic bottle upon considering factors including: the relative useable life of the

85. *See* Mohri, *supra* note 60.

86. *Aro I*, 365 U.S. at 364–65 ("The life of the part . . . in relation to the useful life of the whole combination, the importance of the replaced element to the inventive concept, the cost of the component relative to the cost of the combination, the common sense understanding and intention of the patent owner and the buyer of the combination as to its perishable components, whether the purchased component replaces a worn-out part or is bought for some other purpose, and other pertinent factors.").

87. Aktiebolag v. E.J. Co., 121 F. 3d 669 (Fed. Cir. 1997).

88. *Id.*

89. *Recycle Assist Co.*, *supra* note 75.

90. Liu, *supra* note 70.

91. Schütz Limited v. Werit Limited, [2013] UKSC 16.

bottle vis-à-vis the metal cage, the relative separateness of the bottle and the metal cage, the relative value of the container before and after the replacement, and whether the replaced plastic bottle embodied the inventive feature. With respect to economic factors, Lord Neuberger noted:

If an article has no value when it has been used and before it is worked on, and has substantial value after it has been worked on, that could fairly be said to be a factor in favour of the work resulting in the "making" of a new article, or, to put the point another way, in favour of the work involved amounting to more than repair.[92]

Although the outcome of this case differed from the Chinese bottle-recycling case, courts in both the U.K and China appear to accept the idea that a finding of reconstruction is more likely when the starting stock material literally has no value.

4. The Significance of Parts: All Elements or Essential Elements

The last divide turns on whether all parts of a patented article are created equal. The *Aro I* majority stated that the patent "covers only the totality of the elements in the claim and that no element, separately viewed, is within the grant."[93] Therefore, all elements of a patented article are created equal and the replacement of one part does not amount to the creation of the whole.[94] Supreme Court Justices rejected the essential-element test and permitted the sale of an unpatented component.[95] However, commentators including Federal Circuit Judge Gajarsa noted the continued influence of the essential-element test in refurbishment cases since *Aro I*.[96]

In contrast, a country applying the essential-element test assigns greater importance to those parts that are essential to the invention, which therefore cannot be replaced without causing infringement. Toshiko Takenaka observes that the Japanese Supreme Court, "focusing on essential elements and the advantage of the invention, has made it easy for patentees to circumvent the exhaustion doctrine and unreasonably restrict the right of the owner for a specific patented product."[97] The ink inside a printer cartridge became an essential element and as a result, refilling the ink amounted to reconstruction in the *Canon* case. This doctrinal difference between Japan and the United States

92. *Id.* at 20.

93. *Aro I*, 365 U.S. 336, 344 (1961).

94. *See, e.g.*, Porter v. Farmers Supply Serv., Inc., 790 F.2d 882, 885 (Fed. Cir. 1986) (quoting Dawson Chem. Co. v. Rohm & Haas Co., 448 U.S. 176, 217 (1980)) (refusing to consider "whether the element of the combination that has been replaced is an 'essential' or 'distinguishing' part of the invention").

95. *Aro I*, 365 U.S. at 346.

96. *See* Bernard Chao, *Breaking Aro's Commandment: Recognizing That Inventions Have Heart*, 20 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 1183, 1208 (2010); Janis, *supra* note 58, at 455–57.

97. Takenaka, *supra* note 78.

results in the infringement liability imposed on camera refurbishers in Japan but not the United States.[98]

This is not to say that the essential-element test always yields a finding of infringement. In *Schütz v. Werit*, the U.K. Court observed that "the replaced part . . . is a free-standing item of property, which does not include, or relate to, the inventive concept."[99] When courts adopt an essential-element test based on the inventive concept, it follows that some refurbishing operation will relate to the inventive concept and some will not. *Schütz v. Werit* notwithstanding, courts applying the essential-element test are more likely to find infringement because the replacement of a single essential element may satisfy the definition of making.[100] Where a nonessential part of the invention is replaced, a court applying the all-elements test is likely to find permissible repair in any event.

To summarize, the core test for the probity of refurbishment under patent law spawns a slew of analytical methods—whether the ultimate legal question is one of repair or reconstruction, whether the subject of analysis focuses on the refurbishment process or product identity, whether the evidence of refurbishment include physical changes or the totality of the circumstances, and whether any of the physical components are considered essential. Although individual cases adopted specific variations over the meaning of "making," the plethora of arbitrary tests expose refurbishers to infringement risk that is beyond their ability to evaluate ex ante. The complexity of the test also imposes a burden of coming forward with extensive evidence that may be financially and logistically challenging to a refurbisher.

B. Geographical Limitations of Exhaustion

The second barrier arises out of the geographical limits of exhaustion. The geographic scope of a country's exhaustion doctrines refers to the area in which an authorized sale will exhaust the patent rights attached to the product, which may take the form of international exhaustion, regional exhaustion or national exhaustion. This is a doctrinal area undergoing active developments in Japan, China, and the United States.

The doctrine of international exhaustion allows a refurbisher to repair and sell a patented product that was previously sold anywhere in the world. Under this regime, refurbishers have access to a greater pool of spent goods and incur fewer transaction costs by not having to sort the spent stock material according to their country of first sale.[101] Chinese patent law adopted international

98. *Id.*

99. Schütz v Werit, [2013] UKSC 16.

100. This split echoes the split among the justices in *Aro I.* Four Justices espoused a multiple factor test that looks into whether a replaced component is essential and therefore infringing. Justices Harlan, Frankfurter, and Stewart answered yes to infringement. *Aro I*, 365 U.S. at 369. Justice Brennan also endorsed the essential elements test but found no infringement under it. *Id.* at 362.

101. The single use camera cases and the ink cartridge cases provide examples of injunctions against refurbishers requiring refurbishers to sort through its stock. *See, e.g.*, Fujifilm Corp. v.

exhaustion under the Third Revision of the patent law.[102] This is also the current rule in Japan following the decision of the Japanese Supreme Court in *BBS v. Japan-Auto Products*.[103] The Japanese rule does have an additional caveat, where the patentee may prevent the application of international exhaustion through a conditional sale if the product was originally sold but without the permission to import into Japan.[104] In any event, Japanese and Chinese refurbishers may repair and sell a patented product without regard to where the original product was first sold and refurbished under the default rule.

Countries in the European Union operate under regional exhaustion. Articles 28 and 30 of the European Community (EC) Treaty and Articles 11 and 13 of the European Economic Area (EEA) Agreement guarantee the free movement of products among the member states, although it has not been an issue in refurbishment-related disputes.[105] Thus, refurbishers in the United Kingdom can repair and sell any products originally sold in the EC or EEA countries.[106]

Under the principal of national exhaustion, only the sale of products inside the United States will exhaust U.S. patent rights and permit repair. Refurbishment of products sold outside the United States, on the other hand, constitutes infringement.[107] The Court of Appeals for the Federal Circuit adopted the principal of national exhaustion for the United States in *Jazz Photo*

Benun, 605 F.3d 1366, 1369 (Fed. Cir. 2010) ("On June 15, 2005, the district court's second preliminary injunction enjoined defendants from selling in or to the United States: LFFPs not made from shells first sold in the United States by Fuji or its licensees.").

102. Patent Law of the People's Republic of China (promulgated by the Standing Comm. Nat'l People's Cong., Mar. 12, 1984, amended Dec. 27, 2008, effective Oct. 1, 2009), arts. 69 ("None of the following shall be deemed as infringement of the patent right: (1) where, after the sale of a patented product or a product obtained directly by a patented process by the patentee or any entity or individual authorized by the patentee, any other person uses, offers to sell, sell, or imports that product . . . .") [hereinafter CPL].

103. *See* Saikō Saibansho [Sup. Ct.] Jul. 1, 1997, Hei 7 (o) no. 1988, 51 SAIKŌ SAIBANSHO MINJI HANREISHŪ [MINSYŪ] 2299 (Japan); Kaoru Kuroda & Eiji Katayama, *Efforts to Establish Clear Standards for Exhaustion in Japan*, 7 WASH. J. L. TECH. & ARTS 515, 519–20 (2012) (analyzing the *BBS* case).

104. *See* Association Internationale pour la Propriete Intellectuelle (AIPPI), Report Q205 (Japan), *available at* https://www.aippi.org/download/commitees/205/GR205japan.pdf (reporting that, according to the *BBS* case in Japan, "parallel importation of goods was permissible unless the parties concerned agreed to exclude Japan from the countries and regions where the goods were to be sold or used and explicitly indicated to that effect on the goods").

105. Treaty Establishing the European Community, arts. 28, 30, July 29, 1992, O.J. 192E103, *available at* http://eur-lex.europa.eu/en/treaties/dat/11992M/htm/11992M.html; European Economic Area Agreement, Arts. 11, 13, European Free Trade Association, http://www.efta.int/eea/eea-agreement.aspx (last visited Oct. 2, 2012).

106. Association Internationale pour la Propriete Intellectuelle (AIPPI), Report Q156 (United Kingdom), https://www.aippi.org/download/commitees/156/GR156japan.pdf ("UK patent rights are exhausted if a patented product is put on the market by or with the consent of the patentee anywhere within the EEA. This applies even when the patentee does not have an equivalent patent in the country of first marketing, when there is no patent protection available there or where the local legislation fixes an artificially low sales price for the products there.").

107. *See id.*

Corp. v. International Trade Commission, the Fuji single-use camera dispute.[108] Fuji cannot prevent the importation and sale of cameras refurbished from those that Fuji had first sold in the United States earlier, but it retains the right to do so against cameras refurbished from those that Fuji had first sold outside the United States.[109] Similarly, in *Ninestar v. International Trade Commission*, a Chinese company collected spent ink cartridges from non-U.S. sources, refurbished the cartridges, and sold the refilled cartridge in the United States.[110] On appeal to the Court of Appeals for the Federal Circuit, the refurbisher argued that the United States should adopt the principal of international exhaustion but the court reaffirmed the national exhaustion doctrine articulated in the *Fuji* cases.[111] The national exhaustion requirement created a difficult trial issue for refurbishers. The legality of their operation depends on a fact possibly beyond their knowledge: where the patentee initially sold the patented product. The burden of proving whether and how many products the patentee sold in the United States is particularly onerous when the patentee sells similar products globally.[112]

Two recent Supreme Court decisions, *Quanta v. LG Electronics* in 2008 and *Kirstaeng v. John Wiley & Sons, Inc.* in 2013, hint at a possible shift toward international exhaustion in the United States. *Quanta* relates to a computer chip technology that LG, the patentee, licensed to another company, Intel.[113] The Justices refused to impose patent infringement liability against purchasers of the Intel chips, who used the chips inconsistently with the upstream licensing agreement between LG and Intel.[114] The opinion stated broadly that "[t]he authorized sale of an article that substantially embodies a patent exhausts the patent holder's rights and prevents the patent holder from invoking patent law to control post sale use of the article."[115]

On remand, the district court faced the issue of whether the exhaustion doctrine applied to chips first sold outside the United States. Although the

108. For a history of the national exhaustion doctrine in the United States, see Sarah Wasserman Rajec, *Free Trade in Patented Goods: International Exhaustion for Patents*, 29 BERKELEY TECH. L. J. 317.

109. Jazz Photo Corp. v. Int'l Trade Comm'n, 264 F.3d 1094, 1105 (Fed. Cir. 2001).

110. Commission Opinion, *In re* Certain Ink Cartridges and Components thereof, Inv. No. 337-TA-565, Consolidated Enforcement Proceeding and Enforcement Proceeding II, 9 (2010).

111. Ninestar Technology Co., Ltd., v. Int'l Trade Comm'n, 667 F.3d 1373 (Fed. Cir. 2012) (applying national exhaustion to find a foreign refurbishing infringing), *cert. denied*, No. 12–552 (U.S. Mar. 25, 2013).

112. *See, e.g.*, Jazz Photo Corp. v. U.S., 439 F.3d 1344 (Fed. Cir. 2006) (affirming the order of the Court of International Trade to segregate refurbished cameras based on the country of the original sale); Commission Opinion, *In re* Certain Ink Cartridges and Components thereof, Inv. No. 337-TA-565, Consolidated Enforcement Proceeding and Enforcement Proceeding II, 13-14 (2010) ("[The ALJ] found that the Ninestar Respondents failed to meet their burden of proving permissible repair by a preponderance of the evidence as they did not establish from whom or where the cartridge at issue had originated.").

113. Quanta Computer, Inc. v. LG Electronics, Inc., 553 U.S. 617 (2008).

114. *Id.* at 636–38.

115. *Id.* at 638.

