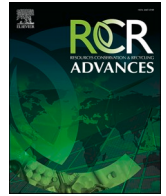


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Industry hybrid regulation: Exploring a model for business-driven circular economy

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ABSTRACT

Government is often seen as the arbiter for environmental protection. Alternatively, firms can volunteer to proactively take collective action toward sustainability, called industry self-regulation. But, what happens when neither of the two alternatives can deliver the expected outcomes? This inductive study addresses such a situation in managing hazardous consumer waste in the province of Ontario, Canada, where waste management and later circular economy have been on the agenda since the 1980s. However, both self- and government regulation failed to spur the advancements required to close material loops effectively and efficiently. Finally, after three decades, actors developed a new path to transition to circular economy. This longitudinal process study focuses on this process to explore the changes in business-policy interactions that realized this transition. I analyze extensive qualitative data, including 55 interviews with top-level decision-makers in all stakeholder groups (businesses, policy-makers, NGOs, consultants, etc.). Based on the unearthed patterns, I propose a hybrid model for regulation. In this model, both business and government coordinate throughout the process to set the rules and enforce them. By allowing organically shaped competition, this model can spur proactivity and innovation, which are crucial for the transition to circular economy but are hard to incentivize in conventional policy-making. The model can be used in any situation where an urgent issue needs immediate proactive responses by business.

1. Introduction

Society is becoming increasingly sensitive to the impacts of business on the natural environment, including the adverse effects of consumed material resources used in products and services. In the dominant “take-make-waste” model, used resources return to nature, often harming the ecology and limiting future resource availability. Emerging models challenge this linear approach. For instance, extended producer responsibility (EPR), product stewardship, industrial symbiosis, and circular economy deem business responsible for the entire material cycles (Beaulieu et al., 2015; Chertow, 2000; OECD, 2016). In recent years, growing attention is paid to developing new models to close the loops (Das et al., 2023).

With such emerging responsibilities, business is increasingly expected to embrace post-consumer products and develop innovative solutions to close the resource cycles. Nonetheless, motivating business to advocate for this responsibility is difficult as it is a challenging and costly endeavor. Except for some companies with particular business models, it is impractical for most firms to collect their used products from

consumers individually, because individual actions by multitudinous producers from dozens of industries are not only extremely costly and inefficient but also fraught with practical challenges in logistics and producer-consumer interactions. Indeed, post-consumer operations have historically been shaped by governments via aggregating all similar used materials, which has laid the institutional foundations for current waste management systems. Thus, managing everyday post-consumer materials seems practical only through collective action by producers. This characteristic makes the emerging responsibility of managing post-consumer materials different from many individual-level environmental responsibilities of business.

Firms' collective actions to protect the natural environment often take the form of industry self-regulation (King et al., 2012; Lee, 2009); however, the realization and efficacy of voluntary self-regulation are uncertain. On the one hand, in the absence of prerequisites of collective actions, such as cooperation and appropriate normative institutions, firms are unlikely to take on new responsibilities voluntarily, actively, and consistently (Bridoux and Stoelhorst, 2022; Lee, 2009; Ostrom, 2000a; Sandler, 2015). Even when a group of firms self-regulate, the

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collective action can become a bare minimal endeavor to forestall regulation or prevent the punitive responses of actors exogenous to the business, such as environmentally conscious consumers (Borck and Coglianesi, 2009; King and Lenox, 2000; Rivera, 2010).

Consequently, governments have gradually intervened and either indirectly coerced or directly regulated business to manage post-consumer materials. Yet government intervention may prove inefficient, too. First, because regulation generally targets individual firms, how can policy-makers efficiently translate the collective problem of waste into individual firms' responsibility, i.e., regulate firms to take collective action? Second, research demonstrates that when minimal collective actions are already shaped voluntarily, government intervention can "crowd out" the action and thereby harm the outcomes (Frey, 1994; Montgomery and Bean, 1999; Ostrom, 2000a). Last but not foremost, regulation often aims to ensure compliance with minimal requirements and hinders motivations for going beyond the policies, yet closing the resource cycles needs costly innovation and continual proactivity. In other words, spurring proactivity through government regulation is a challenging task, let alone when firms need to act collectively.

As such, little is known about the efficient coordination mechanisms to realize the collective responsibility of business to close the resource loops. On the one hand, voluntary self-regulation for innovation-intensive movements such as circular economy is costly. It might not be shaped by business organically, without the involvement of policy, and even if business takes such actions, it might not lead to the expected fast change in the system. On the other hand, government policy may hinder innovation by setting compliance-based requirements on individual firms. Yet innovation is at the heart of circular economy and is frequently overlooked, for instance, by focusing on ordinary recycling efforts rather than groundbreaking solutions to "design out" waste (Iyer-Raniga et al., 2023).

This article is motivated by the field observation that whereas government regulation and self-regulation both proved ineffective in transitioning to circular economy in the context of this research, in recent years, the two alternatives gradually converged and formed an intertwined model; therefore, investigating the interactions of these two alternatives and the emergent hybrid model can suggest better coordination mechanisms to pursue circular economy. Albeit, the influence of government on industry self-regulation has long been noticed in the past literature (Gunningham and Rees, 1997; King et al., 2012; Reeson and Tisdell, 2008), yet the model explored in this research is drastically different from either alternative. At the heart of this case lies the fact that the growing impact, urgency, and complexity of environmental issues create demand for unique solutions that involve both business and government. Addressing such challenges calls for proactive involvement of business and this quality is often lost in the outcomes of either of the two pure solutions, i.e., self-regulation and government regulation. Thus, I aim to answer the question: *How do business and government coordinate their actions when they address collective responsibilities that need proactive responses?*

To explore such a mechanism, I studied the process of household hazardous waste management in the province of Ontario, Canada, which differed radically from waste programs in other Canadian jurisdictions. When the provincial government raised the idea of business's responsibility in managing waste in the early 1980s, for nearly two decades, firms avoided taking consistent voluntary actions to participate. Consequently, the provincial government imposed a stringent collective-level regulation and mandated every individual firm to partake. This collective program was mostly formed or influenced by other actors such as municipal governments. The inefficiency of this coercion led to ongoing confrontations between firms and other stakeholders. As the costs of this regime increased, business gradually tried to take the lead. Also, government noticed that such a prescriptive regime might not result in the innovative solutions that closing resource cycles requires. Thus, the regime gradually transformed from a pure regulatory model to

a hybrid form of policy-making, co-regulated and co-enforced by business and government. This hybrid model is beyond the interactions identified in the past literature (Gunningham and Rees, 1997; Rees, 1988), and I name this model "Industry Hybrid Regulation." The main goal of the research is to unpack this model. To this end, I studied the period between 1981 and 2022, but I particularly zoomed on the hybridization process which evolved after 2014.

This marriage of two institutional alternatives—self-regulation and government regulation—can not only prevent conventional problems of each alternative, such as free-riding, information asymmetry, and environmental underperformance, but also spur proactivity and innovation needed to address many environmental issues. I explore five main practices in the hybrid model that can secure efficiency and proactivity through collective action.

This research contributes significantly to both the theory of self-regulation and the practice of circular economy. It addresses the gray area of the intervention of non-business actors in industry self-regulation, which has been long acknowledged yet has remained understudied (King et al., 2012; Rees, 1988). The introduced hybrid model is especially valuable when proactive collective actions are needed to pursue sustainability but are unlikely to be initiated by business. Many proposed models toward sustainability, such as circular economy, rely heavily upon the innovative involvement of business but they also call for policy because business may not partake voluntarily. How can policy, which inherently tends to generate "compliance," spur innovative collective actions? One solution is this proposed industry hybrid regulation, which can also contribute to other sustainability problems that are inherently collective (Geels, 2011).

