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Design in Marketization: The Invention of Car Safety in Automobile Markets

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Abstract

This article conceptualizes the relation between design, economics, and innovation. Rather than connecting design to economics through the notion of value, it explores how economics construes negative side-effects of market activities. Aligning itself with recent *She Ji* contributions that tie design to the economic sociology of Michel Callon, this article argues that markets assume a constant process of managing such side-effects. The invention of car safety and the development of safety design features in 1950s Sweden illustrate this. Automotive design through safety innovations can be seen as a design process that transcended the clear separation between business and politics assumed by neoclassical economics. This article argues that this phenomenon is a concern for design scholars as well as social scientists. I assert that it is important to explore this line of inquiry by investigating design processes in different economic settings.

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<https://doi.org/10.1016/j.sheji.2023.04.001>

- 1 Joanna Boehner, "Anthropocene Economics and Design: Heterodox Economics for Design Transitions," *She Ji: The Journal of Design, Economics, and Innovation* 4, no. 4 (2018): 355–74, <https://doi.org/10.1016/j.sheji.2018.10.002>.
- 2 Cameron M. Weber, "What Is Good for General Motors Is Bad for America: The 2009 Bailout Through the Lens of Heskett's Design-Oriented Theory of Value," *She Ji: The Journal of Design, Economics, and Innovation* 2, no. 3 (2016): 183–98, <https://doi.org/10.1016/j.sheji.2016.11.001>.
- 3 See for instance Roger Whitham et al., eds., "Understanding, Capturing and Assessing Value in Collaborative Design Research," special issue, *CoDesign* 15, no. 1 (2019), <https://www.tandfonline.com/toc/ncdn20/15/1>.
- 4 Stefan Molnar and Karl Palmås, "Dissonance and Diplomacy: Coordination of Conflicting Values in Urban Co-design," *CoDesign* 18, no. 4 (2021): 416–30, <https://doi.org/10.1080/15710882.2021.1968441>; Stefan Molnar, "The Framing of Urban Values and Qualities in Inter-organisational Settings: The Case of Ground Floor Planning in Gothenburg, Sweden," *Urban Studies* 60, no. 2 (2023): 292–307, <https://doi.org/10.1177/00420980221090883>; Ignacio Farias, "Epistemic Dissonance: Reconfiguring Valuation in Architectural Practice," in *Moments of Valuation: Exploring Sites of Dissonance*, ed. Ariane Berthoin Antal, Michael Hutter, and David Stark (Oxford: Oxford University Press, 2015), 271–90, <https://doi.org/10.1093/acprof:oso/9780198702504.003.0014>.
- 5 Clive Dilnot, introduction to *Design and the Creation of Value*, by John Heskett (London: Bloomsbury, 2017), 1.
- 6 Lucy Kimbell and Guy Julier, "Confronting Bureaucracies and Assessing Value in the Co-production of Social Design Research," *CoDesign* 15, no. 1 (2019): 8–23, <https://doi.org/10.1080/15710882.2018.1563190>.
- 7 Note for instance the place of the labor theory of value in Marxist accounts of economic life, or the fact that when French 19th-century sociology Gabriel Tarde lays out his heterodox economic theory, he begins by defining value. See Bruno Latour and Vincent Antonin Lépinay, *The Science of Passionate Interests: An Introduction to Gabriel Tarde's Economic Anthropology* (Chicago: Prickly Paradigm Press, 2009), 7–8.
- 8 Dilnot, introduction to *Design and the Creation of Value*, 1; See also Sharon

Introduction

Value is the central concept in current debates on the relation between design, economics, and innovation. Research explores how to situate design in relation to the distinction between (economic) value and (social) values,¹ design value and corporate strategy,² and how the value of design is assessed in contemporary economics.³ Attempts have been made to introduce valuation studies to interrogate the value and values dyad in the context of co-design and urban design as well as architectural practice.⁴ And there is a perceived need for design scholars to explain the value that design brings to society—whether the promotion of design thinking in business,⁵ arguing for a strengthened role of the creative arts in education, or demonstrating the value of design research itself.⁶

The notion of value is the entry point for developing the economics-oriented study of the design-economy nexus. This is no coincidence. Different schools of thought in economics dispute different conceptions of value.⁷ A key intervention comes from John Heskett. As Clive Dilnot suggests, Heskett's *Design and the Creation of Value* stands out for "tak[ing] seriously the relation between design and economics."⁸ Heskett outlines neoclassical and mainstream ideas from the Austrian school of thinkers and institutionalist perspectives, as well as more recent New Growth Theory developments. He suggests that the standard neoclassical account fails to adequately gauge the value of design.⁹ Nevertheless, New Growth Theory makes it possible to conceive of design "as an activity that is integral to converting technological opportunity into innovative reality."¹⁰

This article also explores another route to the intersection of design and economics, connecting design studies with developments in economic sociology. Such a repositioning sheds new light on the nature of markets, industry, and the politics of innovation—claims that constitute the main contribution of the article.