Supreme Court did not address the geographical scope of exhaustion, the district court applied international exhaustion based the broadly framed first sale doctrine in *Quanta*.[116] The Court also raised the policy concern that a national exhaustion regime would allow a company such as LG to profit twice from the same patented product, once for sales outside the United States, and once for sales inside the United States.[117] It should be noted that no other U.S. courts have followed this rationale. The Federal Circuit explicitly affirmed national exhaustion in cases regarding the *Fuji* single-use camera and *Ninestar* ink cartridge disputes that arose after *Quanta*.[118]

The second decision, *Kirtsaeng v. John Wiley & Sons, Inc.*, altered the United States' copyright exhaustion regime from national exhaustion to international exhaustion. In *Kirtsaeng*, the Supreme Court refused to impose copyright infringement liability against an importer who purchased genuine copies of English textbooks in Thailand for resale in the United States.[119] Although the first sale doctrine is codified in the copyright statute, the Supreme Court placed substantial emphasis on the common law origin of the first sale doctrine. Tracing what it viewed as "an impeccable historic pedigree" of the first sale doctrine, the Supreme Court endorsed the traditional policy underlying the first sale doctrine that "[a] law that permits a copyright holder to control the resale or other disposition of a chattel once sold is similarly 'against Trade and Traffi[c], and bargaining and contracting.'"[120] The Court also expressed a policy reason a bit closer to home: "[t]he 'first sale' doctrine also frees courts from the administrative burden of trying to enforce restrictions upon difficult-to-trace, readily movable goods. And it avoids the selective enforcement inherent in any such effort."[121]

By relying on early copyright cases and the language of the copyright statute, the Supreme Court ostensibly did not disturb the exhaustion regime in patent law.[122] Nonetheless, if the twin policy considerations, the free movement of goods and the difficulty of enforcement, are appropriate for the adoption of international exhaustion in copyright, they appear even more *apropos* to the patent context. The secondary market of patented products is particularly vulnerable to a weak exhaustion regime, given that patents implicate more categories of products, and each product can be the subject of multiple

116. LG Electronics, Inc. v. Hitachi, Ltd. 655 F. Supp.2d 1036, 1047 (N.D. Cal. 2009).

117. *See id.* at 1046.

118. *See* Fujifilm Corp. v. Benun, 605 F.3d 1366, 1371-72 (Fed. Cir. 2010); *see also* Ninestar Technology Co., Ltd., v. Int'l Trade Comm'n, 667 F.3d 1373 (Fed. Cir. 2012) (applying national exhaustion to find a foreign refurbishing infringing).

119. Kirtsaeng v. John Wiley & Sons, Inc., 133 S. Ct. 1351 (2013).

120. *Id*. at 1363 (quoting 1 E. COKE, INSTITUTES OF THE LAWS OF ENGLAND § 360, 223 (1628)).

121. *Id.*

122. Sarah Wasserman Rajec, *supra* note 108, at 360 (analyzing the statutory basis of the *Kirtsaeng* decision and reached the same conclusion that "[t]he statutory interpretation that underlies the *Kirtsaeng* decision, while interesting, does not constrain the possibilities for patent law").

overlapping patents.[123] As for the administrative cost of complying with a national exhaustion regime, one need not look further than the *Fuji v. Jazz* or the *Epson v. Ninestar* line of cases for the potential quagmire of sorting out products that were first sold in the United States from those that were first sold elsewhere.[124] As product supply chains extend globally, it has become more and more difficult to distinguish what is first sold in the United States from what is sold in other parts of the world. Although the ban was technically partial as to those products refurbished from stock material initially sold outside the United States, patentees were able to leverage this partial victory to impose additional compliance on imports and to saddle refurbishers with the burden of proving exhaustion.

The U.S. Supreme Court recently had an opportunity to address the issue of national versus international exhaustion after *Quanta* and *Kirtsaeng* when the defendant in *Ninestar* sought *a certiorari* but it declined to do so.[125] The result: the U.S. border remains a wall against foreign refurbishers. Nonetheless, the pro-exhaustion language in *Quanta* and *Kirtsaeng*, and the defection of the district court, show up as small fissures and cracks.

C. Contractual Limits on Exhaustion

Even after a refurbisher complies with the ambiguous repair-reconstruction doctrine and the draconian national-exhaustion rule, he may still run afoul of licensing conditions which limit refurbishment. Patentees occasionally try to avoid competing with their own products by imposing single-use conditions that limit the application of the patent exhaustion doctrine. This creates another barrier to refurbishers.[126]

U.S. courts have not addressed this question consistently. Some decisions held that subsequent owners of the product may not refurbish a patented article sold under a single-use restriction. For example, in one nineteenth century Supreme Court ruling, *American Cotton-Tie Co. v. Simmons*, a refurbisher recycled pieces of the belt and buckle of a cotton-tying belt by piecing them back together and reusing it in a patented cotton-tie combination. The Supreme Court found this to be an impermissible reconstruction, noting that the cotton-tie was sold with the phrase: "[l]icensed to use once only."[127] The 1992 Federal Circuit decision in *Mallinckrodt v. Medipart* furnishes the contemporary legal framework for analyzing whether a conditional sale restrains post-sale

123. This is also true for some products subject to overlapping copyrights, such as cars or computers containing different software programs. I am grateful to Sarah Rajec for pointing this out. *See* Brief of Association of Service and Computer Dealers International, Inc. as Amicus Curiae Supporting Petitioner, 6–7, Kirtsaeng v. John Wiley & Sons, Inc., 133 S. Ct. 1351 (2013) (No. 11-697).

124. *See supra* note 112 and accompanying text.

125. Ninestar Tech. Co. v. Int'l Trade Comm'n, 667 F.3d 1373 (Fed. Cir. 2012).

126. Brief for Automotive Aftermarket Industry Association et al., *supra* note 22, 18

127. American Cotton-Tie Co. v. Simmons, 106 U.S. 89, 91 (1882).

activities.[128] *Mallinckrodt* involves a company that reconditioned a patented medical nebulizer (by pasteurizing it through irradiation).[129] The nebulizer was sold to hospitals under a single-use restriction and the product itself bears the sign: "Single Use Only."[130] The Federal Circuit found the refurbishment infringing and reasoned that because the sale was conditioned on single use, the purchaser and downstream refurbishers had no authority to reuse the nebulizer.[131] Farmers have been prohibited to save and replant patented seeds sold under single-planting restrictions.[132] U.S. courts have refused to enforce single-use restrictions in other cases. For example, in *Jazz Photo Corp. v. Int'l Trade Comm'n*, the court held that the "single-use" designation on disposable cameras sold by Fuji did not prevent third-party refurbishment.[133] According to the Federal Circuit, "the patentee's unilateral intent, without more, does not bar reuse of the patented article, or convert repair into reconstruction."[134]

The effect of single-use restrictions under the patent law came into doubt after the Supreme Court decisions in *Quanta Computer v. LG Electronics*. There, the patentee LG Electronics contractually required its licensee Intel to notify downstream purchasers of patented computer chips that the chips are not to be used with non-Intel parts. In *Quanta*, the Court held that such patent licensing language was insufficient to prevent the exhaustion of patentee's rights pursuant to an authorized sale of the patented chips.[135] While the facts in *Quanta* do not address single-sale *per se*, commentators remain divided on whether the holding in *Quanta* restricts the patentee's ability to limit patent exhaustion through conditional sale.[136] Shubha Ghosh argues that use restrictions apply only to the direct purchaser of the product under *Quanta*—an interpretation that is favorable to third-party refurbishers. Likewise, Herbert Hovenkamp contends that *Quanta* heralds a strong patent-exhaustion regime that overruled cases upholding single-use restrictions like *Mallinckrodt*. In

128. *See* Mallinckrodt, Inc. v. Medipart, Inc., 976 F.2d 700 (Fed. Cir. 1992).

129. *Id.* at 702.

130. *Id*.

131. *Id.* at 709.

132. *See, e.g.*, Monsanto v. Scruggs, 459 F.3d 1328 (Fed. Cir. 2006) (holding no patent exhausting for the harvesting and replanting of patented seeds because the original sale condition prohibits replanting and, in the alternative, because the making of new seeds is infringing making).

133. Jazz Photo Corp. v. Int'l Trade Comm'n, 264 F.3d 1094 (Fed. Cir. 2001).

134. *Id.* at 1106; *see also* Hewlett-Packard Co. v. Repeat-O-Type Stencil Mfg. Corp., 123 F.3d 1445, 1453 (Fed. Cir. 1997).

135. Quanta Computer, Inc. v. LG Electronics, Inc., 553 U.S. 617, 636–37 (2008).

136. Several commentators argued that *Quanta* does not limit a patentee's ability to impose patent law through contractual limitations against post-sale activities. *See, e.g.*, Matthew W. Siegal & Kevin C. Ecker, Quanta Computer, Inc., et al. v. LG Electronics, Inc.*: Patent Exhaustion Restrictions May Not Be . . . Exhausted*, 11 INTELL. PROP. STRATEGIST 1 (2008); *see also* Erin Julia Daida Austin, *Reconciling the Patent Exhaustion and Conditional Sales Doctrine in Light of* Quanta Computer v. LG Electronics, 30 CARDOZO L. REV. 2947, 2979 (2009); Herbert Hovenkamp, *Innovation and the Domain of Competition Policy*, 60 ALA. L. REV. 103, 131 n.35 (2008). The *Quanta* decision explicitly declined to address this issue in a footnote. *Quanta*, 553 U.S. at 637 n.7.

contrast, some read *Quanta* as a case of poor contract drafting.[137] Lower courts are split on the application of *Quanta*. In an unreported order relating to the replanting of genetically modified seeds, the Northern District Court of Mississippi held that *Quanta* does not limit a patentee's ability to contractually invoke patent law against post-sale activities.[138] However, the Eastern District Court of Kentucky read *Quanta* decision to implicitly overrule *Mallinckrodt* and removed a patentee's ability to invoke patent law against ink cartridge refurbishers through contractual single-use restrictions in *Static Control Components, Inc. v. Lexmark Intern., Inc.*[139]

Even if single-use restrictions are enforceable as a matter of law, a third-party refurbisher who recovers an item from a trash heap may not be aware of the restrictions or circumstances surrounding the initial contract formation between the patentee and the original purchaser. Hovenkemp explains that the exhaustion doctrine plays the role of avoiding accidental violation by innocent downstream purchasers:

As a general matter one can be guilty of patent infringement without having any notice whatsoever. If that rule were applied to post-sale restraints, the result could be a significant problem of hold-up, as innocent subsequent purchasers could be sued for patent infringement for violating conditions they knew nothing about.[140]

A patentee rarely knows of (and therefore cannot notify) a refurbisher until the refurbished product appears on the market. By the time a patentee receives notice, the refurbisher would already have made the manufacturing and distribution investment. Even Hovenkemp, who is otherwise sympathetic to some post-sale restrictions and critical of the strong exhaustion regime, as articulated in *Quanta*, warns that a single-use restriction to limit output and the reuse of durable goods is a "socially harmful" act that "not only prevents the rise of a used goods market but limits the use of each good to a single cycle."[141]

D. Summary

The discussion of exhaustion doctrines within the United States and the comparison between the United States, Japan, the United Kingdom, and China illustrates the legal complexity confounding refurbishers operating in the global

137. Some commentators argue that the *Quanta* decision is a lesson in proper contract drafting. William LaFuze et al., *The Conditional Sale Doctrine in a Post-Quanta World and Its Implications on Modern Licensing Agreements*, 11 J. MARSHALL REV. INTELL. PROP. L. 295, 316 (2011) ("The Quanta opinion makes clear that conditions drafted to avoid patent exhaustion must be explicitly described in the body of the licensing agreement and follow classic principles of contract law.").

138. Monsanto Co. v. Scruggs, No. 3:00CV-161-P-D, 2009 WL 536833, at *1 (N.D. Miss., Mar. 3, 2009).

139. Static Control Components, Inc. v. Lexmark Intern., Inc., 615 F. Supp. 2d 575, 587 (E.D. Ky. 2009).

140. Herbert Hovenkemp, *Post-sale Restraints and Competitive Harm: The First Sale Doctrine in Perspective*, 66 N.Y.U. ANN. SURV. AM. L. 487, 542 (2011).

141. *Id*. at 530.

economy. Each of these legal hurdles is a doctrinal muddle, exacerbated by the uniqueness of the underlying technology, variations of the refurbishment process, and the idiosyncrasies of the product market space.

The common moniker of the repair-reconstruction test belies a range of approaches between countries and even among courts within the same country. U.S. courts focus on the physical process of repair and appear more inclined to find permissible repair than courts in Japan, the United Kingdom, or China. Chinese courts have adopted the narrowest analysis of exhaustion and imposed liability against liquor-bottle recyclers even without any physical sign of reconstruction. In this area of unsettled law, how judges frame the repair-reconstruction question in a particular case is just as important as the facts underlying the case. With respect to territorial limits of exhaustions, China and Japan have adopted international exhaustion and permit the refurbishment of products previously sold anywhere in the world. In Europe, the rule of regional exhaustion permits the refurbishment of products previously sold in the European Community and European Economic Area. U.S. courts apply domestic exhaustion, but the recent Supreme Court decisions in *Kirtseang* and *Quanta* signal possible shift to international exhaustion in the future. Furthermore, *Quanta* calls into question whether post-sale single-use restriction can extend patent rights beyond the first sale.

This summary reveals another curious pattern: Even when one of the three barriers permits refurbishment, others threaten to remove the safe harbor. For example, Chinese and Japanese refurbishers can better access stock material under the international exhaustion rule, but the product-identity test under the totality of circumstances increases the likelihood of finding reconstruction. In the United States, courts are more sympathetic to the refurbisher under the repair-reconstruction doctrine. But national exhaustion increases the cost for refurbishers due to the need to sort waste-stock materials and to evidence the source of their product in a legal dispute. The possibility of single-use restrictions also threatens to take away refurbishers' already limited legal safe harbor. Contractual conditions can deny permissible repair in toto in the United States or reduce the breadth of international exhaustion in Japan. To the refurbisher, the exhaustion doctrine gives with one hand and takes away with the other. To sustainability at large, the exhaustion doctrine does not appear to promote technological enablement, conservation or economic development. This underlying tension between sustainable development and patent policy is the subject of the next section.