2. Theoretical foundations

2.1. Classical collective action and industry self-regulation

Actors who share a common interest may choose to pool their resources, set rules, and take actions collectively (Olson, 1965). Collective action may arise when two or more actors are required to accomplish an outcome (Sandler, 2015). For example, the excessive use of the common pool resource, such as fisheries, will benefit a single entity at a cost to the collective, resulting in "the tragedy of the commons" (Hardin, 1968). Various studies of collective action have developed formal models to explore how independent actions ultimately change the broader landscape in an evolutionary process (Oliver, 1993), dealing with such concepts as reciprocity and free-riding (Ostrom, 1990, 2000b, 2010; Ostrom et al., 1994).

Industry self-regulation refers to a particular form of business-driven collective actions in which firms collectively determine the rules they will follow (Berchicci and King, 2007; King et al., 2012). The subject of self-regulation is diverse; for instance, firms can self-regulate operating standards for safety or environmental protection (A. Gupta and Lad, 1983). Industry is increasingly self-regulating standards related to social and environmental concerns (Baron, 2016).

Self-regulation can help to deflect stakeholder intervention, such as penalties by activists (Baron, 2012; S. Gupta and Innes, 2014) or regulation by government. Although self-regulation is often viewed as a cooperative tactic to go beyond mere compliance with the existing regulation (Rivera et al., 2009), it can be used proactively to preempt or weaken stringent government policies (Darnall and Sides, 2008; Johnston, 2006; King et al., 2012) and influence future regulations (Delmas and Terlaak, 2001; Lee, 2009).

2.2. The outcomes and effectiveness of voluntary regimes

Business argues that, compared with imposed regulations, voluntary initiatives are not only more efficient and less costly, but can foster innovation. Yet, there is little empirical support for these claims (King et al., 2012). For instance, King and Lenox (2000) show that without an

iron fist of sanction, participants of the Responsible Care program did not improve their environmental performance faster than other industry members. Rivera and de Leon (2004) observed that ski areas participating in a voluntary sustainability program were more likely to achieve lower ratings in third-party environmental assessments than non-participating ski areas.

Overall, most empirical work has found that industry self-regulation that is not backed by solid performance standards, such as third-party certification, has not enhanced firms' social and environmental performance (Darnall and Sides, 2008; King and Lenox, 2000). The societal advantage of collective initiatives improves with the imposition of tighter requirements and control mechanisms, such as exogenous monitoring and verification, public disclosure of the results, and sanctioning non-compliers or expelling them from the program (King and Lenox, 2000; Lenox and Nash, 2003).

2.3. The blurry boundaries of industry self-regulation

Despite the assumption of voluntariness in the literature on industry self-regulation, most programs are far from voluntary, because companies feel coerced into participating (Gupta and Lad, 1983, p. 421). In fact, scholars have long noticed the ubiquity of government intervention in self-regulatory regimes by policy-makers and NGOs (Gunningham and Rees, 1997; Huyse and Parmentier, 1990; King et al., 2012; Rees, 1988). Exogenous intervention in industry self-regulation can decrease information asymmetry, prevent free-riding, and motivate higher environmental and social performance (Darnall and Sides, 2008; Tashman and Rivera, 2016).

The involvement of exogenous actors blurs the boundaries of self-regulation. Scholars have noticed that rather than focusing on pure, dichotomous models of formal regulation and self-regulation, an innovative combination of them can have advantages, yet this gray area has mainly remained overlooked (Huyse and Parmentier, 1990; Rees, 1988; Rubenstein, 2011; Sinclair, 1997). Although some scholars have paid attention to the impacts of regulatory settings on voluntary self-regulation (e.g., Arimura et al., 2016), little empirical work has tried to explore the relationship between business and government in the industry self-regulation literature.

2.4. Sustainability and the need for new models of coordination

I argue that combining the two models is critical for the collective social and environmental responsibilities of business, because none of the two models can generate proactivity and innovation needed for many sustainability practices. Particularly, proactivity and innovation are at the heart of the current attempts at closing material loops, as emphasized in concepts such as the circular economy. By developing innovative solutions, the circular economy aims to keep biological and technical materials, components, and products at their highest utility and value in their most extended life cycles (Bocken et al., 2017; Geissdoerfer et al., 2017). The circular economy calls for innovation at all levels, especially in developing both new business models and the technology needed to close the loops (Ellen MacArthur Foundation, 2013). Developing these solutions on a large scale, however, is far too challenging for business. Business has conventionally disregarded the post-consumer phases of materials and the costs of dealing with used products, mainly through disposing of them, have been historically covered by governments via tax systems. Imposing this responsibility on firms requires new institutional regimes, yet existing institutions may safeguard private interests and hinder the evolution of new institutions to shift the responsibility for used materials to business (Moreau et al., 2017; Vatn, 2009).

Therefore, given the costs of embracing the post-consumer phases of product life cycle, business has little incentive to adopt voluntary actions to close the material loops. Even if business takes such responsibilities, consistent with the self-regulation literature, the actions are not likely to

go beyond a minimal level (Borck and Coglianese, 2009; King et al., 2012; King and Lenox, 2000), which is far from the innovation and proactivity needed for transition to a circular economy.

Avoidance of business may consequently require legislation, leading to a second challenge: Policy tends to translate society- and collective-level issues into individual-level mandates. However, based on the current socially evolved means to manage post-consumption materials, waste is addressed in an aggregated system; thus, mandating individual producers of consumer products to collect and manage their consumer waste seems impractical, and practical solutions may not readily exist. In fact, developing new regulatory regimes to translate the collective responsibility of consumer waste to the responsibility of individual firms may cause significant inefficiencies. Even if government regulators establish such a regime, the needed proactivity and innovation are difficult to achieve, because conventional government regulation tends to curb innovation. That is, despite the complicated relationship between regulation and innovation (Blind et al., 2017), it is often argued that complying with regulations will likely restrict firms' freedom of action (Palmer et al., 1995). When an official regulation is imposed, firms seek compliance to avoid non-compliance penalties. Yet compliance-driven responses are far from the proactivity that a circular economy needs. Hence, it is difficult to imagine how waste-driven regulation can spur the elevated level of proactivity needed to propel a circular economy.

In summary, addressing responsibilities such as post-consumer materials needs collective action by business (i.e., industry self-regulation); however, because these responsibilities do not motivate firms to take action, government needs to both force business to take action and intervene to ensure that the actions go beyond minimal compliance. Scholars have already discussed the problems of collective action in joint value creation (Bridoux and Stoelhorst, 2014, 2016; Klein et al., 2019) and proposed approaches to stakeholder management (Bridoux and Stoelhorst, 2022). Research has also explored the importance of stakeholder collaboration and collective governance-oriented strategies to pursue circular economy (Schultz et al., 2023). Given the value of innovative combinations of self-regulation and government regulation, we need to better understand the complexities of such combinations (Mills, 2016). This multi-stakeholder study explores how business and government can coordinate their actions to better respond to a collective responsibility that needs proactivity.

3. Research context, method, and data

3.1. Hazardous post-consumer materials in Ontario

The municipal hazardous or special waste (MHSW) programs are a subset of diverse post-consumer waste management initiatives in Ontario, Canada, that include nine broad groups of materials: paint and coatings, antifreeze, fertilizers, oil containers, oil filters, pesticides, pressurized containers, single-use dry cell batteries, and solvents. Paint and coatings arguably represent the main material group of MHSW, both from a financial perspective and considering the dynamics of the programs. Industry experts estimate that up to 10 percent of the paint purchased by households remains unused, some returned to drop-off municipality facilities or occasionally to retail stores. For instance, in 2014, the industry collected 9422 tonnes of paint and coating materials, representing one-third of all MHSW materials. Of all paint collected, 82 percent was recycled and returned to the market with a lower environmental footprint than virgin paint. The rest was either incinerated to generate energy or safely disposed of. Other MHSW materials also followed the same process.