Much like Caliskan and Wade's contributions to this journal,¹¹ the argument starts with Michel Callon's influential economic sociology.¹² This involves the concept of externality and how markets deal with adverse side effects of economic activities. It highlights how market economies presuppose a particular type of design process that emerges in the context of externalities. In this view, markets are characterized by *competition* among existing goods and by collective *contestation* of the very meaning and social viability of any given good.¹³ While markets coordinate the supply and demand of goods, they also coordinate the collective re-imaginings of what a good can and should be. Thus, the argument of this article involves a broad conception of design. This conception does more than imply a specific design phase during product or service development. In this article, design implies a wider transformational process that includes assigning new meanings to—as well as achieving social, economic, political, and cultural viability for—objects.¹⁴

The argument of this article is structured in a specific way. First, it presents a brief vignette suggesting that we can examine economic systems by studying how a particular good or artifact has been designed in them. It then reviews key principles about the functioning of markets using both

- Helmer Poggenpohl, "Blindspots in Economics and Design: A Review of John Heskett's *Design and the Creation of Value*," *She Ji: The Journal of Design, Economics, and Innovation* 3, no. 4 (2017): 251–61, <https://doi.org/10.1016/j.sheji.2018.02.002>.
- 9 John Heskett, *Design and the Creation of Value* (London: Bloomsbury, 2017), 75–76.
- 10 Ibid., 141.
- 11 Koray Caliskan and Matt Wade, "DARN (Part 1): What Is Strategic Design? Social Theory and Intangible Design in Perspective," *She Ji: The Journal of Design, Economics, and Innovation* 8, no. 3 (2022): 299–318, <https://doi.org/10.1016/j.sheji.2022.10.001>; Koray Caliskan and Matt Wade, "DARN (Part 2): An Evidence-Based Research and Prototyping Method for Strategic Design," *She Ji: The Journal of Design, Economics, and Innovation* 8, no. 3 (2022): 319–37, <https://doi.org/10.1016/j.sheji.2022.11.002>.
- 12 Michel Callon, ed., *The Laws of the Markets* (Oxford: Blackwell Publishers, 1998).
- 13 Following the work of Callon, it is imperative to not interpret terms like "contestation" or even "politicization" as processes necessarily tied to government intervention in markets. The specifics of this point will become evident below.
- 14 For a more management-oriented description of this approach, see Roberto Verganti, *Design-Driven Innovation: Changing the Rules of Competition by Radically Innovating What Things Mean* (Boston: Harvard Business Press, 2009).
- 15 Dilnot, introduction to *Design and the Creation of Value*, 2–3.
- 16 Weber, "What Is Good for General Motors."
- 17 Pelle Ehn, *Work-Oriented Design of Computer Artifacts* (Mahwah, NJ: Lawrence Erlbaum Associates, 1988).
- 18 John Kay, *The Truth about Markets: Their Genius, Their Limits, Their Follies* (London: Allen Lane, 2003), 17.
- 19 Ibid., 18.
- 20 Karl Marx and Friedrich Engels, *The Communist Manifesto* (1848; London: Penguin, 2014), 222.
- 21 Joseph Schumpeter, *Capitalism, Socialism and Democracy* (1942; London: Routledge, 1976), 84.

economics and economic sociology. This article explores these principles by using a case study. Like Dilnot¹⁵ and Weber,¹⁶ the text discusses the paradigmatic consumer good of the 20th century—the automobile—recounting the emergence of car safety design in mid-twentieth century Sweden. As such, the case engages with work in the Scandinavian tradition of participatory design.¹⁷ The article goes on to analyze the case, paying particular attention to what it tells us about the nature of markets, firms, and the politics of such design processes. The article concludes with a discussion of why design scholars should study this phenomenon and presents two suggestions on how to continue this line of inquiry.

Market Economies and the Problem of Externalities

In *The Truth about Markets*, economist John Kay outlines the fundamentals of economics through anecdotes from ordinary people across the world. Kay states that the "economic lives of individuals are the product of the systems within which they operate" and claims that "no modern experience illustrates this as starkly as the difference between the economic lives of the brothers Friedrich and Heinz."¹⁸

Kay's story tells of two brothers born in 1930s Germany, whose fates are shaped by ending up on different sides of the Iron Curtain. Though they make similar life choices—marrying early and becoming engineers—they come to lead different everyday lives.

"When the Wall came down in 1989, Heinz, like millions of other Easterners, drove his Trabant into the Western zone to see for himself. He had heard that the range and quality of goods in the shops was far superior: now he knew it was a reality. His clothes, his furniture looked shabby compared with Friedrich's: his cramped apartment in a barracks-style block hardly matched Friedrich's semi-detached house with garden. When Heinz described the equipment he used at work, Friedrich laughed."¹⁹

The story reflects the proposition that "the division of Germany into two economic zones was the nearest approach ever made in social science to a controlled experiment." Scholars can assess the relative merits different economic systems. Indeed, the product-versus-product comparison between Western and Eastern designs makes such comparisons extraordinarily concrete: What are the hands-on differences in the material realities of the two brothers? It also suggests that design processes can teach us about different economic systems. Heinz's Trabant was widely recognized as unsafe—at least compared to Western European automobiles. So, what can we learn from the innovation processes that made Western cars safer?

The frenzied nature of Western-style capitalism—its capacity to produce incessant innovation—is a long-standing theme in economic thought. The great figures of classical political economy described the process in memorable ways. Karl Marx wrote, "All that is solid melts into air."²⁰ Joseph Schumpeter characterized this process as a "perennial gale of creative destruction."²¹ More recently, economist William Baumol echoed these sensibilities, suggesting that the ability to foster innovation distinguishes

- 22 William J. Baumol, *The Free-Market Innovation Machine: Analyzing the Growth Miracle of Capitalism* (Princeton: Princeton University Press, 2002), 4–5.
- 23 Kay, *Truth about Markets*, 249.
- 24 Ronald Coase, "The Problem of Social Costs," *Journal of Law and Economics* 3 (October 1960): 1–44, <https://www.jstor.org/stable/724810>.
- 25 Callon, *Laws of the Markets*.
- 26 Michel Callon, "An Essay on Framing and Overflowing: Economic Revisited by Sociology," in *The Laws of the Markets* (Oxford: Blackwell Publishers, 1998), 244–69.

capitalism from other economic systems. Baumol identifies five key properties of capitalism that boost innovative potential. These are oligopolistic competition; routinization; productive entrepreneurship; the rule of law; and technology-selling and trading.²² This article reviews the emergence of car safety innovations in Sweden and the United States, proposing that we add one further economic system property to Baumol's list. Automotive safety innovations emerged from design processes that traversed the boundaries of business and non-business entities, notably civil society organizations. We can't reduce the apparent superiority of Western products to the conditions of free enterprise and private property rights. The freedom of association also had a role to play—that is, the freedom to build independent, competent, and resilient civic organizations.