III.
PATENT POLICY AND THE DOWNSTREAM MARKET

Scholars have noted the ways sustainable development may intersect patent law.[142] Henning Grosse Ruse-Khan reminds us that a sustainable development

142. *See generally* RICARDO MELENDEZ-ORTIZ & PEDRO ROFFE, INTELLECTUAL PROPERTY

perspective can guide the interpretation of IP provisions, tailoring the IP protection to societal and environmental concerns.[143] The World Trade Organization recognizes the hope of developing countries to receive welfare-enhancing technology when they agreed to abide by the stronger patent rules in TRIPs.[144] There have also been repeated calls for the transfer of green technology to help developing countries combat the pollution following industrialization and urbanization.[145] However, these proposals focus on challenges and contributions that are *exogenous* to patent doctrines. The technological content of a coal emission scrubber or high-vitamin rice is the element that proposes to enhance welfare in developing countries. Patent law plays a facilitator role.

In contrast, the problem presented by the jurisprudence of refurbishment is *endogenous* to patent law. The *raison d'être* of patent law is to promote innovation by granting a right to exclude, and the refurbishing business erodes that exclusivity. But for the exclusivity granted by patent law, free market forces would have sustained ink-cartridge refillers and single-use camera recyclers. The current exhaustion doctrines have ignored sustainable development, with the consequence that much of the refurbishing activity is taking place under the shadow of patent infringement. This clash sets the refurbishment conundrum apart from the other intersections of IP and conservation. Estelle Derclaye, who otherwise defends the compatibility between IP rights and human rights, nonetheless concedes that "the right for the patentee to object to reconstruction of the products beyond repair" is an "apparent conflict."[146]

Perhaps patent doctrines and commercial refurbishment are destined to collide. Although some exceptions are made for a user's property rights through the exhaustion doctrine, a refurbisher subverts the usual justification because it exists as a chimeric creature somewhere between a competitor and a

AND SUSTAINABLE DEVELOPMENT: DEVELOPMENT AGENDAS IN A CHANGING WORLD (collecting essays discussing the role of IP law in a sustainable development program).

143. Henning Groose Ruse-Khan, *Sustainable Development in International Intellectual Property Law – New Approaches from EU Economic Partnership Agreements?*, ICTSD PROGRAMME ON INTELLECTUAL PROPERTY RIGHTS AND SUSTAINABLE DEVELOPMENT, 15 (2010), *available at* http://ictsd.org/i/publications/86420.

144. TRIPs, *supra* note 6, art. 7 ("The protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations."); *Technology Transfer*, WTO http://www.wto.org/english/tratop_e/trips_e/tech transfer_e.htm (last visited Aug. 16, 2013) ("Developing countries, in particular, see technology transfer as part of the bargain in which they have agreed to protect intellectual property rights.").

145. *See generally* Joshua D. Sarnoff, *The Patent System and Climate Change*, 16 VA. J.L. & TECH. 301, 306–307 (2011) (discussing the history of green technology transfer as assistance to developing countries and proposing policy levers to achieve such transfer).

146. Estelle Derclaye, *Intellectual Property Rights and Human Rights: Coinciding and Cooperating* 134, 156, *in* INTELLECTUAL PROPERTY AND HUMAN RIGHTS (Paul L. C. Torremans ed., 2008).

consumer.[147] They straddle uncomfortably across the three patent fault lines and threaten the truce between patentees and users. This section identifies patent policy concerns that shape how patent law treats refurbishers, including: (1) diminished patent incentive; (2) consumer's right to repair; (3) leakage through parallel importation; and (4) possible counterfeit concerns.

A. Patent Incentive

From the patentees' perspective, every refurbished product represents a lost sale and reduces the profitability of a patent, especially when a third-party business collects and refurbishes products on a commercial scale. The restoration creates a substitute good in some segment of an otherwise exclusive marketplace. This is problematic for theories justifying the patent system. Whether the purpose of the patent system is to reward inventors, enable commercialization, signal a firm's strength or to encourage disclosure, it is unclear why the patent incentive for inventors should differ simply because one product can be recycled multiple times, while another product can only be recycled once, and yet a third product cannot be recycled and therefore extracts the most reward. The irony of the situation is that patent incentives for reusable inventions are the strongest when the law prohibits reuse, and the incentives are the weakest when it allows unfettered reuse.

Even if patent law permits reuse, private parties may redirect resources to the search for anti-reuse inventions, a phenomenon surely familiar to anyone who owns an inkjet printer. As if channeling Lawrence Lessig's multiple codes, printers and ink cartridges come packaged with technological locks and legal protections that have little to do with the printing utility but much to do with preventing downstream ink refills.[148] In addition, printer manufacturers aggressively seek patent claims, with the practical effect of blocking the range of permissible refurbishment and improving their odds at the repair-reconstruction roulette.[149] They even manage to shut refurbishers out of the casino entirely at times by contractually foreclosing the possibility of permissible repair under patent law.[150] This dynamic is similar to what Scott Kieff observed in the context of terminator genes that prevent farmers from

147. *See infra* Section III.B.

148. *See* LAWRENCE LESSIG, CODE VERSION 2.0, 5 (2006).

149. *See* Mohri, *supra* note 60, at 66–73 (attributing the outcome of the Japanese ink cartridge refurbishment litigation to, among other reasons, how different Japanese courts applied distinct interpretation of the patent claims). It was reported that Epson sought 1045 Chinese patents in 2005 alone. Zhang Jiang (张健), *Aipusheng zhuanli weiji de beihou* (爱普生专利危机的背后), DIANNAO AIHAOZHE (电脑爱好者) 2006:15.

150. Arizona Cartridge Remanufacturers Ass'n, Inc. v. Lexmark Intern., Inc., 421 F.3d 981 (9th Cir. 2005) (finding ink cartridge refilling a violation of conditional sale that triggers patent liability). Japanese approach offers another interesting blend of contract law and patent exhaustion doctrine. In one exhaustion case, the Japanese court opined that contract law may alter the default international exhaustion rule and prevent the exhaustion of a Japanese patent. *E.g.*, Kuroda & Katayama, *supra* note 103.

saving the future generations of genetically engineered seeds, thereby forcing farmers to buy new seeds at every planting.[151] He notes that the exclusivity of patent law "provides individual actors with a legal alternative to self-help approaches that may have more pernicious impact on the ability to obtain use."[152] The agriculture company Monsanto developed the terminator gene technology in the 1990s to ensure that genetically modified plants could only live for a single generation, which is analogous to the locking chip in an ink cartridge. Public outcry ensued over the terminator gene technology, and Monsanto pledged not to use it.[153] Unable to rely on technological exclusivity, Monsanto had to rely on patent suits against farmers for saving and replanting seeds. One of these lawsuits, *Bowman v. Monsanto Company*, eventually wound its way to the U.S. Supreme Court.[154] There, the Justices concluded that the replanting of genetically modified seeds is infringing "making" and do not qualify as permissible "use," in order to preserve incentive for biotech innovations.[155]

The analogy with patented seeds can only go so far, however. A single seed can multiply indefinitely, while products are refurbished one at a time. True-bred seed reproduces its traits perfectly. Its progenies are perfect substitutes of the patented seeds and threaten to supplant the entire market of the patented seed. The nature of the competition between refurbished products and their patented originals is much more ambiguous. To be sure, refurbished products are substitute goods, but they are imperfect substitutes perceived to have lower quality than the genuine product. The erosion of market share due to lost sales is therefore rarely one-to-one. The exact competitive impact necessarily varies from industry to industry. A CRT television with a defunct capacitor may be functionally perfect after a part replacement. The cracked body of a used disposable camera can be restored only by tape in a crude way, which may suffer light leakage.[156] Consumer protection law also plays a role: In China as well as the United States, consumer protection regulations govern whether refurbished or used products may be sold as new.[157] Consumer demographics are another compounding factor. Some buyers of discounted refurbishments will not pay full price for the product directly from the original manufacturer. A unit

151. F. Scott Kieff, *Patents for Environmentalists*, 9 WASH. U.J.L. & POL'Y 307, 315 (2002).

152. *Id.*

153. *See* Heidi Ledford, *Seed-Patent Case in Supreme Court*, NATURE (Feb. 19, 2013), http://www.nature.com/news/seed-patent-case-in-supreme-court-1.12445.

154. Bowman v. Monsanto Co., 133 S. Ct. 1761 (2013).

155. *Id.* at 1767–69.

156. Fuji Photo Film Co., Ltd. v. Int'l Trade Comm'n, 474 F.3d 1281, 1288 n.3 (Fed. Cir. 2007).

157. *See Letter from FTC to Sony*, FEDERAL TRADE COMMISSION (Dec. 20, 2006), http://www.ftc.gov/os/opinions/resaleofconsumerelectronics/061220staffopintosonyelect.pdf (permitting Sony to sell returned and unused products as "new" instead of "refurbished."); Circular Economy Law, *supra* note 26, art. 39 ("Any recycled electric apparatus or electronic product to be sold after repair must meet the standards for reutilized products and be labeled it as a reutilized product at an eye-catching place.").

sold to this segment of the market does not translate to a lost sale of the original product. Loss may instead take the form of price erosion. A patentee may need to lower prices in order to defend the share of a market created by its invention, trading unit profit for total sales.[158] Amidst these economic complexities, the ultimate redress is an injunction that restores the patentee's exclusivity.

The primary discourse of patent law casts the give-and-take between refurbishers and the patentee in the narrative of a competitor threatening an inventor's due reward. However, this framing ignores the complex relationships between the patentee and refurbisher, while overlooking the social contribution of a refurbisher, such as when a refurbisher tinkering with the latest technological castoffs contributes to technological progress in the same capacity as an innovator[159] or when patentees and refurbishers must collaborate to form a closed-loop industry ecology system.[160]

B. Purchasers' Rights

Repair issues in patent law first arose in the United States out of a desire to protect a consumer's right to control and make full use of the chattel he or she purchased. *Wilson v. Simpson*, the very first repair case in the United States, endorsed a purchaser's ability to replace the dull blade on the patented wood planing machine he purchased.[161] To the extent refurbishers get any break from patent law, it is through their roles as owners and users of the product. Specifically, the exhaustion doctrine provides a safe harbor to protect two interests: the expected use of the product that the consumer bargained for and the ownership rights in the physical item free from IP encumbrance. But here again, the business of refurbishments does not quite fit with the policy concerns underlying these safe harbors.

158. James Bandler, *Two Big Film Makers Strive to Crush Renegade Recycler*, WALL ST. J. (Dec. 4, 2002), http://online.wsj.com/article/SB103895297884232611 3.html (reporting that refurbishers drove "the average price of a single-use camera to $5.87 today from $8.82 in the beginning of 1999").

159. *See supra* Section A.

160. Corporate responsibility for product end of life management is embodied in the concept of "extended producer responsibility." Many countries and industries have Extended Producer Responsibility (EPR) regulations. A discussion of EPR is beyond the scope of this article but there is much scholarship on the subject. *See, e.g.*, Noah Sachs, *Planning the Funeral at the Birth: Extended Producer Responsibility in the European Union and the United States*, 30 HARV. ENVTL. L. REV. 51 (2006); Wang Xiang & Chen Ming, *Implementing extended producer responsibility: vehicle remanufacturing in China*, 19 J. CLEANER PRODUCTION 680 (2011); Hannah G. Elisha, *Addressing the E-Waste Crisis: The Need for Comprehensive Federal E-Waste Regulation within the United States*, 14 CHAP. L. REV. 195 (2010). In the United States, there is no uniform federal law governing EPR. However many states have industry specific regulations. *See Extended Producer Responsibility Legislation as of December 31, 2012*, PRODUCT STEWARDSHIP INST., http://productstewardship.us/associations/6596/files/PSActiveLegislation2012.cfm (last visited Aug. 16, 2013) (listing state EPR laws).

161. Wilson v. Simpson, 50 U.S. (9 How.) 109, 123–26 (1850).

With respect to the first "bargain" interest, Shubha Ghosh notes that exhaustion "is desirable because some degree of freedom to operate is desirable for the purchaser of a product without having to engage in licensing negotiations or the threat of a lawsuit."[162] Given the myriad possible transactions post-sale and the transaction cost potentially incurred if every user is required to enter an IP negotiation, patent exhaustion functions as a good default rule that vests the initial allocation of rights in the user. This transactional perspective manifested through the concept of implied license, where the consumer "has an implied license under any patents of the seller that dominate the product or any uses of the product to which the parties might reasonably contemplate the product will be put."[163] Similarly, Janis argued that the entire U.S. repair-and-reconstruction doctrine should be reconfigured according to the implied license theory—a position that Robert Merges and John Duffy echoed in the latest edition of their patent law casebook.[164]

Refurbishment operations challenge this transactional view of exhaustion in two ways. First, it presupposes a permissive contractual relationship between the patentee and the user of the product. Commercial refurbishers are rarely the initial purchasers but instead acquire the patented stock material from a trash heap. They lack any contractual tie with the patentee, implied or otherwise. Some refurbishers may acquire the product from the original purchasers or their privy and therefore maintain indirect privity with the patentee. It is not clear that they will receive a benefit of exhaustion under the implied-license theory due to the indirectness of their relationship. But even if the theory does protect this subset of refurbishers, there are no principled policy reasons why a theory of exhaustion will treat these two types of refurbishers differently. After all, the economic effect of a refurbisher collecting its stock from a trash dump does not differ from a refurbisher collecting its stock from the consumer. If refurbishment is socially desirable, it should be desirable for the entire class of goods whether the refurbisher acquired the product through a second-hand purchase or from the trash dump.