The waste management process is costly and market prices may not fully cover the costs; therefore, for most materials, all the involved firms, known as "stewards," pay their share of the costs. Stewards expectedly add this handling fee to the price of the virgin products, either by adding a visible "eco-fee" to the consumer's bill or by burying the fee in the

price. With the gradual introduction of waste policies in various Canadian provinces, a separate sector has evolved to run the operations and function as industry's "compliance vehicle."

These programs have developed differently in different jurisdictions. For example, in British Columbia, consistent with the industry self-regulation literature, the action was shaped "voluntarily" after government urged business to do so, and regulation followed later. Ontario's waste paint program is both unique and extreme for various reasons. First, two decades of government encouragement did not lead the industries to adopt self-regulation continually, and business resistance led to stringent government regulations that caused many challenges. Second, Ontario regulation followed a unique governance structure with intense government involvement in how business should fulfill the regulation. Third, in contrast to other jurisdictions that focused on compliance, the Ontario government ambitiously called for beyond-compliance practices and innovation, which required different coordination mechanisms. As a result of the above, this case underwent a unique transition that provided new learning regarding the circular economy. Indeed, both within and beyond Canada, the case of Ontario has been closely monitored by many other jurisdictions developing their post-consumer material management systems.

3.2. Data sources

I conducted an embedded single case study (Yin, 2014) that included different programs for different material groups within the category of hazardous and special waste in Ontario (e.g., paint program, automotive oil filter and container program, etc.). Including more than one program in the case increased the validity and robustness of results, as I could study the replication of patterns in different programs under the same regime. This empirical approach allowed me to form a logic potentially applicable to other situations (Yin, 2014), which provides analytical generalizability to theory (Pratt, 2008).

Collecting primary and secondary data started in May 2016 and was mostly done by the end of 2018, yet follow-ups and updates continued until 2022. Data included the phenomenon's history for over four decades, especially the intense dynamics after 2008. To ensure that I captured various perspectives, I adopted an inclusive approach and the data included all pertinent sources, such as different firms (stewards) and their collective organizations, governments and their representative organizations, service providers, and NGOs. Data sources included extensive public and non-public data, 55 interviews with the most informed people available, and other sources, as summarized in Table 1, with further information about interviewees in APPENDIX A.

Given the sensitivity of the context and historical conflicts among different actors, conducting interviews was a time-consuming part of data collection. All interviews were audio-recorded and transcribed except for six interviewees who did not consent to audio-recording, thus notes were taken instead. Given the sensitivity of the data, despite the stringent confidentiality provisions, five highly informed interviewees did not consent to even being quoted anonymously.

The data sources were complementary, but they also allowed me to triangulate the data (Yin, 2016), and helped to support the honesty and precision of the data provided by different informants and exclude social desirability. The primary data collection process (e.g., through interviews) was nurtured by both secondary data and previously collected primary data. As the analysis advanced simultaneously with the data collection, the focus of data collection gradually shifted from understanding the general trends and events to the actions during the hybridization process, how actors perceive the issues, and the contradiction between the perceptions.

3.3. Analysis

The analysis followed an emergent approach. I first adopted a general longitudinal approach (Langley, 1999; Langley and Tsoukas, 2016)

Table 1

Data sources.

Source of Data	Quantity of Data	Description	Application
Public documents	Voluminous	Various reports, regulations and policies, especially at the provincial level, public announcements, news, board meeting minutes, video-recorded events, including annual general meetings, conferences, media materials, and success stories	Facts about the process and events were used to understand the phenomenon, develop the narrative, inform the interviews, identify the patterns, and triangulate the data from other sources.
Interviews	55 interviews within 32 organizations	Semi-structured, with insights from various key experts from the stewardship programs and main stakeholder groups (e.g., firms' pertinent VPs, industry leaders, managers of collective organizations, representatives of provincial and municipal governments, etc.)	Understanding the perspectives, tensions, and interpretations, and making better sense of the process and actions.
Internal documents	Select documents from a few organizations	Board meeting minutes, correspondence, member-specific reports, internal newsletters	Facts about events, actions, and salient issues at different times illustrated the perspective of the focal organizations.
Observations	34 events over 74 h in total	Site visits, industry conventions, specialized conferences, and regulatory and consultation webinars	Understanding the context, current and future trends, and dynamics among the actors improved the knowledge of critical issues from the perspective of different actors.
Supplementary sources	Numerous	Informal interviews, hallway conversations, follow-up emails or phone calls to inquire about a previously discussed issue, conversations with consumers or other involved people	Filled knowledge gaps and validated the data or findings.

based on the "evolutionary" perspective in process studies (Brunet et al., 2021) to understand the formation of the programs. Nonetheless, as the analysis advanced and I explored the formation of a hybrid regime, I shifted the focus to the hybrid model to explore its structure and characteristics. In doing so, I adopted an "activity-based" approach to process studies (Brunet et al., 2021; Jarzabkowski, 2005; Lusiani and Langley, 2019). I compared the characteristics of the hybrid model with those of the previous stages. Overall, the analysis followed three steps. I used Atlas.ti qualitative software (version 8.1) complemented with spreadsheets and other means.

3.3.1. Step 1: developing a narrative

The first step aimed to explore the “realities” of the events (Gephart, 2004). By reviewing various data sources, I identified all notable events and actions within the boundaries of research. I soon learned that I needed to understand hazardous waste management within the entirety of general waste management in Ontario. The first significant event pertinent to existing programs was launched in 1981, which I set as the starting point of the temporal analysis. To organize the data, I created a log file and triangulated the factual data to resolve conflicts. This work was simultaneous with collecting descriptive data that reflected the rationale behind the actions and perspectives of different actors. The goal was to ensure that I captured not only all the events but also their underlying reasons, reactions, and consequences. This step provided a temporal representation of the formation and transformation of the collective actions in three stages: *Unfulfilled Self-Regulation*, *Government Collective-Level Regulation*, and *Hybridization*. In Stage 1, government attempts failed to foster consistent voluntary collective actions across the industries. In Stage 2, the government imposed stringent regulations that failed to translate the collective responsibility of waste to firm-level requirements efficiently, leading to conflicts and deadlocks. Stage 3 evolved gradually after firms took action and government showed flexibility, which resulted in an entanglement of government and self-regulation. The result was documented as a fact-based case narrative and a temporal map, shown in APPENDIX B.

3.3.2. Step 2: understanding the structure of the hybrid model

As Step 1 revealed that the most exciting part of the process is the hybridization stage, in Step 2, I focused on understanding the hybrid model. By temporal bracketing (Langley, 1999) of Stage 3, I studied the patterns of actions by different stakeholders throughout the hybridization process. The results showed how during this stage, business and government were both involved in co-regulation and co-enforcement of the programs. This step allowed me to simplify the recurring patterns and propose a model for industry hybrid regulation.

3.3.3. Step 3: developing the comparative framework

Upon identification of the *hybridization* stage, I traced the data back to investigate the characteristics of each stage. This step helped me theorize further and develop the comparative analysis of the hybrid model in relation to the pure models.

4. The evolution and transformation of collective action

In this section, I describe the aforesaid stages in which collective action evolved. Stage 1 was led primarily by industry but failed; Stage 2 was imposed by government but proved inefficient; and Stage 3 evolved into a novel hybrid model. The events map provided in APPENDIX B depicts the major historical actions stakeholders took throughout the process.

