
Editorial

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1 Introduction

In their classic study *The Sources of Invention*, British scholars Jewkes *et al.* (1969, p.34) observed that two types of researchers had been drawn to the topic. The first group tended “to stress the contrast between the world of today and that of yesterday and to think of change as a series of big fresh starts”. The rest, however, were “congenitally disposed to believe that there is nothing new under the sun, that all that has been said and done has happened before”. In between these two extremes, they wrote, there could be little doubt that the greater part of modern writing on technical progress and invention is strongly inclined towards the view that thinking of the present or the future in terms of past experience was largely irrelevant, and that ideas had to be recast and institutions reformed to meet new challenges.

Not surprisingly, ‘sustainable development’ theorists have tended to fall even more squarely than innovation scholars into the first camp because of their fundamental belief in the unsustainability of traditional economic growth. As a subset of this group, industrial ecologists have therefore generally believed that industrial expansion was characterised by a linear process of extraction, use and disposal of natural resources (Erkman, 1997). Perhaps in part because of a similar outlook, professional historians have also paid scant attention to the topic of industrial waste disposal and reclamation.¹

In the last two decades, however, many students of business activities have documented several spontaneous and geographically dispersed cases where the creation of increased economic value and the simultaneous lessening of polluting emissions were achieved through innovative behaviour that resulted in the increased efficiency of industrial processes and greater waste recovery. As someone who definitely belongs to the second category described by Jewkes *et al.* (1969), I wondered if the market incentives that had generally been credited for generating this ‘eco-efficient’ behaviour were not playing the same role in the more distant past. As I eventually came to realise,

not only had creative technicians and entrepreneurs long been practising what industrial ecologists are now preaching, but also, the core metaphor of industrial ecology had been discussed and promoted extensively in the past (Desrochers, 2002; 2005).

It was therefore hard for me to refuse the offer of PIE's Editor-in-Chief to edit a special issue that would further explore business and technology history in an attempt to shed more light on current policy questions, such as: Can we expect businesses to spontaneously become efficient, or must the visible hand of regulators push them in the right direction? Are some institutions more likely than others to promote eco-friendly behaviour? Are current expectations regarding a close-loop economy too ambitious? Although they do not provide definitive answers, I believe that the detailed contributions on various chapters of the history of waste reclamation appearing in this special issue do raise a variety of issues. Environmental activists and policymakers should pay full attention to these.

2 Contribution of the papers

The first paper is the most theoretical of the group, but it goes a long way towards explaining why the topic of waste recycling linkages has traditionally been neglected by mainstream economists. As the author, Kurz, sees the issue, the main culprit is the traditional emphasis in economic theory on single production, *i.e.*, those rare cases where there is only a single discernible and physically measurable output in each and every production process. This emphasis proved most unfortunate inasmuch as modern technical economists lost sight of the fact that human productive activities typically generate several measurable results, that multiple-production processes are ubiquitous, and that *joint production* – which occurs when commodities such as beef and hide or electricity and nuclear waste are joined in common origins and cannot easily be produced separately – is the rule. Kurz's paper contains both a detailed history of economic thought on the issue – where he points out, among other things, that Marx observed that the prevention of the occurrence of waste and its recycling were fundamental characteristics of industrial development – and a simple economic model that translates some of these insights into modern economic language, to which he then adds current concerns. One can only hope that more economists will eventually join the industrial ecology community.

McCarthy then discusses an early – and at the time well-publicised – attempt to apply what would later become some of the most important items in the industrial ecology toolbox at the Ford Motor Company's River Rouge complex during the 1920s and 1930s. There, at the behest of Henry Ford himself, was conducted what was likely the greatest industrial waste reduction and recycling programme undertaken anywhere in the world during the first half of the 20th century. As the author points out, although not pressured to adopt a policy of extended producer responsibility, Ford briefly contemplated this step before rejecting it. Furthermore, some managers thought that the company's waste reduction zeal was sometimes excessive and several quietly ignored Ford's directives when it was clear that a waste reduction activity had clearly been shown to be unprofitable. These waste reduction and recycling programmes, as well as the take-back experiment, present an important early case study in the difficulties of realising what are now thought to be desirable policy goals.