Second, the idea of a default exhaustion rule that eliminates the transaction cost of licensing negotiations only makes sense when existing between the patentees and their direct customers who are truly in a position to negotiate for a right to repair products sitting in the customers' factory or home. Regardless of how wide or narrow we construe the privity between the patentee and refurbishers, no rational patentee would willingly create its own competition by licensing the patented technology to a third party who did not originally purchase the product from the patentee. If patent exhaustion is truly premised on

162. Ghosh, *supra* note 60, at 47; Sarah Wasserman Rajec, *supra* note 108, at 343 (listing historical US exhaustion cases involving "questions of the scope and ability of licenses to restrict downstream uses").

163. Hewlett-Packard Co. v. Repeat-O-Type Stencil Mfg. Corp., Inc., 123 F.3d 1445, 1451 (Fed. Cir. 1997).

164. Janis, *supra* note at 520–27; MERGES & DUFFY, PATENT LAW AND POLICY: CASES AND MATERIALS (6th ed. 2013).

an implied permission to use and sale, no refurbishers can ever enjoy that permission. This rationale underpinned the Chinese liquor-bottle cases—one court justified its finding of infringement and constructive making based on the subjective intent of the patentee to reject subsequent uses.[165] Belgium and France do make this distinction by treating commercial repair as infringement while exempting private repair.[166] In contrast, courts in the United States treat purchasers and third parties alike; consumer rights thus shaped the law governing dissimilar interests in third-party commercial refurbishment situations. In summary, the implied-license rationale of the exhaustion doctrine is premised on the interest of direct consumers and cannot provide the justification necessary to exempt third-party commercial refurbishers, unless we are willing to postulate environmentally conscious consumers who are negotiating and paying for the future fate of their purchases.

The second "free chattel" interest protects users' bundle of property rights (including the right of use and the right to alienate) that originated with physical ownership.[167] It also extends a safe zone for those who provide materials, parts, and repair labors to the consumer.[168] Ghosh explains:

Exhaustion provides a way to free chattels of servitudes and thereby providing users some clarity in how they can use items they have purchased . . . . Just as dead [hand] control over real property interests are suspect so should the threat of intellectual property infringement in ordinary day to day activities.[169]

This view of exhaustion relates to, but runs deeper than, the justification of implied license, for it projects forward with the chattel beyond its initial owner and its subsequent privy. Thus, according to Ghosh, "[t]he doctrine of repair as

165. *See, e.g., Weixue Piiiu Group Ltd. Co. v. Heiiialun Yinliao Ltd Design Patent Dispute* (河南维雪啤酒集团有限公司与济源市王屋山黑加仑饮料有限公司外观设计专利权纠纷案), *Henan High People's Court, available at* http://www.hncourt.org/public/detail.php?id=114333.

166. *See* Estelle Derclaye, *Repair and Recycle between IP Rights, End User License Agreements and Encryption*, *in* SPARES, REPAIRS AND INTELLECTUAL PROPERTY RIGHTS 29 (Christopher Heath & Anselm Kamperman Sanders eds., 2009) (citing Article L. 613-5 of the French Intellectual Property Code and Art. 28 of the Belgian Patent Act).

167. *See* Amelia Smith Rinehart, *Contracting patents: A Modern Patent Exhaustion Doctrine*, 23 HARV. J.L. & TECH., 483, 492 (2010) (justifying the patent exhaustion rule based on personal property interest). *See also* Andrew T. Dufresne, *Note The Exhaustion Doctrine Revived? Assessing the Scope and Possible Effects of the Supreme Court's Quanta Decision*, *24* BERK. TECH. L.J. 11, 14–15 (2009) (noting the tendency of the exhaustion doctrine to disfavor personal property servitude).

168. In the United States, parts and service suppliers are liable only for indirect infringement if consumers engage in direct infringement when repairing patented products in their possession. Therefore, the tendency to immunize consumers in turn protects their suppliers. *See Aro I*, 365 U.S. 336, 341 (1961) ("[I]t is settled that, if there is no direct infringement of a patent, there can be no contributory infringement . . . . [I]f the purchaser and user could not be amerced as an infringer, certainly one who sold to him . . . cannot be amerced for contributing to a nonexistent infringement.") (internal citation omitted).

169. Ghosh, *supra* note 60, at 50.

it exists under patent law in the United States and Japan is an example of how servitudes can be extinguished."[170]

But even here, the refurbisher finds itself in limbo because the flip side of the "doctrine of repair" is the "doctrine of reconstruction"—resurrecting the dead hand of patent servitude. Currently the repair-reconstruction doctrine defines the boundary of infringement and provides a margin of safety to a purchaser. Refurbishers, on the other hand, dance right at the edge of the abyss. But if we truly want chattels to be free, why stop at the repair-reconstruction test? Why not provide infringement immunity to refurbishment based on a previously sold chattel, regardless of whether it is being repaired or reconstructed? The freedom-of-movement rationale better fits within the situation of the commercial refurbishers but the repair-reconstruction boundary it draws appears under-inclusive and difficult to apply in refurbishment cases.

The exhaustion doctrine embodies the public policy of consumer protection and sets a "hard limit" on patent rights. While commercial refurbishers rely on exhaustion, they are square pegs attempting to fit into a round hole designed for users. They are technologists that subvert the patent-incentive narrative as much as they are downstream users that stretch the rationale underlying exhaustion.

C. Parallel Import

Rationales for the geographical limit fall under two categories: the jurisprudential justification recognizes the territorial limit of the patent statute, while the economic justification recognizes the economic benefit of giving patentees the ability to segment the market based on geographic area.

Under domestic exhaustion, patentees can prevent arbitragers from purchasing their products cheaply in one country for resale at a higher price in another country. Thus, patentees can charge different prices in different jurisdictions without fear of arbitrage.[171] In theory, this strategy leads to several policy consequences: the patentee can reap greater patent rewards than if it had to set a single global price; users in less wealthy countries might enjoy more affordable prices indexed to their income; and the cost of maintaining this pricing model is passed onto the State and its custom enforcers.[172] On the other hand, a regime of international exhaustion permits the free movement of goods in international trade[173] and removes the ability of patentees to shift the cost of

170. *Id.*

171. Rajec, *supra* note 108, at 361 ("[T]he economic argument against international exhaustion posits that the geographical price discrimination that is possible under national exhaustion carries benefits that would be lost in a move to international exhaustion.").

172. *Id.* at 363–64 ("[E]limination of geographical price discrimination would result in lower returns to patent holders, lower prices in high income markets, and less access for those in lower income countries.").

173. *Id.* at 330 ("From a trade viewpoint, a national exhaustion rule may be characterized as a trading cost that hinders efficient downstream sales and uses of products because of the requirement to seek authorization for each contemplated resale market.").

enforcing its private market structure onto the government. However, the actual consequence of exhaustion regimes remains an open empirical question.[174]

To be sure, the effectiveness of a particular exhaustion regime varies from country to country and from industry to industry. A national exhaustion regime is only as robust as the ability of customs officers to detect the influx of cross-border products.[175] And even under an international exhaustion regime, patentees may still target cross-border resale through technological locks such as regional codes, controlled distribution chains such as the drug prescription system, product differentiation according to local language or preference, contractual and licensing arrangements, or controlling the amount of product supplied into the market.[176]

Issues of domestic exhaustion are heavily litigated in refurbishment cases such as *Ninestar* and the *Fuji v. Jazz*. In both cases, the refurbishers were able to show the permissible repair of single-use cameras and ink cartridges under the repair-reconstruction rule. It was only through the national exhaustion regime that refurbished imports were blocked.[177] This phenomenon highlights the close connection between exhaustion and the globalized refurbishment industry today. Patentees' problem of reduced profits is exacerbated when refurbished products are imported into countries at an increased profit margin. Foreign refurbishers are particularly threatening to the lucrative U.S. market as they combine geographical arbitrage with secondary-market arbitrage. Thus, the current U.S. exhaustion doctrine may reflect a policy response to the double arbitrage. This unique combination of lax repair-and-reconstruction doctrine with the stringent national exhaustion doctrine allowed U.S. courts to permit refurbishment within the United States while preventing foreign third-party refurbishers from profiting. In this way, the national exhaustion regime can become a super-reconstruction doctrine against foreign refurbishers while preserving the domestic refurbishing industry and circumventing the national-treatment requirement of the WTO.[178]

174. *Id.* at 363–367 (surveying competing scholarly views regarding the impact of international exhaustion regime).

175. *Counterfeit Products*, UNITED NATIONS OFFICE OF DRUG AND CRIME, 181, *available at* http://www.unodc.org/documents/data-and-analysis/tocta/8.Counterfeit_products.pdf (estimating the rate of custom detection for counterfeit products to be between 3% and 30%, and likely to be 7% of the counterfeit product flow).

176. Rajec, *supra* note 108, at 362–363 (listing options for private market segmentation in an international exhaustion regime through licenses and technology locks); Peter Yu, *Region Codes and the Territorial Mess*, 30 CARDOZO ARTS & ENT. L.J. 187 (2012) (discussing the use of regional codes to limit the geographical distribution of copyrighted material); *U.S. Senate, Committee on Commerce, Science, and Transportation. Shining light on the "Gray market": An examination of why hospitals are forced to pay exorbitant prices for prescription drugs facing critical shortage.* Staff report 2012 Jul. 25 (112 S), 11 *available at* http://democrats.oversight.house.gov/images/stories/7.25.12%20Staff%20Report%20Shining%20Light%20on%20the%20Gray%20Market.pdf (discussing the use of drug pedigree to track the source of gray market pharmaceutical products).

177. *Supra* note 112 and accompanying text.

178. TRIPs, *supra* note 6, art. 3 (mandating national treatment in the intellectual property

D. Counterfeit and Trademark Infringement

Although doctrinally distinct from patent law, concerns for counterfeit products provide an important backstory to refurbishment disputes.[179] The United States Supreme Court in *Champion Spark Plug Co. v. Sanders* held that when remanufactured goods bear the original trademark, sellers must provide notice to consumers that the goods were remanufactured or they will otherwise violate trademark and unfair competition law.[180] To be sure, U.S. law cabins trademark and patent disputes to their respective doctrinal areas, but concerns of source ambiguity and inferior products can color our view of the refurbishing industry and patent law even absent a trademark violation.

For example, the United States Department of Defense issued a report lamenting the national security danger of counterfeit components in military equipment. According to the report, the largest risk came from unscrupulous suppliers selling used or refurbished parts as new.[181] Interestingly, although the traditional definition of counterfeit typically includes some element of trademark violation or passing-off concerns, the report adopted an idiosyncratic definition that includes all forms of passing off used parts as new, with or without trademark violations. Perhaps this semantic move reflects the close connection between refurbishment and trademark violation. It may also reflect a policy choice to address issues of quality control or commercial fraud (of using old products as new) through the international IP enforcement regime-complex.[182]

Emerging legal systems may further blur the distinction between trademark policy and patent policy. This is especially true in China where counterfeiting is rampant.[183] For example, counterfeit and refurbishment is closely linked in the Chinese printer cartridge business. The overall Chinese printer ink market is

context).

179. *See* Application of Mogen David Wine Corp., 328 F.2d 925, 930 (Cust. & Pat. App. 1964) (acknowledging the possibility of protecting a wine bottle under trademark law and design patent law). The recent amendment of Chinese patent law also sought to demarcate a clearer line between design patent and trademarks and trade dress protection by including a provision excluding from patent protection any "designs that serve mainly as indicators of two-dimensional printing goods' pattern, the color or the combination of the two." CPL, *supra* note 102, art. 25(6); *see also* DOUGLAS CLARK, PATENT LITIGATION IN CHINA 176 (2011) (providing the English translation of CPL).

180. Champion Spark Plug Co. v. Sanders, 331 U.S. 125 (1947); *see also* Rolex Watch, U.S.A., Inc. v. Michel Co., 179 F.3d 704 (9th Cir. 1999) (holding that the alteration of used Rolex watches resulted in a new product and the retention of the Rolex mark constituted trademark infringement); J. THOMAS MCCARTHY, TRADEMARK AND UNFAIR COMPETITION, §25:08 (3d ed. 1995) (discussing the dilution risk of rebottled or repackaged products).

181. S. Rep. No. 112-167, at 5 (2012), *available at* http://www.armed-services.senate.gov/Publications/Counterfeit%20Electronic%20Parts.pdf, 5 ("[m]uch of the material used to make counterfeit electronic parts is electronic waste or 'e-waste' shipped from the United States and the rest of the world to China."); *see also* Brian Grow et al., *Dangerous Fakes*, BUSINESS WEEK (Oct. 1, 2008), http://www.businessweek.com/stories/2008-10-01/dangerous-fakes.