To describe the invention of car safety in economic terms, it is useful to start from classical and neoclassical accounts of how markets function. For centuries, Adam Smith's notion of an "invisible hand" creating order without deliberate planning was mere speculation, albeit speculation with predictable outcomes. Aided by mathematics, advances in economics transformed the speculative state of affairs to verify Smith's intuitions. Indeed, if one accepts assumptions regarding stable preferences and perfect information, it is possible to show mathematically that markets are efficient mechanisms for coordinating the supply and demand of goods and services. This proposition lies at the heart of the general equilibrium approach, which in turn is a part of neoclassical economics. Even though it fails to account for change and dynamism, this tradition serves as a foundational approach to describing the principal merits of markets.

However, neoclassical proof of the efficiency of markets is only valid if there are no "externalities"—the economic term for side effects that are not factored into the market relation. Externalities occur, for example, when a polluting factory fails to compensate those affected by the pollution. The market does not account for a benefit that accrues to the factory owners at the cost of those affected by pollution, possibly unwillingly and certainly without the choice made explicit in a market transaction. As John Kay points out: "If there are externalities, there can be no perfectly competitive equilibrium and the fundamental theorems of welfare economics do not hold."²³ A market that spawns unmanaged externalities is a failed market. Thus, markets cannot function properly unless adverse side effects of economic activities are identified and managed. Bringing the side effect into the market relation, for instance through economic compensation, makes externality into an internality. Back to the polluting factory: If the factory owner is made to pay for the pollution, the externality has been transformed into an internality. In economics terminology, the externality is "internalized," and market efficacy is restored.²⁴

Sociologist Michel Callon seizes this phenomenon in his 1998 edited volume *The Laws of the Markets*.²⁵ Using the twin concepts of "frames" and "overflows," he demonstrates how markets are not creatures of nature—they are artifacts, objects of design, requiring a host of activities to stabilize traded goods and facilitate calculative behavior among economic actors.²⁶ A "frame" delineates internalities—all the factors considered in a market

- 27 Here, the influence of Callon's previous work in Science and Technology Studies is evident.
- 28 Below, the article will engage with more recent developments in the economic sociology that has emerged in the wake of Callon's 1998 intervention.
- 29 Alexandre Mallard and Michel Callon, "From Innovation to Markets and Back. A Conversation with Michel Callon," *Sociologica* 16, no. 3 (2022): 163, <https://doi.org/10.6092/issn.1971-8853/16399>.
- 30 J. Bradford DeLong, *Slouching towards Utopia: An Economic History of the Twentieth Century* (New York: Basic Books, 2022), 395.
- 31 The case study outlined in this section is a truncated version of a longer form description in Karl Palmås, *ReVolvolutions: Innovation, Politics and the Swedish Brand* (PhD dissertation, the London School of Economics and Political Science, 2005), chapter 4.

relation—and the externalities of a certain market relation. "Framing" is a socio-political process to establish the boundary between what counts—and what does not count—in a market relation.

If economic activity produces side effects that "overflow" beyond the established frame, a renegotiation of the frame may ensue. If successful, the market arrangement has been "reframed." Frames are therefore transient. Markets mutate as established frames draw attention to new, unexplored externalities. This process depends on knowledge (in part scientific) about overflows, as well as detection and measurement technologies.²⁷ As such, Callon critiques neoclassical economics for neglecting the role of devices and technologies in the construction of both supply (stabilized, framed, and priced goods) and demand (the calculative economic agent).²⁸

The dynamic of framing and overflowing is the analytical entry point to the empirical case that this article presents in the next section. Callon's framing and overflowing dyad hints at an irresolvable tension that drives constantly evolving markets. Unlike neoclassical economists, Callon avoids talking about externalities and overflows as market "failures" subject to corrections. In a recent interview, he describes how the market process is constantly propelled by new concerns:

"Taking one matter of concern in hand leads to the implementation of new framings, which in turn are sources of more overflowing. No markets without failures. Markets work because they fail."²⁹

This suggests that market process gets impetus from the divergent concerns about goods and their broader societal effects. This goes beyond standard accounts of markets as intermediary spaces in which supply meets demand. The market process is not only about *competition*, but it is a process of constant reframing too. In other words, markets entail a *contestation* of the meanings and social viability of products and services. Here, Callon's work dovetails with the broad conception of design outlined above.

This leaves a question to be answered. How does market contestation function in practice? How are markets reframed? The next section of this article reviews the history of car safety. Car safety concerns entered the market "frame" and safety became the responsibility of carmakers.