4.1. Stage 1. unfulfilled self-regulation (1981–July 2008)

Ontario’s hazardous waste programs evolved as part of the provincial waste system. An early watershed in the system, in 1981, was the separation of some recyclables, such as bottles, paper, and packaging materials, in a curbside collection program in leading municipalities, which diffused across the province and, in 1986, was relabeled as the Blue Box. Simultaneously, some municipalities also held occasional events to collect household hazardous waste, including pesticides, pharmaceutical products, and paint. The goal was to separate hazardous materials that could otherwise harm the environment from other recyclables and waste.

Gradually, a few private businesses took form to provide hazardous materials collection services to municipalities. Through scheduled local events, these firms collected household hazardous materials, which were usually aggregated for incineration and safe disposal. The

management at AlphaCycle,¹ a small business in hazardous material management founded in 1991, soon realized that recycling was a viable alternative to disposal. Residual paint was a good start due to the volume of collected materials. However, paint had multitudinous types and shades. To address the technical complexities, they sought advice from virgin paint manufacturers, yet their cooperation did not last long because they deemed recycled paint a competitive threat. AlphaCycle gradually improved its recycling processes but with the market’s little interest in recycled paint, they targeted other countries for their affordable product. Fig. 1 demonstrates this early period of government-funded initiatives to encourage business involvement in voluntary self-regulation.

In 1994, the provincial government regulated municipalities to manage the evolved Blue Box waste. This program was recognized by the United Nations, which presented its first-ever Environmental Award to the program’s founders. Over time, parallel with Blue Box, more municipalities established permanent depots to collect non-Blue Box recyclables, including hazardous materials. Waste programs were costly, and government continuously encouraged business participation. In response, some industries occasionally contributed to the Blue Box program, aiming to serve their interests. For instance, in response to the government’s pressure, some industries established waste collection programs, such as the Ontario Multi-Material Recycling Inc. (OMMRI) in 1986 and Canadian Industry Packaging Stewardship Initiative (CIPSI) in 1992, yet none of these isolated voluntary self-regulations lasted long. Inconsistency of government pressure, heterogeneity of business actors and their interests, and costs of taking on this new responsibility were among the reasons (see Chang et al., 1998).

Toward the late 1990s, waste costs became a growing concern. Finally, on June 23, 2002, the government released the province’s first product stewardship legislation, the *Waste Diversion Act*. Its stated purpose was “to promote the reduction, reuse and recycling of waste and to provide for the development, implementation and operation of waste diversion programs.” Yet the interviewees consensually agree that the *Act* mainly aimed to secure industry’s financial contribution. The initial focus was the Blue Box program.

The *Waste Diversion Act* introduced a unique governance system, shown in Fig. 2. It established an oversight organization—an arm’s-length body responsible for implementing the provisions of the *Act* by establishing waste diversion programs, run by a board of directors composed of various stakeholder representatives. The oversight body was responsible for establishing the industry funding organizations (IFOs) to operate an industry’s program. An IFO was obliged to provide payments equal to 50 percent of the total net costs incurred by municipalities. An IFO’s plans were required to be approved by the oversight organization and the Ministry in advance. Each IFO was responsible for determining and collecting fees from firms, running the operations, and collecting information.

Interestingly, the IFO was also responsible for fully funding the oversight organization, which industries deemed a disruptive idea. Another controversial decision was the designation of a specific organization as the Blue Box program’s IFO (which was supposed to represent industry) by the Ministry and assigned its top manager. An interviewee experienced in different industries explains:

It was a quasi-monopoly scenario and many of the stewards objected, both in principle and in practice. It was different than the way some of these programs had happened in Europe and elsewhere in the country where industry created an association to manage [the program]. All the producers were obligated by law to participate in that stewardship organization unless they got permission to do something different, and getting the permission was next to impossible.

Indeed, the over-prescriptive nature of the *Act* was the government’s

¹ Private company names are pseudonyms.



Left: A Municipal Advertisement to Announce a Collection Event in Hamilton, Ontario.
 Right: A “Mobile Collection Unit” event in York, Ontario, early 1990s (courtesy of Envirosystems, Inc.)

Fig. 1. Early years of stage 1.

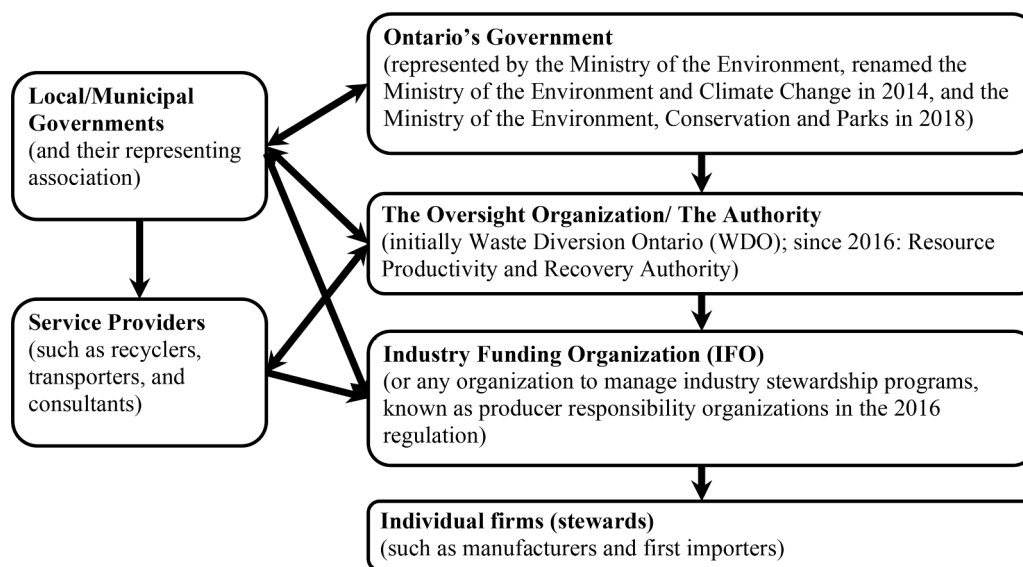


Fig. 2. Waste management structure based on Ontario’s waste diversion act, 2002.

response to business which never showed interest in taking the responsibility of waste. Also, it is critical to notice that the *Act* established a regulatory regime to translate the collective problem of waste into individual firm requirements. The individual-firm requirements were primarily financial, aiming to fund municipal waste programs, and firms had no choice other than the imposed structure.

4.2. Stage 2. government regulation (July 2008-May 2014)

The Ministry gradually extended the regulations to non-Blue Box materials. In December 2006, the Minister appended the MHSW to the regulated materials and directed the oversight organization to develop a diversion program for hazardous material categories in three phases. Also, he stipulated that the Blue Box IFO also acts as the IFO for the MHSW. Designating the same IFO could facilitate the operations, but again, it was contentious, and some deemed it a political decision to curb the actions of the MHSW industries.

The MHSW Program Plan for Phase 1 commenced on July 1, 2008. Phase 1 involved thousands of products and brands in nine material groups, such as paint and coatings and their containers, single-use dry batteries, and antifreeze. Similar to the established programs, firms had to pay their share of waste management costs to the same IFO. With such a structure, naturally this cost became another item in firms’ operational costs and were consequently transferred to consumers.

Government also consistently held the predetermined waste management structure. Although the *Act* allowed industries to establish their own IFOs, businesses soon learned that acquiring the government’s consent was practically impossible. The government-imposed IFO also faced challenges in identifying appropriate products, setting fair fees, and interacting with municipal collection sites and service providers. Further, with all the challenges in operationalization, monitoring became an ancillary issue and the oversight organization became merely a liaison between the IFO and government to ensure that regulation is being fulfilled.