182. Ghosh, *supra* note 60, at 93.

183. ORGANIZATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT, THE ECONOMIC IMPACT OF COUNTERFEITING AND PIRACY, 66 (2008).

roughly divided at a 5:2:3 ratio between printer manufacturers (for example, Canon, HP, and Epson), domestic replacement cartridges, and "counterfeits" that bear the trademark of branded cartridges.[184] The counterfeit category encompasses the business model of refilling discarded brand toners and selling them at close to brand prices—a practice that enjoys profit margins greater than those of drug trafficking.[185] In contrast, legitimate refurbishers who sell toner properly identified as refilled comprise only 5% of the domestic replacement cartridges (or 1% of the overall domestic Chinese ink cartridge market).[186] In other words, of all the refurbishers who must contend with patent exhaustion, 95% of them also violate trademark law. Perhaps it is not a coincidence that the published refurbishment decisions in China relate to design-patent disputes addressing the legality of refilling a competitor's liquor bottle for reuse. Although the opinions focus on the patent-law rubrics of exhaustion, implied license, and reconstruction, the reuse of a distinctive bottle design raises trade dress and passing-off concerns.

Legitimate (non-counterfeiting) refurbishers stand to lose the most amidst the fight between brand owners and counterfeiters. Legitimate refurbishers complain that empty toners are diverted to counterfeiters who can afford to pay a higher price to collectors even though China generates billions of cartridges.[187] Consequently, non-counterfeit refurbishers have looked outside China, importing non-Chinese cartridges and exporting the refurbished product to the world market, triggering patent disputes such as *Ninestar* in the United States and *Canon* in Japan.[188] The business pattern in the printer cartridge industry may explain why multinational corporations like Fuji and Cannon waged patent wars against Chinese refurbishers and local importers under the reconstruction theory in the United States and Japan but have yet to follow this path in China.[189] Instead, they primarily rely on administrative and criminal

184. Zou Kaiju (邹开菊), *CBIResearch：Zhongguo hao cai shichang diaocha* (中国耗材市场调查), Mar. 13, 2006, *available at* http://www.cbismb.com/security/news/2006-03-13/31895.html.

185. The seizure of counterfeit ink cartridge in China on May 2013 exemplifies the connection between counterfeit and refurbished goods in China. *See* Zhang Lulu (张璐璐), Shexian shou jia dianpu mo he xi gu zao chakou (涉嫌售假 8店铺墨盒硒鼓遭查扣), Bandao Chenbao (半岛晨报), May 30, 2013, *available at* http://epaper.hilizi.com/shtml/bdcb/20130530/36902.shtml; *see also Tom Spring, Fake Ink Catridges Ooze Into the Market*, PCWORLD (May 21, 2013), http://www.pcworld.com/article/110835/article.html (noting that "fake ink is a gold mine for terrorist organizations, because it can be as profitable as drugs and is more easily sold").

186. *Puliao！Jiekai dayin hao cai huishou liyong ge wenhao* (曝料！解开打印耗材回收利用7个问号), XINMIN WANBAO (新民晚报), (Aug. 27, 2008), *available at* http://info.office.hc360.com/2009/02/11132150760.shtml.

187. *Id.*

188. Ninestar Tech. Co., Ltd. v. Int'l Trade Comm'n, 667 F.3d 1373 (Fed. Cir. 2012); *Recycle Assist Co.*, *supra* note 75; *see also* Seiko Epson Corp. v. E-Babylon, Inc., No. 3:07-CV-896-BR, 2011 WL 5554447 (D. Or. Nov. 15, 2011); In re Certain Ink Cartridges & Components Thereof, No. 337-TA-565, USITC Pub. 4290 (Nov. 2011) (Final).

189. *See infra* section (noting the absence of civil patent litigations involving cartridge refurbishment).

enforcement of trademark law against counterfeiters.[190] Occasionally patent infringement lawsuits have been brought against makers of generic replacement cartridges, but these disputes are conventional patent infringement litigation without a refurbishment component.[191]

To summarize, patent doctrines reflect policy choices that often presuppose dichotomies that are ill suited for analyzing the refurbishing industry. The right to exclude presupposes innovators and imitators but many innovators today began as imitators and have reached their present accomplishments through "learning by refurbishing." Similarly, the exhaustion doctrine presupposes a seller and a consumer but refurbishers buy and sell the same product while remaining outside the original first-sale transaction. In this way, their iconoclastic interaction with the patent system creates the legal complexity observed in Section II above. Meanwhile, refurbishers' potential for sustainability, conservation, economic entry, and capacity building remains underexplored in patent law.

IV.
THE LIMIT OF EXHAUSTION FOR SUSTAINABLE DEVELOPMENT

Ten years after the ITC ruling in *In re Lens-Fitted Film Packages*, the Federal Circuit issued a *per curiam* opinion in 2010 that introduced the dispute by noting: "This is the *sixth* appeal from decisions finding liability for infringing Fuji's LFFP patents" by a refurbisher and his companies.[192] The Supreme Court took up twice in the span of three years the seminal repair and reconstruction case, *Aro Manufacturing Co. v. Convertible Top Replacement Co.*[193] The Japanese Supreme Court decided *Canon* in 2007. The Supreme Court of the United Kingdom decided *United Wire v. Screen Repair* in 2000 and *Schütz v*

190. A quick news search turns up many arrested based on counterfeit ink cartridges in China, including the use of refurbished cartridges. *See, e.g.*, Chongqing: jiamao mo he xi gu chanpin liu xiang ge da diannao cheng (重庆：假冒墨盒硒鼓产品流向各大电脑城) [Chongqing: Counterfeit Toner Cartridge Products Flows Into Major Computer Malls], Xinhua.Net, (Apr. 27, 2009), available at http://news.xinhuanet.com/newscenter/2009-04/28/content_11269661.htm.

191. *See, e.g.*, Seiko Epson Corporation v. Guangzhou Mipo Ltd. (精工爱普生株式会社与广州麦普科技有限公司侵犯发明专利权纠纷案), LEGALDAILY.COM (Beijing High People's Court, Aug. 7, 2008) *available at* http://lawyer.legaldaily.com.cn/judgment/default/detail/uuid/148111917579242101; Zhuhai Doumen Galaxy Printing Supplies Ltd. v. Seiko Epson Corp. (珠海市斗门银河打印耗材有限公司与（日本）精工爱普生株式会社侵犯专利权纠纷上诉案), LEGALDAILY.COM (Beijing High People's Court, May 29, 2008), *available at* http://lawyer.legaldaily.com.cn/judgment/default/detail/uuid/94805536284889049. In response, Chinese cartridge makers have launched validity challenges. *See* Seiko Epson Corp. v. Patent Reexamination Board of the State Intellectual Property Office (精工爱普生与国家知识产权局复审委员会等发明专利无效行政纠纷案), (Supreme People's Court, Sept. 9, 2013), *available at* http://www.chinaiprlaw.cn/file/2014010330997.html.

192. Fujifilm Corp. v. Benun, 605 F.3d 1366 (Fed. Cir. 2010) (emphasis added).

193. *Aro I*, 365 U.S. 336 (1961); Aro Mfg. Co., Inc. v. Convertible Top Replacement Co., 377 U.S. 476 (1964).

Werit in 2013. Exhaustion issues seem to demand more than their fair share of attention from the world's leading courts and cash-strapped litigants.

This section examines the likely impact of the current patent jurisprudence on the refurbishment industry. First, legal tests based on an undetermined definition of "making" inherently undermine refurbishment. Second, whether we look to the repair-reconstruction doctrine, the territorial reach of exhaustion, or the enforceability of single-use restrictions, the legal ambiguity and vacillation lead to extensive fact-finding and recordkeeping. For example, the territoriality limitation imposes costly sorting and tracking programs and the repair-reconstruction test requires close documentation of the refurbishing process. This imposes business and litigation costs even if the refurbisher should prevail in the end. Third, the winner-takes-all outcome of a lawsuit encourages scorched-earth litigation rather than settlement or ex ante licensing negotiation. The resulting high cost of compliance, coupled with the low-margin economics of the industry, means that in reality most refurbishers simply ignore patents and risk infringement liability. Thus, what transpires in the mature patent systems proves a poor model for developing countries looking to exercise their policy freedom under TRIPs.

A. The Indeterminate Definition of "Making"

Of the three legal hurdles to refurbishment, the repair-reconstruction test remains the linchpin of the analysis since it applies in all refurbishment cases without regard to geographical or contractual specificities. Yet for the central role it plays in refurbishment cases, the test itself is indeterminate. Cases such as *Dana* and *Jazz* (in which courts found permissible repair in situations that just as likely pass for impermissible reconstruction) demonstrate this unpredictability. A court that asks whether a refurbishment process is permissible repair, focusing on the physical alternations of the product, will likely find the permissible repair. A court that asks whether a refurbished product is reconstructed, focusing instead on the totality of the circumstance and the replacement of essential parts, will likely find impermissible reconstruction. When judges blend approaches, the result defies consistency. The euphemism of "case-by-case" reflects the arbitrary picking and choosing of subtests that should not, but in fact do, predetermine the outcome.[194]

The real culprit lies in the intractable repair-reconstruction test, which is centered on a contested meaning of "making" that has challenged thinkers since antiquity. Courts have acknowledged the connection between the repair-reconstruction doctrines and the paradox of the apocryphal axe, which is itself the American version of a 2000-year-old conundrum.[195] In 75 B.C., Plutarch described the ship of Theseus paradox:

194. *See, e.g.*, Standard Havens Products, Inc. v. Gencor Indus., Inc., 953 F.2d 1360, 1376 (Fed. Cir. 1991).

195. FMC Corp. v. Up-Right, Inc., 816 F. Supp. 1455, 1464 n.15 (N.D. Cal. 1993), aff'd,

> The ship wherein Theseus and the youth of Athens returned had thirty oars, and was preserved by the Athenians down even to the time of Demetrius Phalereus, for they took away the old planks as they decayed, putting in new and stronger timber in their place, insomuch that this ship became a standing example among the philosophers, for the logical question of things that grow; one side holding that the ship remained the same, and the other contending that it was not the same.[196]

Was the ship Theseus arrived in identical to the ship he boarded? To state it differently, was Theseus's ship repaired or reconstructed? The Ship of Theseus paradox, and the repair-reconstruction problems more generally, are puzzles that challenge our notion of identity as it changes across time. Some philosophers tackle the paradox by focusing on conflicting notions of identity, while others locate the paradox in competing intuitions of the relationships between the parts and the whole.[197] At the heart of the paradox is the incompatibility among a group of intuitions regarding the definition of an object, and the answer to the paradox requires us to abandon one of the conflicting intuitions. The final answer (whether the ship on arrival was or was not the Ship of Theseus) turns on which intuition judges maintain or abandon—a prospect that excites philosophers but spells disaster for refurbishers and patentees.

For a more modern analogy of the problem, we can look to the concept of "making" in another field preoccupied with the creation of tangible items: art. There, the "making" gradually moved away from material and physical composition toward a conceptual and non-corporal process in a way that parallels the evolving thinking on repair and reconstruction between jurisdictions. Marcel Duchamp, the French modern artist, created one of the most iconic and controversial artworks of the twentieth century by turning a factory-made urinal on its side and naming it the "Fountain" (1917).[198] This work subverted the traditional definition of art-making through the physical act of constructing an object and instead located the act of creation in the mental process of conceiving a new identity and context surrounding the object.[199] "The Fountain," together with Duchamp's other found object art, are known as the ready-mades: "The Fountain" was made (and the urinal unmade) at the moment when it was thought of and recognized as a piece of art titled "The Fountain."[200] This redefined what it means to "make" an art object in the same

21 F.3d 1073 (Fed. Cir. 1994); *see generally* Janis, *supra* note.

196. PLUTARCH, THESEUS, *available at* http://classics.mit.edu/Plutarch/theseus.html.

197. Michael C. Rea, *The Problem of Material Constitution*, 104 PHIL. REV. 525, 525 (1995), *available at* http://www3.nd.edu/~mrea/papers/Problem%20of%20Material%20Constitution.pdf.

198. MARCEL DUCHAMP, FOUNTAIN (1917).

199. Duchamp himself highlighted the centrality of human intention in the making of an object: "Whether Mr. Mutt made the fountain with his own hands or not has no importance. He CHOSE it. He took an article of life, placed it so that its useful significance disappeared under the new title and point of view – created a new thought for that object." *The Richard Mutt Case*, THE BLIND MAN, 5 (May 1917), *available at*http://sdrc.lib.uiowa.edu/dada/blindman/2/index.htm

200. *Marcel Duchamp and the Readymade*, MOMA, http://www.moma.org/learn/moma_learning/themes/dada/marcel-duchamp-and-the-readymade (last visited Aug. 16, 2013).

way the Chinese courts redefined what it means to "make" a patented product. The Chinese jurisprudence is arguably more consistent with the transforming notion of creation and waste in contemporary life. The focus of transformation on the creative and the generative takes the definition of "making" out of an industrial process and places it into a conceptual space—a dramatic departure from our own industrial-era discourse of repair versus reconstruction that obsesses over what is broken, what is stored, and what is relative value of the parts to the whole.