Reframing the Auto Market: Designing a Safe Car

Historians sometimes speak of Western economies having a "glorious thirty years"³⁰ of progress following the Second World War. Mass-production created a virtuous circle of growth, creating a surge in productivity, leading to higher wages and increased consumption. However, productivity gains saturated domestic markets, creating pressure to sell excess goods abroad. Swedish carmaker Volvo reached domestic market saturation in the early 1950s. By this time, Volvo's national competitor Saab had grown to claim a large share of the Swedish market. Volvo had to export.³¹

There was, however, one problem. Volvo's key capability—building sturdy, somewhat clunky automobiles—was more of a liability than an asset in foreign markets. Germans, Italians and not least Americans all

- 32 If other sources are not cited specifically, this section is based on the following monographs: Rune Andréasson, Jonas Gawell, and Sven Gerentz, *Bilismens genombrottsår i Sverige* (Uppsala, Sweden: Uppsala Publishing House, 1997); Rune Andréasson and Claes-Göran Bäcklund, *Bilbältet: Svenskt utvecklingsarbete för global bilsäkerhet* (Stockholm, Sweden: Kulturvårdskommittén, Vattenfall, 2000).
- 33 The received wisdom — as well as the science — of the time stated that 90% of all motoring accidents were the result of human error, and that another five percent were caused by a poorly engineered traffic environment.
- 34 The expression “nut behind the wheel” — signifying a reckless driver — is taken from Ralph Nader, *Unsafe at Any Speed: The Designed-in Dangers of the American Automobile* (New York: Grossman, 1965).
- 35 Motorist interest groups were dismissive towards the concept of car safety, its director stating that “car safety is not a clearly defined concept.”
- 36 Andréasson and Bäcklund, *Bilbältet*, 14. The argument that seatbelts may be dangerous, as they may incite risk-prone behavior, would later be rehearsed by economist Gordon Tullock.
- 37 Andréasson and Bäcklund, *Bilbältet*.

had distinct car buying preferences — clunkiness was not one of them. Country-specific inclinations were better accommodated by homegrown brands that already dominated Volvo’s target markets. Volvo could not out-engineer the Germans or outsize the Americans. Incoming Volvo CEO, Gunnar Engellau needed a new sales pitch. And he found it among the activists concerned about the negative side-effects of the very product he was selling.

Inventing Car Safety

During the first half of the 20th century, automobile ownership had steadily risen, and so had the number of traffic accident victims. Higher speeds and faster acceleration, along with ever more cars on the roads proved to be an increasingly lethal combination. Nevertheless, it may be misleading to say that this “proved to be” the case. Statistics on car crashes and casualties were scarce. Moreover, there was little knowledge about the impact of road accidents on car occupants or pedestrians.

Governing automotive safety had been discussed since the thirties but focused on driver conduct and road improvements. Interest groups such as the Swedish National Organization for Furthering Traffic Safety (NTF) actively campaigned for better roads and speed restrictions. Safety concerns revolved around macro-planning the *infrastructural context* of motoring. It did not focus on the automobiles themselves.³² Caring for human safety in traffic was the responsibility of the individual citizen and the state.³³ Car-makers were not expected to make up for the irresponsible behavior of the proverbial “nut behind the wheel.”³⁴

Dr. Stig Lindgren, a Swedish surgeon who had seen first-hand the extent of bodily harm caused by traffic accidents rejected this premise. He argued that more must be done — safer roads and responsible driving were not enough. From the 1940s on, Lindgren frequently spoke publicly on the issue, but he was regarded as a radical. With no way of gauging the dangers of motoring — no reliable accident statistics, crash test results, or safety features — misgivings about automobility were dismissed as reactionary and moralistic.³⁵

Attitudes were similar in the United States. Since the early 20th century, there had been scattered attempts to redesign automobiles with safety in mind. Early efforts involved dashboards stuffed with padding, but American inventors soon developed various harnesses and straps. However, car seatbelts met with serious opposition — the confederation of United States carmakers deemed them unethical. After all, there was no proof that they mitigated injuries; they were even thought to *cause* injuries.³⁶ Ford’s attempt to sell a car that featured optional seatbelts failed miserably in 1955. Car buyers opted for General Motors (GM) that year, as restrictive seatbelts did not chime with the freedom that cars were supposed to deliver. Moreover, some buyers were suspicious of Ford’s motives — a car that needs seatbelts must be flawed. This cemented a prevailing belief that cars provided harmless freedom to modern everyday life.³⁷

Activists like Dr. Lindgren lacked the science and technology to provide a basis for their argument. There were no reliable statistics to prove

38 By the 1953 version I refer to the 1953/1954 version of the model. At this time, Volvo cars were not changed on a yearly basis, but every other year.

39 "PV444," promotional material, 1953.

40 "Sommarbil – vinterbil," promotional material, 1956.

skyrocketing traffic casualties. Efforts in the United States had been equally futile. Neither discourse, nor technological alternatives were enough to spur change. Instead, the complementary mix of science, design, marketing, and activism led to change.

Prior to Engellau becoming CEO, Volvo had cautiously spoken about safety. Promotional material³⁸ for the 1953 PV444 model uses the word "safety" several times—surprising given that safety was a taboo topic for other car manufacturers. The copywriters trod gently, avoiding alarmism and maintaining feelgood jargon that characterized advertising of the day. To both justify and neutralize the stigmatized s-word, the publication mutely adds: "... in case something should happen."³⁹ A full page is dedicated to safety features. "Safety is built into the car," proclaims Volvo pointing to:

- Safety brakes
- Self-supporting safety body
- Driving indicators (which were not standard at this time)
- Door locking mechanism, preventing the door opening while the vehicle is in operation
- Rock-proof windscreen
- Robust front body

Several attributes described as safety features were old design solutions, previously peddled through other rationales. Brakes were now "safety brakes" rather than "quality brakes." The self-supporting body was touted as a weight-saving solution to counter criticism of Volvo's notoriously high vehicle weights. Also, a rock-proof windscreen and robust front body were properties of the sturdy-car-concept that Volvo had already developed. The same phenomenon is apparent in another Volvo publication, released in 1956, which focuses on PV444's winter abilities. Being "winter-friendly" had previously implied reliability. By 1956, winter-friendliness meant safety.⁴⁰ Thus, early safety efforts were discursive, rather than tangible. They did not imply new design features, but rather changes in how automobiles were discussed and marketed. New features would materialize, but in a distinctly collaborative fashion.