A few weeks after the commencement of Phase 1, the Minister ambitiously provided direction to the oversight organization to develop two subsequent phases of MHSW Program simultaneously. Phases 2 and 3 added 22 new material groups, including aerosol containers, fluorescent light bulbs, and all types of flammable, corrosive, toxic, reactive, and leachate toxic materials. On short notice, the Minister determined the commencement date to be July 1, 2010. The decision was bold, but it could signal the Ontario government's leadership in regulating waste management across Canada.

However, interviewees generally describe the result of this rash decision as *mayhem*, *crisis*, *disaster*, and *catastrophe*. The 22 new material groups included thousands of consumer products. On July 1, 2010, consumer suddenly noticed an extra environmental handling fee on the bills for many everyday products, some of which many people perceived as not hazardous, such as chlorinated bleach. Angry about the "eco-fees" suddenly added to the price, consumers started contacting the media. On July 21, 2010, after three weeks of furious public debates, the Minister revoked Phases 2 and 3 and suspended the fees, but Phase 1 continued to operate. The Minister was soon fired. To manage the municipalities' dissatisfaction (as they did not benefit from the expected industry funding), the Ministry allotted a limited budget to cover some costs of six material groups until 2012. The 2010 crisis influenced waste policies and programs in the years to come. The public and media remained sensitive to the costs and the IFOs' actions, and the government actors also became increasingly cautious.

The 2010 crisis both weakened the government and gave industries a stronger voice to raise their concerns and take a more active role in the programs. The paint industry was a leader. As the collected volumes ramped up, a second company, BetaCycle, entered the paint recycling business and helped the industry to become closer to the aspirational government-imposed targets. Still, waste management was costly and collecting more waste meant more cost for business.

The main concern of business was Ontario's higher stewardship costs than other provinces. Increased costs result in a higher product price, which could disharmonize the market across provinces and influence demand. Further, industries and the IFO continuously expressed dissatisfaction with the inefficiency of collection, transport, and processing, yet the regulation had left such decisions to municipalities. The years after 2010 were fraught with confrontation among actor groups. Stewards criticized some of the 444 municipalities for inefficient operations, hiring unnecessary people in collection sites, and creating jobs by spending business funds. As one steward put it:

We don't have control over [municipal depots'] operating hours or how much we pay them... It seems like they've built a Cadillac for return depots when they only need a Volkswagen... [the IFO] would bring this to their attention and they'd say, "Well, that is none of your business. Your job is you pay us what we tell you."

In response, municipalities condemned businesses for trying to evade the costs of their legal responsibilities. A similar conflict existed between stewards and service providers, such as transportation companies and recyclers. From the industry's perspective, the operations of service providers were inefficient. Yet the government and the oversight organization did not want any stakeholder adding fuel to the fire. A steward depicted the dynamics as follows:

There was a lot of politics that were involved. One time the Ministry would agree with us and then they would agree with the IFO and then they would change their mind because there was a political faction that was involved. The trucking companies, for example, this is a lot of money for them. [The IFO] would sit down with them and try to negotiate with them and they would run to the Ministry and say, "The IFO is not being fair with us." [...] Everybody wanted their pound of flesh.

In the tumultuous atmosphere after 2010, the oversight organization was almost reactive. Its role was more that of an intermediary to mediate the soaring conflicts among the actor groups. Besides, its initial

structure, defined by the 2002 Act, included board members from the government and various stakeholder groups that held competing interests, which made their board discussions an inconclusive confrontation of interests. On February 9, 2012, the Ministry changed the regulation to designate a "disinterested" board structure for the oversight organization, with members assigned directly or indirectly by the Minister. It was the beginning of a shift. Transitioning to Stage 3 happened gradually, but it was the threshold of hybridization.

4.3. Stage 3. hybridization (May 2014–)

The gradual change in the structure of programs was government's response to the multitudinous challenges urged by business. As a government interviewee described,

The province probably could've done a better job in helping and educating stewards on the opportunities that they could've veiled to themselves. A few years later [the Ministry and the oversight organization] realized that no one's coming forward with an Industry Stewardship Plan. Everyone was just joining the IFO... So, to their credit, they put together a guidebook to develop Industry Stewardship Plans.

Another expert with experience in different stakeholder groups views this more as a pressure from industry:

Paint industry chaps jumped through the hoops to get their program under control, rather than just paying the eco-fees. The Ministry and [the oversight organization] were reluctant first, but over time they figured that this overloaded truck is stuck in mud and business may provide traction to get it out.

Paint and coatings had always been a major MHSW material group. Budget-wise, the IFO's highest revenue collected from the member firms in MHSW program came from paint products. Since the government regulation was introduced, the paint and coatings industry had long tried to establish its distinct IFO to run the program. As the stakeholder conflicts and program costs increased in Ontario, the industry took a more active role and started a new course of negotiation with the oversight organization to transfer their program to their own collective. Finally, in May 2014, the industry submitted its final draft of an Industry Stewardship Program, which was approved by the government, effective June 30, 2015. A stewardship program reflects how an industry has planned industry-specific strategies to meet the government's requirements, how they meet the targets, and how they monitor and report the results.

This approval was the government's official consent to the more active involvement of business. Some interviewees argue that after such a prescriptive regulation, the government's acquiescence was the gradual outcome of various factors. First, the irreconcilable stakeholder conflicts proved the regulation inefficient, and business seemed to be the best actor in creating efficient programs. More importantly, the existing programs were merely a mechanism to secure the funding for municipalities to continue the status quo, and this was far from the advanced approach to resource management and closing the loop. Circular economy and similar concepts focus on enablers such as eco-design, innovation, business model change, reuse, and recycling, mainly pursued by business (Beaulieu et al., 2015; European Environment Agency, 2016), but the regulation had left no motivation for such proactive actions by business.

Circular economy became a catalyst for change in the regulatory regime. In November 2015, the Minister proposed a waste reduction legislation entitled the *Waste-Free Ontario Act*, Bill 151, to replace the *Waste Diversion Act, 2002*. Also, the Ministry released a *Draft Strategy* document on how the new legislation might be applied. The new Act, proclaimed one year later, aimed to dramatically overhaul the province's recycling regime, transitioning to a more robust producer responsibility that allowed for more flexibility for stewards. The Act empowered the Minister to direct the replacement of the previous IFOs

with business-driven programs, similar to what happened in the paint industry. This change had many advantages. The Act allowed firms to adopt various individual- or collective-level programs. This option can theoretically incentivize a firm or a group of them to remove their waste or develop a groundbreaking solution to manage post-consumer materials more efficiently and effectively, which can reduce the operation costs of business. Having multiple collective and individual programs could spur competition and innovation needed for the transition to a circular economy.

With increased autonomy, the paint industry not only adopted strategies to enhance efficiency but also demonstrated many instances of proactivity. As one of the industry leaders explained:

10 years ago, industry members didn't even know each other. Stewardship drove the agenda, and now, we can collaborate. We've developed a really good logistics and distribution network for collecting post-consumer paint. We haven't developed expertise in what we do with that [waste] paint. Well, what we're doing is okay, right, but I'd sure like to see that go to another level. That's for me the big opportunity. [...] It's going to take some R&D expertise.

The virgin paint manufacturers' support for innovation in recycling was unprecedented. Whereas paint recyclers were initially deemed outsiders, the industry's perception gradually changed and even a recycler's representative joined the industry's board. Finding new applications for waste paint was favorable for everyone, as it would secure compliance, lower the costs for industry members, and potentially resolve the concerns of virgin paint manufacturers about competing with recycled paint. Stewards also increased their proactive participation in the programs. For instance, the paint IFO gradually recruited members to establish more return depots in their stores. Despite the costs for the participating stores, this was a cheaper input channel than municipal depots, saving money for the collective. Increased depots could also increase consumer access and collection volume. Another proactive action by business was the voluntary collection of a new material group, bulbs and lights: the paint IFO suggested covering the costs of a new program for this material group conditional on that the government regulates it in one year.