The struggle over the identity of a thing, from ancient philosophy to modern art, perhaps helps explain the doctrinal differences between the approaches of the United States, Japan, and China. U.S. jurisprudence on the identity of a thing emerged in the nineteenth-century industrial era and is deeply rooted in a physical notion of making. Although U.S. courts made it work today, the concept grows increasingly incongruous in contemporary life and frays before the myriad variations of the refurbishment process. Japanese courts confronted the problem in the twentieth century and grew more receptive to a totality-of-circumstantial analysis that takes into account the economic non-corporal life of a product. Unfortunately for refurbishers, avoiding this expanded notion of making is more difficult than the purely physical definition. Now in the twenty-first century, the post-modernists have thoroughly deconstructed "making" and liberated it from the material realm, just as Chinese courts nonchalantly pronounce that glass-bottle recycling is "akin to making" even though there is not a single physical alteration to the object. Occasionally, these intuitions compete within the same case, leading to legally inconsistent outcomes. Therefore, a new jurisdiction of refurbishment is needed to increase the ex-ante certainty for refurbishers without prohibiting refurbishment altogether as China appears to have done.

B. The Evidentiary Demands of the Refurbishment Defense

The three legal barriers require detailed examination of an ever-expanding list of factors. While this analytical framework allows judges flexibility to dispense equity ex post, it is a less useful tool when attempting to ascertain the legality of a particular refurbishment arrangement ex ante. Therefore, it fails to provide refurbishers assurance before they embark on the path of restoration. And even where refurbishment is permissible, parties have to expend significant resource to establish the defense in litigation. Consequently, the extent doctrines increase the likelihood of false-positive decisions that erroneously enforce patents against legitimate refurbishers who cannot meet the burden of proving permissible repair.[201]

201. In the economic theory of law enforcement literature, false positive (also known as a Type II error) occurs when jurists mistakenly assign liability to legitimate activities. *See* A. Mitchell Polinsky & Steven Shavell, *The Economic Theory of Public Enforcement of Law*, 38 J. ECON. LIT. 45, 60 (2000). Andre Sawicki recently provided a systematic treatment of examining false positives and negatives in patent law. However, his treatment focuses on the propriety of granting patent

The repair-reconstruction doctrine alone depends on the physical refurbishing process, supply and distribution chain, the make-up of the refurbished products, the relative value and durability of the components, and the contribution of the patented technology. The details of every item on this list can only emerge at the end of discovery, following separate lines of inquiry in the litigation process. The "identity"-based repair-reconstruction test articulated by the Japanese Supreme Court in *Canon* imposes a similar if not higher evidentiary burden.[202] To reach its ultimate conclusion of infringement, the Court had to consider the recreation of the air-seal claim feature and the scale of the production and distribution. Because it examines commercial factors in addition to the physical repair steps, the Japanese "identity test" amounts to a super-repair test that requires more evidence than its counterpart in the United States.

The compliance cost increases further when the intended market of the refurbished product operates under a national exhaustion system. The refurbisher must implement a sorting system to ensure that products are only refurbished from stock materials first sold in that market. In *Kirtsaeng*, Goodwill Industries International submitted an *amicus* brief on this exact point:

> Goodwill lacks the resources to determine whether a particular item w[as]manufactured abroad and, if it was manufactured abroad, whether the item was imported into the United States with the copyright owner's consent. Given the sheer number of donations made to Goodwill, conducting these investigations would be financially and operationally impossible.[203]

A charity that depends on the donation of second-hand products is right to be concerned. Although the issue in *Kirtsaeng* addresses copyright exhaustion, the concern applies to patented goods with equal force.

Assessment problems persist with single-use restrictions. The Automotive Aftermarket Industry Association, Automotive Parts Remanufacturers Association, and International Imaging Technology Council detailed their plight confronting single-use restrictions in an *amicus curiae* brief submitted in *Bowman v. Monsanto*:[204]

> Businesses that later upgrade or repair products . . . may be unaware of a purported downstream restriction. Aftermarket competitors likely never will see the outer container of the original vended item, and have no information to determine whether the outer container was slapped with a post-sale restriction or whether such a restriction legally could prevent repair. Many of these service companies receive empty consumable articles through intermediaries, such as

rights in the first place, and not the application of specific infringement rules. *See generally* Andre Sawicki, *Better Mistakes in Patent Law*, 39 FLA. ST. U. L. REV. 735 (2012). For a similar proposal in other intellectual property context, Ben Depoorter and Robert Kirk Walker recommended placing additional burden on copyright holders to combat false positives in a recent article. Ben Depoorter & Robert Kirk, *Copyright False Positives*, 89 NOTRE DAME L. REV. 319, 347–48 (2013).

202. *Recycle Assist Co.*, *supra* note 75.

203. Brief for the Goodwill Industries International, Inc. as Amicus Curiae Supporting Petitioner, 9–10, Kirtsaeng v. John Wiley & Sons, Inc., 133 S. Ct. 1351 (2013) (No. 11-697).

204. Brief for Automotive Aftermarket Industry Association et al., *supra* note 22.

commercial brokers and "cash for trash" charitable drives. . . .[205]

The problem of assessment cost is more severe in developing countries that stand to benefit more from sustainable development. For example, the Chinese judicial system lacks the institutional capacity and legal authority to engage in this fact-intensive adversarial process, much less the tools to compel the amount and type of facts required determine repair *vis-à-vis* reconstruction. Some problematic features of the system include: limited discovery, limited use of experts, reliance on written evidence over oral testimony, and formality requirements for introducing written documents.[206] Consequently, a patentee cannot compel the production of documents relating to the refurbishing operation process, cannot enter the factory to film the production line, and cannot depose the refurbishing workers. The refurbisher will be hard-pressed to develop a document trail evidencing the "chain of title" of its products as they originate from the patentee and passes through the consumer. The refurbisher cannot expect to rely on statements of a factory worker to demonstrate a non-infringing process where Chinese courts almost exclusively rely on written evidence. One Justice of Beijing's First Intermediate Court summarizes the problem of admitting witness testimony in patent litigation: "(1) [F]ew witnesses appear before the court, and their testimony cannot be cross examined during court hearings, which is a defect in the procedure; (2) witness's low credibility, false testimony, untruthful statements is prevalent, which makes it difficult to trust witness testimony in practice."[207]

Applying a fact-intensive test in a fact vacuum is an empty judicial exercise that prejudices the party saddled with the burden of proof. It also risks undermining people's confidence in China's nascent legal institution if litigants believe the adjudicated facts are inconsistent with the actual facts or perceive the ambiguity as a cover for extra-judicial influence. In a country where discovery is weak and the manufacturing process difficult to prove in court, a U.S.-style permissible-repair defense may not allow companies to organize their activities with a better view of the risks.

Chinese refurbishers have already faced this problem in the United States in *Epson v. Ninestar* and *Fuji v. Jazz.* Now they may be facing the same problem in China. In the only reported administrative enforcement concerning refurbishment, Epson asked the Shanghai Intellectual Property Office to enforce its ink-cartridge patents against a seller of infringing cartridges. In response, the

205. *Id.* at 19–20.

206. *See* Zhongqi Zhou, *Judicial Protection of Patent Rights*, MANAGING INTELL. PROP. CHINA, IP FOCUS (Jan. 2004); Jeffrey M. Duncan et al., *A Comparison Between the Judicial and Administrative Routes to Enforce Intellectual Property Rights in China*, 7 J. MARSHALL REV. INTELL. PROP. L. 529, 535 (2008) ("There is no evidentiary discovery system in China."); Benjamin Piwei Liu, *Chinese Patents as Copyrights*, 34 CAMPBELL L. REV. 685 (2012); DOUGLAS CLARK, PATENT LITIGATION IN CHINA, 105–116 (2011) (reviewing evidentiary hurdles for patent infringement cases in China).

207. Liting Zhou, *Certain Issues Related to Evidence and Proof, in* STUDY OF HOT ISSUES OF INTELLECTUAL PROPERTY CIVIL LITIGATION 378-79 (Zhang Guangliang ed., 2009).

seller asserted the defense of exhaustion.[208] Epson ultimately prevailed because the seller was not able to prove that the refurbished cartridges originated from Epson. It is unclear how the refurbisher would have done so *vis-à-vis* an uncooperative patentee. The refurbisher was not the original purchaser of the ink cartridge and was unlikely to produce a receipt showing the patent exhausting sale. The proof of first sale may lie inaccessible with the patentee or otherwise raise the cost of paperwork in the course of operating a low margin business. Even if the law permits refurbishment in theory, the transaction cost associated with the legal determination can thwart a legitimate refurbisher.

The current legal test overemphasizes the initial allocation of entitlements and indulges in an allocation method that imposes excessive costs. Therefore, it fails to maximize welfare and reflect equity between parties when applied to refurbishment cases. The current test further imposes significant procedural demands, skewing the result towards those with legal resources.

C. The Imprimatur of All-or-None Outcome of Refurbishment Cases

Another negative outcome of the triple doctrinal barriers is the all-or-none outcome that discourages socially beneficial private ordering. Refurbishment disputes follow property rules.[209] A refurbisher either wins the privilege of unfettered repair or faces an injunction. Property rules are often praised for their lower transaction costs and compatibility with private ordering. However, application of the property rule in the refurbishing context pushes patentees and refurbishers towards litigation and away from the right kind of private ordering needed for sustainable development—an ex-ante license to restore products.

Patentees have no incentive to grant refurbishers licenses to undermine their own pricing strategy and market ex ante. Conversely, they are driven to litigate when refurbishers do emerge to avoid the potential loss of monopolistic pricing. The stakes are high from the patentee's perspective: a finding of permissible repair exposes its pricing strategy and market share to competition. This is especially true within a developing country like China because many innovations there are protected by design patents and utility model patents that are easy to refurbish (such as the liquor bottles).[210] A finding of permissible repair is particularly discouraging to these innovators. Even if courts generally permit refurbishment as repair, the outcome in a specific application of the repair-reconstruction test is unknown ex ante, and patentees can always hope that the fact of their particular case justifies a finding of impermissible

208. Liu, *supra* note 70 (detailing the Chinese bottle refill cases).

209. *See, e.g.*, Fujifilm Corp. v. Benun, 605 F.3d 1366 (Fed. Cir. 2010) (upholding the imposition of injunction against a refurbisher).

210. Mark Liang, *Chinese Patent Quality: Running the Numbers and Possible Remedies*, 11 J. MARSHALL REV. INTELL. PROP. L. 478 (2012) (surveying the number of design and utility model patent applications); Benjamin Liu, *Chinese Patents as Copyrights*, 34 CAMPBELL L. REV. 685 (2012) ("Over 80% of all recent [patent] grants are utility model and design patents.").

reconstruction.[211] Moreover, the costs associated with discovery and trial preparation may financially cripple refurbishers regardless of merit. The financial calculus therefore encourages patentees to wage scorched-earth, hold-no-prisoner wars. Under the current system, the only acceptable settlement to the patentee is the complete withdrawal of refurbishers from the market.

In response, refurbishers have a choice between fight or flight. Those with the financial wherewithal have an incentive to litigate. Their profit motive encourages the establishment of refurbishment-based business. If refurbishers win, they partake in the market carved out by the patent without accounting to the patentee. They can set prices in the shadow of the patent monopoly above the marginal cost, since they are the only ones allowed to compete with the patentee.[212] They also enjoy a share of the new market created by the patent innovation that is off-limits (or accessible at a cost) to other manufacturers. Hence, they stand to enjoy a windfall should they prevail. Moreover, the affirmative defense of *permissible* repair generally conveys a permissible message to the refurbishing industry, even if the case-by-case analysis makes the actual outcome uncertain. When their conduct is ultimately challenged in court, the fear of losing the initial investment and profitable product lines, along with a perceived likelihood of success ultimately encourage litigation.

The iconic Fuji single-use camera dispute illustrates the distance between the perception of permissible repair and the reality against refurbishment. Toward the end of the single-use camera saga, the refurbisher sought bankruptcy protection from Fuji's infringement awards. The bankruptcy judge observed:

> Fuji pursued the LFFP refurbishers, most relentlessly as to Benun and Jazz as they resisted. Though Benun and his company scored some conceptual points (notably overcoming Fuji's basic thesis that LFFPs could not be "repaired"), and met with some degree of success *sub judice*, the ultimate results have been catastrophic for Benun (and Jazz). Fuji could never have hoped to recover its full measure of damages and costs. Fuji could never have hoped to recover its full measure of damages and costs. Rather it sought the result it got – at what by any measure was a huge investment in attorney time and related costs. Money, in terms of interest or expenses, was not the Fuji object. Market position relative to LFFPs was important to this plaintiff, but seemingly paramount to Fuji is its

211. Mineko Mohri, *Repair and Recycle as Direct Patent Infringement?*, *in* SPARES, REPAIRS AND INTELLECTUAL PROPERTY RIGHTS 82 (Christopher Heath & Anselm Kamperman Sanders eds., 2009) ("The real issue here is that the criteria for 'permissible' repair cases are not necessarily transparent for either patentee or repair services, especially for the latter, who have fewer resources to go through patent litigation.").