The Design of the Three-Point Seatbelt

Engellau became Volvo CEO in 1956 and developed the car safety agenda as a deliberate strategy with which to pursue the US market. Volvo established itself as a laboratory for the new science and technology of car safety, inventing safety-specific features. In the 1957 models—the first cars that Engellau was formally responsible for—Volvo supplied fasteners for seatbelts in the PV444. In the subsequent year, two-point seatbelts became standard features. This risky move—again, Ford created an outcry by merely providing them as an optional extra—was spurred by outside incidents that generated a productive collaboration. Engellau's wife Margit was a nurse, whose father, a doctor, was well-connected within the medical community. It was through this community that the Volvo CEO, Engellau came to know the road safety activist surgeon, Dr. Lindgren. In 1956, they agreed to make Volvo "the Safe Car" by actively promoting the use of seatbelts.

41 *Ratten* (Volvo's intra-corporate magazine), no. 3, 1982.

42 This new type of seatbelt was considerably more effective than the "two-point seatbelt" supplied in the 1958 models, as it had a three-point attachment system. This arrangement — one belt across the pelvis, and one diagonally across the torso — served to distribute the load on the body in the event of a crash.

43 Andréasson and Bäcklund, *Bilbältet*.

Volvo's core capability — building sturdy cars — was turned into a potential sales proposition. Car safety was not yet a desirable property — not in Sweden, nor abroad. Engellau was aware of the previous failings of selling safety and knew that any safety strategy would have to work against the *zeitgeist*. His plan had two unique traits: First, the strategy not only changed market perceptions of Volvo, it changed the way people perceived cars and motoring as a whole. Secondly, the original idea and resources of the plan did not come from within Volvo, nor from any commercial partner or competitor. Instead, the strategy and its implementation came via alliances with civil society actors.

In 1958, Engellau hired a "Chief Safety Engineer" to develop new, safety-specific features to sell car safety in the USA.⁴¹ Such a role — directing research and development efforts related to car safety — had never existed in the automobile industry. It was one of the first steps to construe car safety as a new scientific and engineering discipline. One year on, a full-scale Department of Automotive Safety had been created, supposedly inventing the so-called "three-point seatbelt."⁴² Volvo patented aspects of the design, establishing itself as a hothouse for a new science and technology of car safety. Nevertheless, the development of Volvo's seatbelt was hardly an intra-firm, intra-business affair. Instead, the story involves a vast network of designing actors.

The harness experiments conducted by American inventors and car-makers play a part, but Volvo's seatbelt story starts in the late 1940s, among workers in the forests of rural Sweden. Swedish energy utility, Vattenfall, employed a large, principally car-borne set of workers, who maintained an electricity network stretching across the vast countryside. The labor was demanding and often dangerous. As a state-owned utility, Vattenfall compiled work injury statistics. In 1953, casualties caused by car crashes had soared, and by 1955 more employees lost their lives while driving to work than in site accidents.

Vattenfall's work safety inspector was a keen supporter of seatbelts. Having failed to source designs from on-the-fence carmakers, Vattenfall began its own seatbelt development. In 1955, its engineering team enrolled Dr. Lindgren in development centering on seatbelt load distribution. The solution involved a nylon mesh material that stretched somewhat on impact and a third fastening point for the belt. The additional fastening point formed two loops — one across the pelvis and one diagonally across the torso. Dubbed the three-point seatbelt, it was subsequently adopted by Volvo.⁴³

The work of Vattenfall's engineers mushroomed into the development of safety research methods using crash tests and crash test dummies. By the mid-1950s, Vattenfall's three-point design was certified as a standard. Then, independent manufacturers started producing seatbelts. In the early 1950s, Vattenfall approached Volvo intending to sell its innovation, but this was prior to the car manufacturer's engagement with medical community activists. The embrace of such designs only emerged a couple of years later, when a trust-based collaboration between Volvo and Dr. Lindgren's activist community had been forged.

- 44 Ralph Nader, "The Safe Car that You Just Can't Buy," *The Nation*, April 11, 1959, 311, available at <https://www.autosafety.org/wp-content/uploads/2016/06/safecaryoucantbuy1959.pdf>.
- 45 Andréasson et al., *Bilismens genombrottsår i Sverige*, 81.
- 46 Nader, *Unsafe at Any Speed*.