Simultaneous with the gradual involvement of business, the government restructured the monitoring system. To secure the effective implementation of programs, the oversight organization was restructured and relabeled as the Authority—an organization that maintained the responsibility for oversight, but also took on new responsibilities for compliance and enforcement.

Gradually, both collectives and individual firms showed interest in establishing their own programs in accordance with government's base regulation. At the individual level, in April 2016, a company managed to get program approval for its refillable pressurized cylinders. Other collectives followed the pattern and government cautiously scheduled the transition under the new Act. On April 12, 2018, the Minister issued direction to its imposed IFO to fully wind up the MHSW Program by the end of 2020, which allowed the complete transition of all materials collected under the program to individual producer responsibility. The result was different competing programs in different industries, each trying to develop innovative solutions to comply with regulations and close material loops. For instance, several programs were shaped to manage used tires and explore technologies to upcycle the materials into new valuable products.

5. Discussion: industry hybrid regulation

Pure self-regulation and government regulation have their own shortcomings. Scholars have criticized industry self-regulation for information asymmetry and lack of transparency (as it is typically run by the private sector), free-riding, inadequate incentives to ensure wide-scale participation, and weak outcomes due to, among other reasons, ineffective compliance and enforcement mechanisms (King et al., 2012;

Rubenstein, 2011). On the other hand, government regulation is costly, takes time to establish, and might not represent an effective and efficient structure. Further, government may lack sufficient resources to closely enforce the implemented regulation. Using a mixed alternative can resolve some of these drawbacks. For example, when government engages in monitoring and compliance, the outcomes of the self-regulatory regime may improve. Or, government intervention in setting the rules in an industry self-regulation can lead to higher standards. None of the proposed mixed models, however, can completely resolve the commonplace problems. Still, the gray area between the two pure forms provides a fertile area for innovative combinations (Rubenstein, 2011; Sinclair, 1997).

In this section, I discuss the structure and characteristics of a model of co-regulation and co-enforcement of policies by business and government, as evolved in Stage 3, which I label as Industry Hybrid Regulation. I first briefly recap the rationale behind the hybridization, which should be sought in the failure of the underdeveloped self-regulation and the inefficient government regulation, i.e., Stages 1 and 2, respectively. I will then explain the model based on the recurring patterns in the data. I will conclude by comparing the hybrid model with the two other alternatives.

5.1. The evolution of the programs

Transferring the responsibility of waste management to business is disruptive. Similar to many other social and environmental responsibilities, business may find no incentive to do so and resist. Further, in contrast to many other environmental responsibilities, an average firm may hardly be able to manage its post-consumer products individually, which calls for collective action with other firms. Yet, in Ontario, the prerequisites of voluntary self-regulation were barely in place. First, the involved business actors were highly heterogeneous and had little history of collaboration. Second, some industries were not sufficiently coherent to take the initiative. Third, the changing governments did not demonstrate a consistent intention in this responsibility transfer. The result was two decades of fierce push and pull with a few short-lived voluntary actions in some industries.

Activation of government regulatory instruments highlighted another challenge: Translating a collective program such as waste management to individual regulatory provisions for every firm was an unbeaten path. Given the history of industry avoidance, designating a collective (i.e., the IFOs) by the government to launch the program on behalf of business could be an innovative policy tool to secure the responsibility transition. Further, the regulation aimed to protect the pre-existing waste management systems and the authority of municipal governments. But both seemingly required decisions raised another problem: Such a stringent policy leaves no room for business to actively involve. Considering industry merely as a source of funding hindered business's ability to utilize its capabilities to act efficiently and enhance the results in the long term. Further, conflicts in stakeholder interests and power imbalance brought forth continuous dissonance. Consistent with the past literature, when firms face "a common opponent," they gradually develop stronger in-group identities and showed more forceful reactions against the out-group (Pozner and Rao, 2006). This reaction can be viewed as a form of "institutional work" by industry (Lawrence and Suddaby, 2006; Nilsson, 2013) and one of the catalysts that changed the regulatory institutions.

A key catalyst in the process was the growing attention to closing the loop, which, in turn, needs different mechanisms to spur innovation. Government's policy flexibility is critical in utilizing business capabilities. In Stage 3, gradually, the regime transitioned into a hybrid model in which both government and business were involved in regulating and enforcing the programs. This hybrid form held some elements of both government regulation and self-regulation. Although the foundations of the programs were still regulated, business could self-regulate in many operational aspects. Further, the hybrid model leaves to firms the

decision of individual or collective action. This option is a core characteristic of the model, as it allows firms to experiment and spurs organically shaped competing solutions developed by business. Fig. 3 represents a schematic view of the stages and the process as well as the characteristics and catalysts for change.

5.2. A hybrid model of industry regulation

The hybrid model that this research explores goes beyond the extant models of regulatory regimes. Hybridity refers to “the state of being composed through the mixture of disparate parts” (Battilana and Lee, 2014, p. 400). The use of the label “hybrid” here is specifically informed by the literature on “mechanism-centered” hybrids (Seibel, 2015). The proposed industry hybrid regulation moves between the mechanisms of the two pure models iteratively to resolve some of their shortcomings.

In general, every regulatory regime has two stages: rule-setting and enforcement. The former denotes all the processes of formation and release of the policies, and the latter deals with monitoring and control mechanisms to ensure compliance and to penalize the non-compliant actors. In a pure government-regulated regime, government both imposes the regulation and sets up enforcement provisions. In a pure self-regulatory regime, industry runs both practices. Scholars have also noticed self-regulatory regimes in which the government, for instance, runs either regulation or enforcement and leaves the other to industry (Gunningham and Rees, 1997; Rees, 1988). However, the institutional arrangements in the proposed industry hybrid regulation are based on the involvement of both actors in both sets of practices. This entrenchment of the two pure forms is drastically different from conventional policy-making in which industry acts by tools such as lobbying, consultation, and advocacy. It is also different from other known collaborations.

As shown in Fig. 4, the proposed hybrid model involves at least five practices in regulation and enforcement. The process is instigated by government, which identifies the specific problem and requires a regulatory regime. To ensure appropriate and timely action, the government mandates the action by defining the foundations and goals of the regulatory regime. The government can also develop roadmaps or propose strategies to guide the following steps, but in contrast to conventional government regulation, it does not translate the foundations to collective or individual actions. Instead, it requires business’s own regulation for action. This characteristic was noticeable in the case with every firm’s agency to take actions either individually or in collaboration with

any group of firms.

The model secures the active involvement of business in maintaining its efficiency-driven mechanisms, such as minimizing the costs of operations by utilizing different arrays of individual or collective actions. This approach encourages innovation (e.g., upcycling rather than down-cycling) and competition. In other words, at point 2 of the model (Fig. 4), different firms would seek different alternatives (i.e., individual or collective actions) to comply with the core regulations (point 1) but in seeking for such self-regulatory regimes, they would naturally utilize their innovative capabilities to achieve the highest value by market mechanisms. At point 3, to ensure that those actions would meet the foundational regulations, government needs to approve the proposed self-regulations developed by business. The goal is to verify that various actors have translated the goals of the policy into practice-oriented policies effectively, and also, the aggregation of different self-regulatory regimes by different actors will address the entire problem. Overall, the first three points in the model demonstrate a co-regulation process by government and business.

Both sides are also involved in enforcement. At point 4, to forestall potential government sanctions, business actors expectedly establish their own monitoring and compliance mechanisms to ensure that their regulatory system is implemented in the predefined scope by all members. Yet, this internal enforcement does not obviate the need for higher-level exogenous enforcement, which requires point 5. As a unique characteristic of the studied regulatory regime, the government enforcement is entirely funded by industry. While industry-funding is not a necessary characteristic of the model, such a provision can ensure that government budget fluctuations will not harm the regime in the long run.