212. This is comparable to the six months exclusivity a generics drug manufacturer enjoys for successfully challenging an Orange Book patent under the Hatch-Waxman act. Studies show that during this period of duopoly, the price of the drug does not decrease significantly. *See, e.g.*, Luke M. Olson & Brett W. Wendling, *The Effect of Generic Drug Competition on Generic Drug Pricing During the Hatch-Waxman 180-Day Exclusivity Period* tbl. 1, BUREAU OF ECONOMICS, FEDERAL TRADE COMM'N WORKING PAPER NO. 317 (Apr. 2013), *available at* http://www.ftc.gov/be/workpapers/wp317.pdf (there is a slight reduction of price, from 1 to 0.9, in a two competitors market when there are less than five competitors ultimately). The refurbished product is not an exact substitute.

image as a fierce protector of its patent rights.[213]

Although the repair-reconstruction doctrine in the United States purports to be generous to permissible repair, the single-use camera refurbisher merely scored "conceptual points" amidst "catastrophic" results.[214] Results like these, together with the legal uncertainty and costs discussed in the previous section, cast a dark cloud over some of the would-be refurbishers who would sooner give up than test their operations in court. This second group of refurbishers is less noticeable because its (non)battle does not result in a citable legal saga. In *Fuji v. Jazz*, many refurbishers failed to participate in the initial ITC investigation, possibly because they were not able to fund their day in court.[215] Meanwhile, several ink-cartridge refillers have decided not to repair Lexmark cartridges because they "cannot reasonably assess risks associated with their business plan," including the risk of "increased damages, attorney fees awards, and injunctions."[216] Thus for every Jazz or Ninestar that wages full-out firefights with the patentees, many more sulk away.

A more recent example poignantly illustrates the social loss associated with the flight response. Sanho was a Chinese company in the business of selling after-market computer accessories, marketed chargers, battery packs designed to extend the life of Apple products, and providing functionalities not available through Apple, such as a car-charging adaptor.[217] In 2010, Apple asserted six utility and design patents covering various Apple specific connectors against Sanho. In response, Sanho noted that the connectors used in Sanho's chargers were recycled Apple connectors.[218] Nonetheless, Sanho withdrew the connectors from the market and settled soon following the suit instead of pursuing a possible permissible repair defense.[219] Perhaps Sanho had recycled Apple connectors first sold in China—connectors which therefore would not have been subject to exhaustion rulings. Yet even if these connectors were first sold in the United States, Sanho may not have had the wherewithal to prove their geographic origin or establish permissible use in court, while Apple could

213. In re Benun, 386 B.R. 59 (D.N.J. 2008)

214. *Id.*

215. Certain Lens-Fitted Film Packages, Inv. No. 337-TA-406, USITC Pub. 3219 (Aug. 1999), http://www.usitc.gov/publications/337/pub3219.pdf ("Boshi Technology Ltd., Fast Shot, Haichi International, Innovative Trading Company, Labelle Time, Inc., Linfa Photographic Ind. Co. Ltd., Forcecam, Inc., and Rino Trading Co. Ltd., in default for failure to respond to the complaint and notice of investigationFalse Ten respondents that had filed responses to the complaint and notice of investigation failed to appear at the hearing, viz., Ad-Tek Specialties Inc., Arnerhnage, Inc. d/b/a/ Rainbow Products, Boecks Camera LLC, BPS Marketing, E.T. Trading d/b/a Klikit, Penmax, Inc., PhilmEx Photographic Film, T.D.A. Trading Corp., Vantage Sales, Inc., and Vivitar Corp.").

216. Brief for Automotive Aftermarket Industry Association et al., *supra* note 22, 25–26 & n.37.

217. Complaint, Apple Inc. v. Sanho Corp. (N.D. Cal. 2010) (No. 5:10-cv-04042-HRL).

218. Neil Hughes, *Apple sues 'HyperMac' accessory maker over MagSafe, iPod* CABLES, APPLE INSIDER (Sept. 21, 2010), http://appleinsider.com/articles/10/09/21/apple_sues_hypermac_accessory_maker_over_magsafe_ipod_cables.html.

219. *Id.*

have outspent Sanho's legal budget. As a result of Sanho's exit, defunct Apple power cables will either sit in a landfill or enter the e-waste recycling stream, and consumers are deprived of product options that Apple itself refused to supply.

Not only does the all-or-none nature of the physical reconstruction test disincentivize private contracting between patentee and refurbishers, it also fails to reflect broader public policy confronting developing countries. The refurbishment business is encouraged or encumbered based on contingent facts of the patented technology or the location of exhaustion, without corresponding to the utility of the recycling operation or its economic impact. In *Canon*, the refurbisher recycled empty printer cartridges, which seemed like a good example of sustainability. But such conduct was nevertheless ruled to be an infringement. So was the reuse of empty bottles. In these refurbishing cases, the success of a permissible-repair defense depended on the business organization of the refurbisher, the refurbishing process, the geographical locations of sale and the technical features of the refurbished product—not the level of sustainability, choice to the consumer, or other positive externalities.

Notwithstanding the desire to demarcate a viable product ecosystem for refurbishers through the exhaustion doctrine, the reality is that repair-reconstruction doctrine cannot fend off a patentee wielding technological locks, cleverly drafted patent claims, and contractual restrictions. The combination of high financial stakes and a winner-takes-all outcome, all based on an indeterminate test, either encourages drawn-out litigation or the premature abandonment of otherwise-legal refurbishment operations. Neither of these outcomes is socially beneficial. An alternative set of rules are needed to replace the excess of the current refurbishment tests.

V.
A SUSTAINABLE PATENT EXHAUSTION DOCTRINE

How can developing countries address commercial refurbishment and strike the appropriate balance between a patentee, a purchaser, a refurbisher, a conservationist, and the public? This section suggests several alternatives paths that courts may take to alleviate the policy tension: (1) permitting the repair defense with international exhaustion, (2) shifting the burden of proof of proving exhaustion, (3) permitting refurbishment generally, or (4) adjusting the remedy regime to eschew injunctions in favor of damages.

A. Adopting the Repair Defense with International Exhaustion

As noted earlier, aspects of the exhaustion doctrines do not line up properly. The United States generally permits repair but erects the wall of national exhaustion. Japan and China adopt international exhaustion but impose a stricter repair-reconstruction test. Therefore, the low hanging fruit for promoting refurbishment is to combine a liberal repair defense with international exhaustion.

Chinese commentators suggest that China should adopt the United States' repair-reconstruction test that permits the commercial refurbishment of patented products short of making a new article.[220] Drafters of Chinese patent law have studied foreign IP systems extensively, and the Chinese exhaustion doctrine may restore the safe harbor for refurbishers in the future. Since, at the moment, the starting point in China is to forbid third-party refurbishment, adopting the repair-reconstruction doctrine undoubtedly promotes conservation, technological learning, and economic opportunities.

A full transplantation of the repair-reconstruction jurisprudence may not strike the right policy balance for all of the faults within the exhaustion doctrine. Despite the rhetoric of permissible repair, the prevailing repair-reconstruction framework does not give refurbishers total peace of mind for the reasons mentioned in the previous section. Transplanting refurbishment jurisprudence whole-cloth from mature patent regimes may replicate the compliance cost, the unpredictable outcome, and the lack of private ordering that undermines sustainable development efforts. However, it will be an outcome more consistent with sustainability than the current state of affairs in China.

B. Adjusting the Procedural Burden

Adopting the permissive-repair defense used in the United States merely opens the door to sustainability considerations. It means little when the requisite legal and compliance cost extend beyond the refurbisher's wherewithal. Therefore, the implementation of the defense should minimize litigation and compliance costs. One adjustment is to shift onto the patentee the evidentiary burden of proving the absence of authorized first sale. This lowers the legal cost of proving permissible repair and discourages those patentees that mount strategic litigation to run legitimate refurbishers out of business.

A hypothetical based on the Shanghai Epson cartridges disputes illustrates this approach. Currently it is up to the refurbisher to prove that the product was repaired from what the patentee originally sold once a patentee demonstrates that its patent covers a product. The seller of infringing cartridges was not able to prove that the ink cartridges were refurbished from Epson under the existing law. Under the new proposal, the burden is placed on Epson to come forward with the evidence showing the absence of patent exhausting the first sale. The result lowers the refurbisher's cost of proving permissible repair and promotes more socially beneficial refurbishment at the margin.

220. *See, e.g.*, Hu Kaizhong (胡开忠), 专利产品的修理、再造与专利侵权的认定———从再生墨盒案谈起 (zhuanli chanpin de xiuli, zaizao yu zhuanli qinquan rending – cong zaisheng mohe an tanqi) [The Repair/reconstruction of Patented Products and the Determination of Patent Infringement – From Recycled Cartridges Case], 12 LEGAL SCI. MONTHLY (法学) 145, 149 (2006); Yan Wenjun (闫文军), Cong youguan Meiguo pan li kan zhuanli chanpin xiuli yu zai zao de qufen (从有关美国判例看专利产品修理与再造的区分) [From the look on US patent jurisprudence distinction Repair and reconstruction], PATENT LAW RESEARCH 401 (2004).

Consequentialist arguments aside, this change is also justified on the grounds of doctrinal consistency, efficiency, and procedural fairness. The burden of proving unauthorized making is on the patentee.[221] This includes the burden of proving that a making or sale is unauthorized. In cases implicating refurbishment, proving the absence a patent being exhausted at first sale is a part of proving the lack of authorization. This also means that the initial burden of proving non-exhausting foreign sales in a national exhaustion jurisdiction should lie with the patentee.

Placing the burden of proving the absence of patent exhaustion on the patentee is also more efficient and likely to lower the overall litigation costs. A patentee is better equipped to determine whether an alleged infringing item is refurbished from its own product in the first place.[222] Consumer products contain lot and model designations for customer service purposes. Epson's ink cartridges may contain markings traceable to Epson through internal documents inaccessible to refurbishers. Epson may also possess marketing or technical documents listing all the makes and models of ink cartridges that it sells around the world. A better practice would be to require the patentee to come forward with the evidence showing the absence of a patent exhausting first sale and require the refurbisher to show only that the refurbishment process is permissible repair or to rebut patentee's evidence showing an absence of first sale. After all, how can we expect the refurbishers to know the place of first sale if the patentee cannot do it in the first place?

This modified procedure is also likely to produce aggregate outcomes that are more consistent with the underlying merit of the infringement claim. As mentioned earlier, the current law places the majority of the burden on the refurbishers; they systemically bear the risk of an erroneous false-positive determination. Consequently, society loses the benefit of legitimate refurbishers who are mistakenly treated as infringers, but never enjoy the benefit of infringing refurbishers who are mistakenly permitted to operate. Once some of the burden is shifted onto the patentee, more legitimate refurbishers can avail themselves to the defense of exhaustion. Under this new burden regime, patent litigations may continue to produce occasional mistakes inconsistent with the underlying merit. However, the mistakes will spread among legitimate refurbishers who cannot adduce evidence to support permissible repair and deserving patentees who cannot rebut permissible repair, thereby enhancing sustainability.

221. Medtronic, Inc. v. Mirowski Family Ventures, LLC, No. 12–1128, slip op. at 6 (Jan. 22, 2014) (Breyer, J.) ("It is well established that the burden of proving infringement generally rests upon the patentee.").

222. The ordinary rule of civil procedure places the burden of proof on a litigant likely to have knowledge of the relevant facts. *See* Campbell v. U.S., 365 U.S. 85 (1961) ("[T]he ordinary rule, based on considerations of fairness, does not place the burden upon a litigant of establishing facts peculiarly within the knowledge of his adversary."). *See also* Concrete Pipe and Products of Cal, Inc. v Constr. Laborers Pension Trust for Southern Cal, 508 U.S. 602, 626 (1993); United States v New York, New Haven & Hartford Railroad Co, 355 U.S. 253, 256 n.5 (1957).

Thus, for countries that choose to negotiate the conflict between innovators and refurbishers through the prevailing repair-reconstruction doctrine, the procedural adjustment of requiring the patentee to prove the absence of exhaustion is consistent with the infringement doctrine, legal efficiency, the underlying merit of the dispute, and the aspiration of sustainable development.

C. Permitting Refurbishment Generally

Each of the first two options preserves the legal status quo and the underlying welfare calculus in favor of the patentee, allowing the patentee to foreclose socially beneficial refurbishment unless it occurs within a single useful life for which the patentee has already extracted the monopoly rent.[223] All three approaches share the repair-reconstruction test, while differing on how the test is applied.

Policymakers in developing countries may also walk away from the repair-reconstruction test altogether and treat all refurbishment as permissible repair. The refurbishment industry provides an important positive externality for the sustainable development agenda: It offers the opportunity of providing industrial learning, conserving resources, facilitating access to the latest welfare enhancing technology, and generally providing raw inputs for the informal economy. Whether the starting point is an empty ink cartridge, a used single-use camera, or liquor bottles, the positive externality accrues at the moment of refurbishment regardless of whether a court later deems it permissible repair or impermissible reconstruction. If Chinese policymakers determine that the total public and private welfare accrued from these spillover effects outweighs the loss of innovation due to reduced patent incentives, it makes sense to expand the scope of permissible repair to cover the entirety of refurbishment activities. It also seems fair that the patent system, as a system that promotes innovation based on the making and sale of tangible goods, should internalize the cost it imposes on the society for shifting the pattern of production of consumption towards patented goods.