The seatbelt's journey from Vattenfall into Volvo's cars suggests that this design process featured an extensive network of activist medical professionals, union bosses, safety inspectors, and corporate executives. In the context of the United States, Volvo's efforts were supported by famous activist, Ralph Nader. In 1959, the year Volvo first supplied the three-point seatbelt as standard, Nader (then a young Harvard law graduate) published an article in *The Nation*. He outlined emerging accident statistics, suggesting that Detroit was "designing automobiles for style, cost, performance, and calculated obsolescence, but not ... for safety."⁴⁴ His continued investigation led to *Unsafe at any Speed*, his 1965 inquiry into the lack of safety of a General Motors sports car. The criticism had considerable impact — not only in the United States, but also in Sweden.⁴⁵

Unsafe at any Speed spelled out the new, worrying traffic casualty statistics to the American public. Nader argued that "the public has never been supplied the information ... to make effective demands" on carmakers.⁴⁶ The book debunked the manufacturer's claims that nothing could be done about traffic hazards. Nader accused General Motors of committing "one of the greatest acts of industrial irresponsibility in the present century," because it had failed to use available safety measures. He was referring to safety belts. Nader's efforts were a continuation of the process instigated in Sweden ten years earlier. New designs had shown that motoring could be made safer, allowing Nader to state that failure to add such design features was a conscious choice — those vehicles without safety features carried "designed-in dangers." In other words, the very existence of such safety designs imposed a moral obligation on the carmakers.

The story of the invention of car safety suggests that while the design of safety features can be attributed to specific companies, they were the result of a process in which civil society activists, medical professionals, unions, state utilities, and other actors participated. It is noteworthy that Swedish state regulators were slow movers, establishing binding legislation long after the roll-out of safety designs. The imperative to regulate can only emerge once new designs have been developed. The next section of this article elaborates on the significance of this design process.

Design between Passions and Interests: Markets, Firms, and Politics

This section focuses on three questions. First, what is the relation between design, reframing, and the making of markets? Second, what can this reframing case study tell us about the relation of business and its boundaries to external, non-business actors? Third, what is the role of power dynamics and political economy in relation to design processes?

First, let us return to the theoretical framework about *markets*. Designing the safe car is a story about reframing the automobile market. In this social process, various actors pointed to side effects — externalities — that had emerged in the automobile market. Individual victims of unsafe motoring were not compensated, nor were the societal costs of traffic hazard accounted for in the manufacturing and sale of automobiles. The facts of this

- 47 Callon, "Essay on Framing and Overflowing."
- 48 Koray Caliskan and Michel Callon, "Economization, Part 1: Shifting Attention from the Economy towards Processes of Economization," *Economy and Society* 38, no. 3 (2009): 369–98, <https://doi.org/10.1080/0308514090320580>; Koray Caliskan and Michel Callon, "Economization, Part 2: A Research Programme for the Study of Markets," *Economy and Society* 39, no. 1 (2010): 1–32, <https://doi.org/10.1080/03085140903424519>.
- 49 The most recent formulation of this approach is found in Michel Callon, ed., *Markets in the Making: Rethinking Competition, Goods and Innovation*, trans. Olivia Custer (Princeton: Princeton University Press, 2021).
- 50 Caliskan and Callon, "Economization, Part 2," 3.
- 51 Here, it is instructive to think of the term "arrangement" as both a noun and a verb; the market as a composite entity that is constantly being subject to re-organization.

matter were increasingly settled by a network of social actors, and the externality of accidents was internalized into the market relation. New design features emerged to compensate for hazards, in turn placing new demands on manufacturers. From the perspective of mainstream economics, the emergence of externalities made the automobile market into a failed one—and the reframing of the market implied that market effectiveness has been restored.

This reading of the case highlights a perspective asserting that the restoration of market order is always fleeting. Indeed, this is in line with Callon's comment on market "failures." In car safety, new concerns tend to emerge continuously. The automotive market is constantly subject to new safety-related reframings—consider all the new safety designs since the seatbelt. This is not the only externality associated with automobility. There is also the monstrous externality of automobile-based CO2 emissions as a major factor in anthropogenic climate change. The automotive market is being reframed in relation to *several contentious issues* at once. Imagine the plethora of actors involved in the myriad reframings occurring in today's automobile industry—all partaking in a process of contestation, operating alongside competing carmakers. As Callon points out, framing always causes overflowing.

The economic sociology that emerged in the wake of Callon's 1998 essay⁴⁷ emphasizes this process-related characteristic of markets. We can view the invention of car safety in the context of what Caliskan and Callon call "marketization."⁴⁸ This term highlights the process of constructing and maintaining markets.⁴⁹ Their 2010 article outlines the concept, pointing out that marketization involves the "conception, production and circulation of goods."⁵⁰ On this fundamental level, the case shows how design clearly contributed to the conception of automobile fitted with a three-point seatbelt. However, more fundamentally, design processes were also a part of another aspect of marketization. This was the "arrangement of heterogeneous constituents." These include:

"Rules and conventions; technical devices; metrological systems; logistical infrastructures; texts, discourses and narratives (e.g. on the pros and cons of competition); technical and scientific knowledge (including social scientific methods), as well as the competencies and skills embodied in living beings."⁵¹

Again, the automotive market shows that the design process concerns the actual good, a host of devices (such as crash test dummies), and knowledge artifacts (such as accident statistics). All of these contribute to market reframing.

Second, the safe car design story tells us something about the nature of *business firm*. In many ways, the case study sits uneasily with mainstream economics accounts of the modern firm. Reframing the market and developing new features such as the seatbelt involved a design process that traversed corporate and societal boundaries. Moreover, it transgressed professional calculation and personal passions. Neoclassical economics, on the other hand, tends to portray firms as monolithic, black-box entities.