5.3. Solving the ubiquitous drawbacks of regulatory regimes

Each of the five points in the iterative involvement of business and government is necessary to resolve the shortcomings of government regulation and self-regulation (discussed at the beginning of Section 5). First, when a new collective responsibility emerges in society, initial but minimal rule-setting by government is needed to overcome the resistance. Second, government regulating processes are vulnerable to different shortcomings, such as a lack of fit between the regulation and the complexities of practice. The close involvement of business in rule-setting (point 2) can improve the outcomes, prevent future conflicts, and protect their legitimate stakes. Third, government’s approval (point

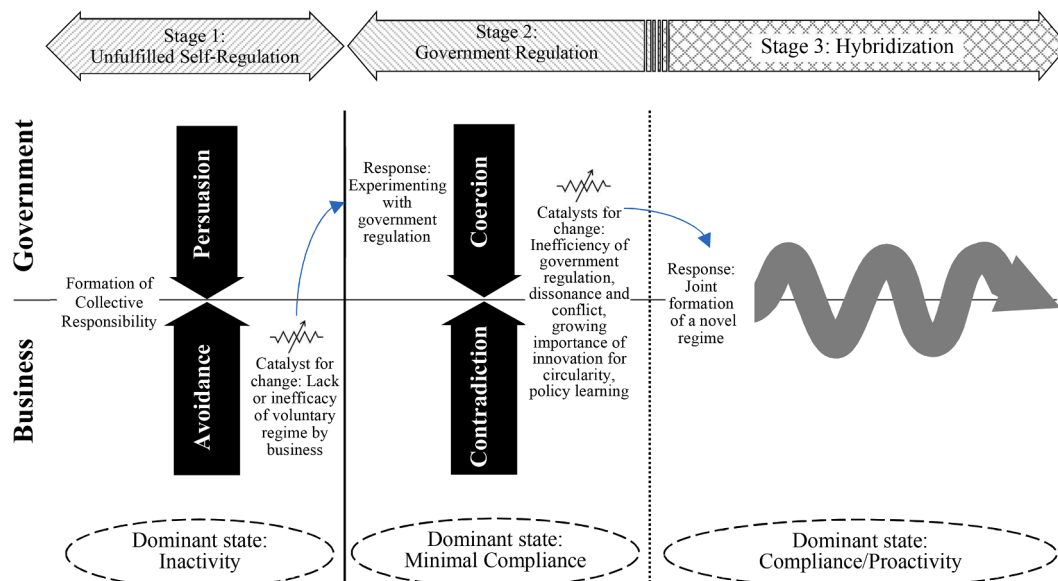


Fig. 3. The evolution of waste management regime through three stages.

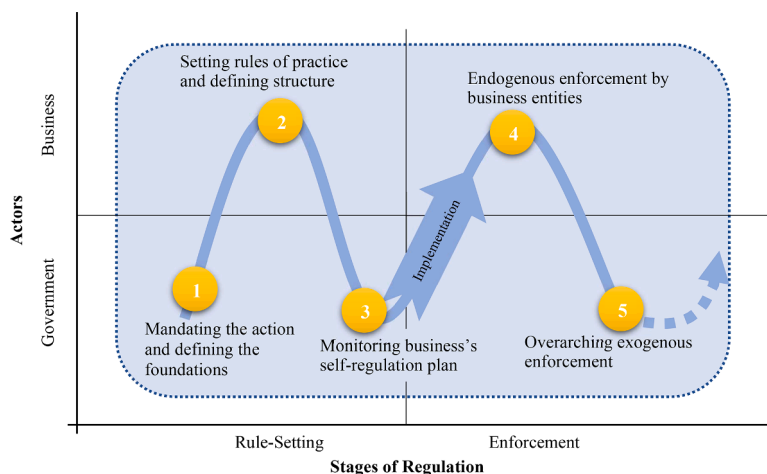


Fig. 4. Government-business interactions in industry hybrid regulation.

3) will prevent the problem of converting a collective action into a self-serving mechanism, as noted in the literature (Borck and Coglianese, 2009; King and Lenox, 2000; Rivera, 2010). Fourth, at the stage of enforcement, the model takes benefits from business's endogenous control mechanisms at point 4, which is a missing element in government regulation. Finally, exogenous enforcement mechanisms will provide the "iron fist" (King and Lenox, 2000) while collecting data for future improvements in the regime.

The most significant advantage of the model is its ability to spur proactivity and innovation rather than a bare minimal response to avoid government and stakeholder sanctions (Borck and Coglianese, 2009; King et al., 2012; King and Lenox, 2000). The model does so by deploying market mechanisms and competition among the firms to reduce the costs or even make a profit.

Table 2 summarizes the findings about industry hybrid regulation model compared to the two initial regimes (Stages 1 and 2; when business avoided taking robust voluntary self-regulation, and when the government translated the collective responsibility into firm mandates).

6. Contributions, limitations, and future research

6.1. Contributions to theory

This study investigates how business and government can coordinate their actions when they address a collective responsibility that needs proactive response. I studied the ongoing interactions of business with government and other stakeholders in a unique large-scale embedded case, which included various sub-cases (i.e., waste programs). Single-case studies usually fall short in their generalizability, and this study is no exception. However, I tried to utilize the strength of this method: Unique and revelatory cases can add significant value to theory because of the generous information they provide compared with ordinary cases (Hällgren et al., 2018). These cases, variously labeled as *talking pig* (Siggelkow, 2007) or *black swan* (Flyvbjerg, 2006), provide value in extending the boundaries of extant theory, challenging or falsifying previous works, and drawing the imaginations for both theory and practice.

The research addresses the identified lack of empirical works and prescriptive outcomes for circular economy (Kirchherr and van Santen, 2019) and continues the works by scholars in exploring the role of policy in transitioning to a circular economy in different contexts (Alaerts et al., 2019; Droege et al., 2023; Hartley et al., 2020; Ignatyeva et al., 2021; Muriithi and Ngare, 2023; Zhu, 2019). Also, it extends the theory of industry self-regulation by investigating self-regulation intertwined with government regulation. It sheds light on the blurry boundary of self-regulation (Gunningham and Rees, 1997; King et al., 2012; Rees,

1988) by suggesting a model for business and government co-regulation and co-enforcement. Although the circular economy approach calls for both firm-level innovative practices to close the material loops and social-level policy, it is unclear how higher-level policy can lead firm-level innovation to this end (Beaulieu et al., 2015). This hybrid model is a step in this direction.

6.2. Implications for practice

The model suggests different implications for government and business. Business-government joint effort via such a hybrid model can not only secure an action but result in proactivity by providing policy flexibility. Whereas too much structure (e.g., regulation) discourages innovation and proactivity (Mintzberg, 1979; Sandhu and Kulik, 2018), having the government set the minimal structure can lead to organically formed competing solutions. Government often cannot mandate collective action but can devise fertile grounds for it. Thus, the heterogeneity of firms, which could be a barrier to voluntary collective actions, can become a driver of competition-driven innovation. Such an approach can help policy-makers expedite the urgent transition toward circular economy. It should be noted that the process explained in the historical analysis is not an inevitable evolutionary process for every setting. Business and government can avoid unsuccessful steps by adopting such a hybrid model. The model also suggests business embrace such responsibilities through various forms of collaboration. Responsibility avoidance, as showcased in this study, is more likely to increase the costs imposed on business in the long term. Accepting the responsibility can fast-track market-based solutions and avoid costly conflicts.