Exempting all refurbishment from patent infringement shifts patent law toward sustainable development in three ways. First, it expands the range of permissible activities and allows more products being recycled. Second, it provides more certainty in the aftermarket by removing the need for the subjective repair-reconstruction test. An ink-cartridge refurbisher no longer needs to worry whether his or her conduct may be infringing based on subjective factors such as whether a refurbished component is an essential part of the cartridge, whether the refurbishment exceeds normal repair, or whether a

223. *See* Adams v. Burke, 84 U.S. 453, 456 (1873) ("That is to say, the patentee or his assignee having in the act of sale received all the royalty or consideration which he claims for the use of his invention in that particular machine or instrument, it is open to the use of the purchaser without further restriction on account of the monopoly of the patentees."); Vincent Chiapetta, *Patent Exhaustion: What's It Good For*, 51 SANTA CLARA L. REV. 1087, 1093–92 (2011) (explaining the single royalty justification).

particular ink cartridge has outlived its useful life. Third, it reduces the complexity of refurbishment disputes—the only issue remaining is a threshold question of what constitutes refurbishment. After all, infringers should not be allowed to avoid liability because they happened to use recycled screws to produce a patented article.

As it turns out, judges already possess the tools to address these concerns and recognize refurbishment without a problem. For example, courts in the single-use camera cases quickly acknowledged the operation at issue is one of refurbishment, in contrast with their difficulty drawing the repair-reconstruction line. There was no serious disagreement over the existence of "refurbishment" for truck transmission restoration in *Dana* or over the decontamination of use inhalers in *Mallinckrodt.* The Chinese and Japanese judges also had no trouble recognizing the refurbishment nature of the case. Whatever threshold matrix courts use to define refurbishment, it appears uncontroversial.

Moreover, courts can develop a threshold test by looking to whether the starting material—the stock to be refurbished—lacks substantial noninfringing use. Specifically, a noninfringing use is substantial if such use provides more economic benefit than the savings obtained from refurbishment. This test of "substantial noninfringing use" should sound familiar because it is the mirror image of the well-established test defining contributory infringement liability in the United States.[224] Under 35 U.S.C. Section 271(c), a contributor of parts is liable for patent infringement if the part is especially adapted for use in a product covered by a patent and not a staple article suitable for substantial noninfringing use. Here, a refurbisher should *not* be liable for refurbishing parts that are adapted for use in the covered product. This convergence is not a coincidence. Both areas of law grapple with the problem of identifying when an incomplete piece is traceable to and identifiable with a patented product. In a recent article, Bernard Chao highlighted the connection between contributory infringement and patent exhaustion as doctrinal areas that implicate a "heart of the invention" test: "If a party replaces component(s) that can properly be considered the heart of a patented invention, that fact should weigh in favor of finding an impermissible reconstruction."[225] In other words, the replacement of the heart of invention is more likely to coincide with a component that lacks a substantial noninfringing use. But the argument here can apply in the reverse as well—when the part lacking a noninfringing use is retained, that fact should

224. 35 U.S.C. § 271(c) states in full:

> Whoever offers to sell or sells within the United States or imports into the United States a component of a patented machine, manufacture, combination, or composition, or a material or apparatus for use in practicing a patented process, constituting a material part of the invention, knowing the same to be especially made or especially adapted for use in an infringement of such patent, and not a staple article or commodity of commerce suitable for substantial noninfringing use, shall be liable as a contributory infringer.

225. Bernard Chao, *Breaking Aro's Commandment: Recognizing That Inventions Have Heart*, 20 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 1183, 1213 (2010).

weigh in favor of the refurbisher. Symmetry suggests that, if the patentee wants to hold the supplier of unpatented parts indirectly liable because it is identifiable with a finished infringing product, it is then fair to exempt from liability the refurbishment of a used product that is identifiable with an exhausted product.

The repair-reconstruction cases may be reinterpreted through the lens of "refurbishability" as defined through substantial noninfringing use. For example, spent ink cartridges or single-use cameras provides clear economic savings when refurbished into the patented ink cartridge or single-use camera but otherwise do not have any other substantial noninfringing use.[226] Prohibition against their restoration promises to send these spent parts directly to the shredder—an economically less substantial use—and undermines conservationist public policies.

In contrast, an unpatented screw reclaimed from an old machine is capable of being used in infringing and noninfringing products and the use of that screw in the patented machine is no more economical than using a commodity screw. We need not afford any special treatment to an infringer who merely used reclaimed screws as a component of an infringing machine when the same sustainability goals could be achieved through non-infringing activities. The broken leather straps and metal buckles in *American Cotton Tie* are essentially scrap material and their use probably does not provide any saving over the construction of cotton ties from stock leather or commodity metal. Because the saving obtained from refurbishment is nearly nonexistent, any noninfringing use of the leather straps and metal ties will justify the refusal to permit refurbishment. Likewise, turning the broken drill bits in *Sandvik* back to a functioning bit is possibly no more economical than constructing a new drill from a piece of stock metal. Therefore, the reshaping of the drill bit for other noninfringing purposes will qualify as a substantial noninfringing use. These facts present situations that *are not even refurbishment*, in contrast with the reuse of single-use camera shells, ink cartridges, or liquor bottles. The subject repair-reconstruction test then transforms into an economic comparison between the relative savings afforded by infringing use and noninfringing use that takes into account the benefit of conservation.

D. Avoid Injunctive Relief

The above three proposals focus on the process of allocating the initial entitlement under a property rule. Another alternative shifts the remedy regime towards a liability-based rule. In other words, courts may reconsider the practice of granting injunctions in reconstruction cases and instead impose monetary damages to create a compulsory licensing scheme for refurbishers.

Recently, Ted Sichelman has argued that compensation based on a liability rule can be appropriate for a practicing patentee, such as when the patent is used

226. This discussion presumes that the prospect of being shredded into plastic pallets or paper pulp during a recycling process is not considered a substantial noninfringing use.

in a downstream product, when the cost of design around is high, or when a licensing transaction cost is high due to differing opinions over "whether a given patent is infringed, valid, or enforceable."[227] These three considerations apply with particular force here. When the infringing act is one of refurbishment in a developing country, the static deadweight inefficiency is compounded by the loss of valuable positive externalities in the form of technological access, jobs, sustainability, and capacity building. The aftermarket refurbishing industry is downstream of the primary market. Refurbishment restores the patented product and by definition does not "design around" the patent. Lastly, issues of repair and reconstruction, national exhaustion, and conditional sales are contentious issues subject to differing opinions. The high assessment costs, the inability to design around patent and the unwillingness of parties to bargain for a refurbishment license weigh in favor of a liability regime.

Courts can implement the liability remedy regime through their equitable power using existing rules, while sidestepping the quagmire involved in determining the initial entitlement to refurbish. The 2006 Supreme Court decision *eBay v. MercExchange* provides the standard for granting a permanent injunction for patent-infringement cases in the United States.[228] It provides the point of departure for analyzing the propriety of issuing injunctions in refurbishment cases. The Court looked to four factors to determine whether to impose permanent injunction against a patent infringer, including:

> (1) that [the patentee] has suffered an irreparable injury; (2) that remedies available at law, such as monetary damages, are inadequate to compensate for that injury; (3) that, considering the balance of hardship between the plaintiff and defendant, a remedy in equity is warranted; and (4) that the public interest would not be disserved by a permanent injunction.[229]

The *eBay* decision reduced the likelihood of granting a permanent injunction to a nonpracticing patentee because a nonpracticing patentee and the infringer do not compete directly in the marketplace and because public policy favors continued access to innovative commercial products.[230] But the factors can be used to justify the denial of injunctions in refurbishing situations.

Irreparable harm and inadequate remedies are usually present where the patentee and the infringers are direct competitors, and the patentee is losing market share to the infringer. This relationship exists between patentees and refurbishers, but their direct competition is only true up to a point. Refurbished products typically occupy a market segment that overlaps with, but is not identical to, the products offered by the patentee. As mentioned earlier, original

227. Ted Sichelman, *Purging Patent Law of 'Private Law' Remedies*, 91 TEX. L. REV. 517 (2013). *But see* Amy L. Landers, *Liquid Patents*, 84 DENV. U. L. REV. 199, 253 (2006) (arguing that practicing and nonpracticing entities are entitled to different patent remedies because they suffer different harms).

228. eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388 (2006).

229. *Id.*

230. *See* Bernard H. Chao, *After* eBay, Inc. v. MercExhange*: The Changing Landscape for Patent Remedies*, 9 MINN. J.L. SCI. & TECH. 543, 553–54 (2008).

goods and refurbished goods are imperfect substitutes because consumers tend to perceive refurbished products as inferior to the original product.[231] Moreover, unlike a direct infringer who is free to manufacturer as much product as possible subject to the market demand, the refurbisher is limited by the supply of original products available for refurbishment. Thus, while there is some irreparable loss of market share, the extent of loss is less than would be in the case of unfettered infringement between two competitors.

The balance of hardship is generally difficult for a refurbisher in two senses. First, the design around cost is infinitely high. Refurbishments by definition make use of the patented article; therefore, a refurbishing business naturally falls within the scope of the patent. Second, given the permissive tenor of the exhaustion doctrine and the state of legal confusion outlined in Section 0, refurbishers are in a poor position to determine what is legally permissible ex ante and may in many cases believe that they have a valid defense to patent infringement. It would be unduly harsh to impose an injunctive remedy against these refurbishers and foreclose their activities altogether.[232]

The public-interest factor weighs heavily in favor of the refurbisher. Section 0 already identified technological, environmental, and welfare reasons why refurbishment serves important public-interest considerations. It is important to note that this balance goes beyond the dominant discourse of dynamic efficiencies (promoting innovation) versus static efficiencies (promoting access). Refurbishers serve as engineers for the industry base of tomorrow. The health of the environment portends consequences spanning generations. The availability of employment and cheap access to technology provide long-term stability to the poorest regions of the world. What is at stake is one form of dynamic efficiency (innovation through patent protection) versus other forms of dynamic efficiency (industry development, sustainability and economic stability).

Developing countries can similarly obtain this result through the jurisprudence of compulsory license and on-going royalty set in the context of environmental or pharmaceutical technology. For example, Chinese patent statutes do not detail the standard for imposing permanent injunctions but take into account the balance of private and public interests in a way not unlike the factors in *eBay*. In the landmark case *Wuhan Jingyuan vs. Japanese Fujikashui and Huayang*, the Supreme People's Court emphasized the weight of environmental and economic factors against injunctions in patent cases. The case involved the infringement of a process patent covering the process of removing sulfur pollutants from industrial exhaust smoke. The trial court declined to impose a permanent injunction against the defendants (a power plant

231. *Supra* Section A.

232. James M. Fischer, *What Hath* eBay v. MercExchange *Wrought?*, 555, 565–66 (2010) (discussing the role good faith belief and the cost of compliance play in the balance of hardship factor).

operator in the Fujian province and its Japanese equipment supplier), instead opting for an ongoing royalty until patent expired. The judgment noted:

> The installation of a flue gas desulphurization facility for thermal power plants accords with the basic national policy and national industrial policy of *environmental protection*, promotes the building of *environment friendly society*, provides good social benefits, and the power supply situation will directly affect the local economy and peoples' livelihood.[233]

Although *Wuhan Jingyuan vs. Japanese Fujikashui and Huayang* involved the use of green technology in large-scale utility projects, the legal calculus is equally applicable to commercial refurbishing operations. They promote resource conservation, advance technological capability, and provide economic opportunity and their desirability is explicitly endorsed by national policy and legislation.[234]

CONCLUSION

This article has highlighted the ongoing tension between patent infringement doctrines and socially beneficial refurbishment activities. The United States espouses a strong repair defense, only to take it away from foreign refurbishers by imposing a strict national exhaustion doctrine. The patent regimes in United Kingdom and Japan take a more permissive view towards the geographical limits of exhaustion but narrowly construe the concept of "repair." In China, the range of permissible repair is even narrower: Salvaging a patented product alone, without physical alteration, is sufficient to trigger infringement. The indeterminate repair-and-reconstruction doctrine, the inordinate burden of proving exhaustion, and the all-or-nothing rule of exclusivity all serve to hamper the refurbishing industry. In order to transcend this impasse and restore certainty to the refurbishment industry, this article proposes a reconfiguration of policy levers within the patent system to internalize the social cost of the waste problem through a change to the remedy regime.

Beyond the specific exhaustion-doctrine debate, the analysis presented here reveals a fundamental incongruity in the way patent narratives interface with the goals of sustainable development. The implementation of stronger patent rules in developing countries has been justified on a technocratic Cornucopian discourse. The way countries can counter a Malthusian demise, goes the argument, lies in the availability of better technologies that allow us to grow more food, generate more energy or purify more water to meet growing populations, and raise standards of living. A robust patent system can incentivize better technologies and promote the transfer of these technologies to developing countries. At the same time, however, a system of innovation based on physical things being made, used, sold, or moved around necessarily alters the patterns in which we utilize physical resources—sometimes leading to

233. China Environmental Project Co., Ltd. v. Fujikasui Engineering Co., Ltd., Huayang Electric Power Co., Ltd. (Wuhan Jingyuan v. Japanese Fuji), SPC (2009).

234. *See supra* Section I.B.

wasteful allocations. The same sustainability concerns that were used to justify stronger patent law in developing countries have not been used to modify the contour of patent law when patent doctrines lead to waste. Now, in hindsight, stronger patent rules not only failed to promote significant technology transfer of cleaner, more efficient technology, but they also threatened to shut down the path towards industrial upgrade and environmental protection through refurbishment that was traditionally available to developing countries.[235] This result is avoidable if the notion of sustainability is a design principle internal to patent law.

235. *Supra* note 14 and accompanying text.