- 52 Michael Parkin, *Economics* (New York: Addison Wesley, 1990), 224.
- 53 *Ibid.*, 242.
- 54 Don Slater and Fran Tonkiss, *Market Society: Markets and Modern Social Theory* (London: Polity Press, 2001), 29–33.
- 55 Ronald H. Coase, "The Nature of the Firm," *Economica* 4, no. 16 (1937): 386–405, <https://doi.org/10.1111/j.1468-0335.1937.tb00002.x>.
- 56 Edith Penrose, *The Theory of the Growth of the Firm* (Oxford: Basil Blackwell, 1959).
- 57 Alfred D. Chandler, *The Visible Hand: The Managerial Revolution in American Business* (Cambridge, MA: Harvard University Press, 1977).
- 58 Here, the term "collective intentionality" denotes a political intention for governing markets, which emerges in public discourse among actors such as civil society organizations, lobbying groups, politicians, activists, intellectuals, and the like.
- 59 Adair Turner, *Just Capital: The Liberal Economy* (London: Macmillan, 2001), 376–77.
- 60 Bruno Latour, *We Have Never Been Modern* (Cambridge, MA: Harvard University Press, 1993).
- 61 For an account of the historical origins of these separations, see Albert O. Hirschman, *The Passions and the Interests: Political Arguments for Capitalism before Its Triumph* (Princeton: Princeton University Press, 1977).

In economics textbooks, students learn that a firm is "an institution that organizes the production of goods and services."⁵² Neoclassical economists simulate the role of firms in markets through "the production function"—a mathematical formula that states how a firm's output changes in relation to changes in its input, i.e., labor and real capital.⁵³ Since this framework construes markets as a mode of economic coordination that guarantees the generation of maximum utility, firms are seen as apolitical, asocial machines that produce this abstract utility. This makes evident the utilitarian roots of classical liberalism.⁵⁴ Ronald Coase's theory⁵⁵ provides richer accounts; it states that firms exist to minimize transaction costs. Edith Penrose's account of firms states that they depend on unique, hard-to-copy resources, enabling companies to extract rents.⁵⁶ Both accounts depict an entity delineated from surrounding society.

Economic history shows how this conception of the firm has been institutionalized. The modern corporation emerged through the establishment of a new cadre of salaried managers.⁵⁷ As non-owners, it was imperative to shed personal passions and ideals. Managers were to be professionals with the objective good of the firm in mind, focusing on profitability and long-term capital growth. The classical liberal model of arranging economic affairs involves separating the effectiveness of the corporation from the collective intentionality of the political system.⁵⁸ British economist Adair Turner explains the separation this way:

"The good society is delivered by a robust tension between politically defined constraints and the self-interest and animal spirits of business and entrepreneurs, and it is not always wise to muddy those roles.... Capitalism flourishes within a clearly understood role for the state as the definer and implementer of wider social objectives."⁵⁹

As car safety shows, there is no tidy separation between state-led and activist-led political intentionality on the one hand and self-interested corporate professionalism on the other. The design process traversed this modern separation. Bruno Latour argues that modernity is characterized by a systematic misrecognition.⁶⁰ Moderns posit a world in which pure objects (residing in Nature) are disentangled from pure subjects (residing in culture). However, real-world modernity is full of impure, entangled entities. Moreover, the harder moderns try to construct a world of purity, the more they simultaneously construct impurities, albeit unofficially. These impurities are "hybrids" that mediate between objects and subjects, between Nature and culture. Nevertheless, such hybrids are never recognized, which creates a false impression that nature and culture can indeed be successfully separated.

We can transpose this onto economic matters. The modern view of the economy is one in which a naturalized market consists of pure, monolithic "production functions" and professionalized self-interest. We separated this from the passions, politics, and intentionality of wider cultural life.⁶¹ However, as the Volvo case shows, all manner of activities span this divide. Reframing requires hybrid activities that sit uneasily with the modern conception of strict separation between business and politics. Nevertheless,

- 62 Ehn, *Work-Oriented Design of Computer Artifacts*.
- 63 *Ibid.*, 4, italics added.
- 64 Otto von Busch and Karl Palmås, *The Corruption of Co-design: Political and Social Conflicts in Participatory Design Thinking* (New York: Routledge, 2023); Otto von Busch and Karl Palmås, "Design Is ... Corrupting," *The Design Journal* 26, no. 3 (2023): 1–4, <https://doi.org/10.1080/14606925.2023.2200295>; Otto von Busch and Karl Palmås, "Social Means Do Not Justify Corruptible Ends: A Realist Perspective of Social Innovation and Design," *She Ji: The Journal of Design, Economics, and Innovation* 2, no. 4 (2016): 275–87, <https://doi.org/10.1016/j.sheji.2017.07.002>; Karl Palmås and Otto von Busch, "Quasi-Quisling: Co-design and the Assembly of Collaborateurs," *CoDesign* 11, no. 3–4 (2015): 236–49, <https://doi.org/10.1080/15710882.2015.1081247>.
- 65 This, of course, is recognized by Ehn, who states that "trade unions, as most large organizations, exhibit contradictions in terms of their internal democracy, and with regard to oppression of weaker groups and minorities." See Ehn, *Work-Oriented Design of Computer Artifacts*, 4.
- 66 Caliskan and Callon, "Economization, Part 2," 3.

these kinds of hybrid connections are imperative for the very functioning of the modern market arrangement.

Finally, the story of Volvo and car safety tells us about the *politics* of such design processes. Set in a period in Swedish economic history when social democracy reigned supreme, design scholars may view it through the lens of previous work within the tradition of Scandinavian participatory design. Often associated with Pelle Ehn,⁶² this tradition emerged from an interest in how workers participate in design-led innovations to reshape their workplace. There are, of course, notable differences between the 1950s story presented in this paper, and Ehn's influential projects of the 1970s. The invention of car safety emerged spontaneously. It was the result of contingencies and coincidences without the aid of a participatory designer. In contrast, Ehn's participatory projects were deliberately designed.