Although the context of the study is circular economy, the model might also inform policy-making in other areas with similar characteristics, i.e., the need for proactivity of actors, unexplored policy solutions, lack of motivation for participation, and weak trust and collaboration among actors.

6.3. Limitations and future research

To some extent, this research was limited due to the sensitivity of the topic and controversies among stakeholders. Despite the extensive primary data collected, some involved decision-makers, mostly from government parties, did not participate or openly discuss their views. Having better access to primary data could shed light on new findings. Also, the study is limited by the fact that it examines industries in only one context with particular aforementioned characteristics. Not every setting needs such a model and in many settings, conventional solutions can suffice. Further, hybridity often increases complexity. Managing the

Table 2
Addressing potential shortcomings of pure models by industry hybrid regulation.

	Self-Regulation	Government Regulation	Industry Hybrid Regulation
<i>Dominant State</i>	Government/ stakeholders: Persuasion Business: avoidance, potentially isolated minimal actions as late as possible	Government: Coercion Business: Basic compliance and/or contradiction	Business and government interact and coordinate rule-setting and enforcement
<i>Outcome</i>	Inactivity or minimal compliance to prevent regulation	Often minimal compliance to prevent penalties	Compliance and periods of proactivity
Characteristics of the Regimes:			
<i>Embedding Responsibility in Business</i>	Not necessarily realized, mostly decoupled	Business decouples responsibility by separating practice from outcome	Business explores opportunities
<i>Focus of Control</i>	Often minimal control	Mainly over means, not ends	Control over both means and ends
<i>Approach to Polycentric Issues</i>	Disjointed and temporary actions by business	Harmonized regulation to serve heterogeneous needs	Allows for any organically-shaped solution
Common Shortcomings and Solutions:			
<i>Defiance/Avoidance/Delay</i>	Despite the expectations, business may avoid taking timely collective actions	Formal regulation process may take a long time	With government's high-level rule-setting, business is motivated to flexibly self-regulate
<i>Free Riding</i>	Common across individual firms	Resolved but needs efficient government enforcement	Resolved by co-enforcement
<i>Lack of Transparency</i>	Ubiquitous information asymmetry	Potentially resolved if regulation requires disclosure	Resolved by co-enforcement
<i>Underperformance</i>	Minimal or no performance, due to non-participation, ceremonial adoption, or late response	Minimal performance to comply with policy	Compliance with requirements, and periods of proactivity and innovation that improve performance

proposed model requires continuous interactions and coordination

Appendix A. Further information about interviewees

Organizational Rank or Level	Actors/Stakeholders *			Service Provider	Instances of positions**
	Business and Stewardship	Provincial Government	Municipal Government		
Top Leader (Chairperson, CEO, President or similar)	14	1	0	10	CEO of manufacturing company, association president, non-profit organization leader
Second level upper echelon (SVP, VP, high-level director or similar)	10	3	4	4	VP operations, board member of stewardship programs, director of compliance, director of communication, senior consultant, sustainability director
Middle manager, supervisor, lower-level directors or similar	7	3	6	0	Sales manager, line manager, project manager, policy director, senior analyst

(continued on next page)

between business and government and joint effort throughout the process. The resultant costs and complexities are among the drawbacks of the model.

Also, the proposed model is merely one model to tackle the challenges of transitioning to a circular economy. Future research can explore other models of business-driven actions in different settings. Particularly, comparative studies across different settings can inform the diversity of business-driven solutions toward a circular economy. Furthermore, research can explore further details about the complexity of hybrid models. Understanding the mechanisms and dynamics of interactions can equally inform policy and theory. Various tensions arise through such a process that deserve other in-depth studies.

CRedit authorship contribution statement

Hadi Chapardar: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Hadi Chapardar reports financial support was provided by Mitacs Accelerate Program. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

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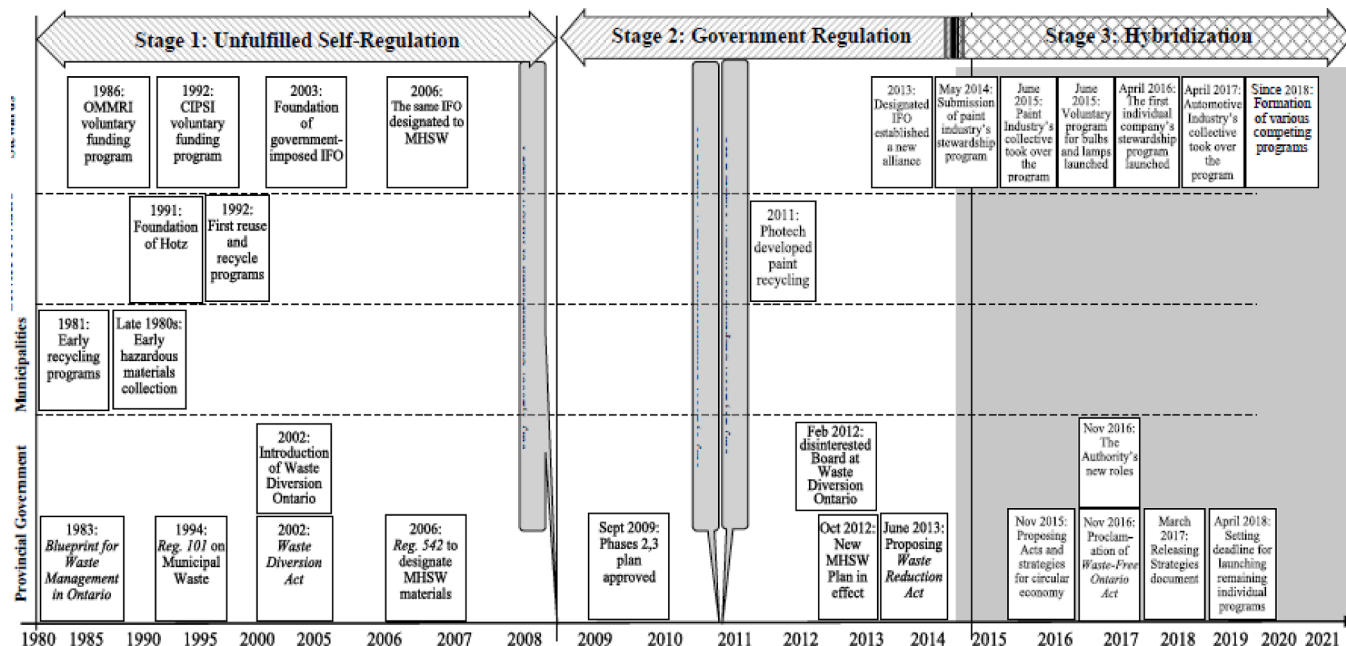
This paper is based initially on the author's PhD dissertation, defended at Ivey Business School, Western University, in 2019. The author deeply appreciates the support and feedback from Dr. Pratima (Tima) Bansal, his PhD supervisor, as well as Dr. Oana Branzei, Dr. Klaus Rerup, and many other scholars whose insights enhanced this research project since its commencement in 2016. The list also includes the reviewers whose constructive comments were invaluable.

(continued)

Organizational Rank or Level	Actors/Stakeholders *				Instances of positions**
	Business and Stewardship	Provincial Government	Municipal Government	Service Provider	
Skilled employee, operation-level or freelance consultant or similar	1	1	1	0	Store manager, business consultant, recycling cite manager
Total number of interviewees in each group*	30	8	11	14	
Total number of interviews	55*				

*Several interviewees had current or past engagement with different actor groups such as business and government and provided information that cross the boundaries. Therefore the total number identified in each cell exceeds the number of interviews.
 ** To protect confidentiality the provided positions may not reflect the type of organization or particular responsibilities.

Appendix B. Historical Critical Events Map in the Formation and Transformation of Ontario Post-Consumer Hazardous Waste Programs



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