Nevertheless, the story of car safety is recognizably aligned with the political-economic reality that engendered participatory design tradition. Like Ehn's projects, seatbelt design amounted to a "Scandinavian *work-oriented* challenge to design."⁶³ "Work-oriented" is in italics because safety only became an issue when it was recognized as a work-related issue.

From this, two points emerge. First, a realist approach provides crucial insights when analyzing the social stakes of design.⁶⁴ Design processes feature large numbers of participants and are rife with politics. The social context in which they unfold may privilege the externalities that impact some groups, while disregarding those that impact others.⁶⁵ This realist rendering of design chimes with Caliskan and Callon's point about how markets "construct a space of confrontation and power struggles [in which] contradictory definitions and valuations of goods as well as agents oppose one another."⁶⁶

A second related point concerns socio-economic context. This takes us back to John Kay's story about Friedrich and Heinz: Economic systems matter. For car safety design, the specifics of Sweden's post-war economic system very much mattered. In other socio-economic systems, with other entrenched power settlements, other design process outcomes may unfold. So, in analyzing this mode of design, scholars must pay attention to existing infrastructures for doing research on overflows. In the case of car safety, Vattenfall—and its worker safety focused research and development—was imperative. As we will see in the concluding section, this question of context is a productive avenue for future research on this phenomenon.

Concluding Discussion

This article suggests that the problem of externalities is a productive starting point to interrogate the relations between design, economics, and innovation. More specifically, the reframing of markets—the collective process in which goods are contested and reimagined—is a design process. This perspective—borrowed from economic sociology—sheds new light on the nature of markets, the business firm and the politics of design-driven innovation. This final section explores the future studies these propositions

- 67 Guy Julier, *Economies of Design* (London: Sage, 2017), 3.
- 68 Victor J. Papanek, *Design for the Real World: Human Ecology and Social Change* (Chicago: Academy of Chicago, 1971), 3.
- 69 Herbert A. Simon, *The Sciences of the Artificial*, 3rd ed. (Cambridge, MA: MIT Press, 1996), 111.
- 70 Caliskan and Wade, "DARN (Part 1)."
- 71 Palmås, *ReVolutions*, chapter 5.
- 72 Karl Palmås and Nicholas Surber, "Between Consultancy and Advocacy: The Politics of Anticipating Future Regulation" (paper, presented at Anticipation 22: 4th International Conference on Anticipation, 4 November, 2022), available at <https://research.chalmers.se/en/publication/532939>.

may stimulate. However, it is first worth discussing why this economic phenomenon should be a concern for design scholars. Why not leave it to economic sociology or Science and Technology Studies (STS)?

There should be room for many approaches to studying the reframing and design in marketization. Scholars in and around design may provide particularly rich accounts of these processes. For one, the phenomenon engages the fundamentals of design. As Guy Julier puts it, design "points towards the possible [and] shows what it is *in potential*."⁶⁷ Similarly, the reframing of a market is a collective charting of future possibilities. It offers an opportunity to collectively explore what Victor Papanek terms "desired, foreseeable end[s]"⁶⁸ and what Herbert Simon terms "preferred situations."⁶⁹ Design scholars skillfully navigate such maps of diverging futures, while remaining alert to material processes that engender new artifacts. Moreover, by recognizing these socio-economic processes as a matter of design, productive research engagements may emerge between design researchers and scholars in economic sociology or Science and Technology Studies. The recent work of Caliskan and Wade suggests that this development is already under way, staking out a new path between design and the social sciences under the heading of DARN (devices, actors, representations, and networks).⁷⁰

Car safety illustrates how design processes animate the making of markets. However, it is a case study from a particular time and place. Further development of this line of inquiry requires thinking about these processes beyond this specific context, shifting the parameters of time and place.

This means moving from historical case studies to contemporary ethnographic examples. In contrast to 1950s Sweden or the 1970s Sweden studied by Ehn, today's European and North American economies are less influenced by state authorities and unions. Reframing processes today are more likely to involve non-government organizations (NGOs). NGOs are Latourian hybrids *par excellence*, traversing the boundary between corporate professionalism and political passions. Indeed, some assume the dual roles of corporate consultant and advocacy group.⁷¹

How such organizations negotiate the realm of future possibilities is of particular interest. Borrowing Papanek's terminology, such NGOs construct with future scenarios that are objectively "foreseeable" and subjectively "desired." Their aim is to convince corporate partners that their vision of the future is an inevitability. For example, Swedish NGO ChemSec regularly publishes a list of dangerous chemicals deemed likely to be banned in a not-too-distant future. The goal of this list is to alert companies and investors to reduce the use of listed chemicals.⁷² While this activity seeks to objectively *describe* future changes in regulation, the organization also seeks to *drive* the changes in regulation. ChemSec thus contributes to reframing the market.

Shifting the parameters of space is perhaps even more productive. Going back to the proposition made in the Friedrich and Heinz vignette — one may examine different economic systems by studying how a particular good or artifact has been designed in them. While this argument has focused on the characteristics of Western capitalism, all economic systems have some way of coping with negative social side effects, as well as with the associated re-imaginings of goods. These design processes are enacted in a plethora of

different economic systems, albeit in radically different ways. In studying these practices of contestation as design, design scholars can contribute to a new understanding of the distinguishing features of different economic systems — past, present, or future.

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There are no conflicts of interest involved in this article.

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