One reason why Ford's extensive recovery activities were sometimes not successful is that his firm could not always outcompete the scrapyards of his era. The role of these actors has until now generally been overlooked in the industrial ecology literature, but the papers by Zimring and McIlwraith are valuable correctives in this respect. Zimring's perspective is the broadest, as it covers the US scrap markets in the last two centuries, with a particular emphasis on the development, increased specialisation and eventual institutionalisation of 'salvage' activities, from the early collection of rags and scrap metal to the development of the modern scrap-recycling industry. In doing so, the author reminds us that the major scrap brokers were established decades before municipal recycling programmes developed and that they could – and should – play a larger role in these programmes today. McIlwraith's meticulously researched and engagingly written contribution on the scrap-iron 'bonanza' that followed the introduction of the railroad in the Canadian province of Ontario in the 19th century is narrower in focus, but provides a closer look at the impact of changing technologies and markets on recovery activities. Although, as he puts it, "the evidence of scrap iron is as diffuse as the fragmentation of the product itself", the author guesstimates the amount of iron that went into and the probable life span of rails, wheels and rolling stock and locomotives, along with the rerolling, recasting and rebuilding activities that inevitably ensued. What emerges from his account is that the starting points of all economic activities, scarcity and trade-offs, ensured that salvage activities were widespread in what was quickly becoming the Canadian industrial heartland.

While the important role played by private actors in past recycling activities is generally unknown to the public, the government-led scrap drives of the Second World War made a more lasting impression. Indeed, it could plausibly be argued that their traditional description as either government-orchestrated efforts or landmarks of civic voluntarism contributed significantly to the now-dominant perception that recycling activities will simply not happen if the 'visible hand' of public officials does not rein in private corporate polluters. As Durr points out, however, the history of US wartime recycling is much more complex than generally believed and was actually dominated by corporate leaders. The author builds his argument around an examination of two distinct waste streams. The first was made up of post-consumer materials such as discarded metal, rubber or paper which were the subjects of the salvage campaigns. The second encompassed industry-generated scrap and worn or obsolete machinery that were retrieved at the point of production, thereby escaping public attention. Durr suggests that, contrary to popular beliefs, most of the materials recovered during the war came from that second stream whose roots often preceded the conflict. Actually, early efforts led by government officials resulted in unsightly piles of low-quality (and therefore often unusable) scrap and consequently disillusioned citizens. One lesson that government officials derived from the experience – and one that the current generation of environmental activists should also probably heed – is that they could count on enthusiastic public support for recycling drives, but only inasmuch as they could deliver on their promises.

The government-led scrap drives in times of political turmoil in market economies were generally short-lived. What is less known, however, is that planners in former communist states made a deliberate effort to recover as much residual materials as possible (Gille, 2004). These attempts, however, have drawn little attention among Western scholars, perhaps because most of them do not speak the various languages in

which the primary archival material can be found. In their short paper ‘Industrial Symbiosis in the Former Soviet Union’, Sathre and Grdzlishvili contribute a new English-language piece on the topic by looking more closely at the Soviet concepts of ‘combined production’, which was instrumental in shaping the patterns of Soviet industrialisation, and ‘waste-free technology’, which was introduced in the final decades of the USSR as a way to limit environmental pollution while increasing industrial production. After discussing several examples, the authors conclude that, despite their best efforts, Soviet efforts at industrial symbiosis must be considered a failure, a result they attribute at least in part to lack of (or inexact) pricing or valuation of natural resources and external costs, the lack of relevant local knowledge among central planners and a lack of institutional motivation. The authors also observe that Soviet industrial symbiosis deliberately aimed to create a ‘rebound effect’ by design through which the increased efficiency of resource utilisation would ultimately raise total production and consumption.

The last paper, by Mårald, broadens the scope of this special issue by discussing various attempts to recover and reuse sewage and other urban wastes in the 19th century. Although several other studies on US and British cases can also be found, the author’s analysis of the Stockholm case covers a longer time period than most. Mårald describes a number of schemes that attempted to return the city’s waste to the countryside where they would maintain – and perhaps even increase – soil fertility while simultaneously solving the urban waste disposal problem, in the process generating substantial profits. These attempts, however, failed for a variety of practical reasons, ranging from high costs to public health concerns and the development of cheap fertilisers derived from nitrogen fixation from the air. Perhaps the main lesson from the paper is that, despite its intellectual appeal, the idea of a fully closed ‘ecocyclical society’ will probably never be realised in practice because of pressing practical considerations.

3 Broader policy implications

Modern waste management and reclamation policies are often devised with the most complete ignorance of historical precedent, and as such might contain the seeds of their own (at least partial) demise. Recent European Union (EU) waste policies would seem to be a case in point.² Gille (2004) summarises the EU waste policy as being articulated around five key principles, or ‘5Ps’: prevention, polluter pays, proximity, precaution and producer responsibility:

- 1 The *prevention principle* refers to the avoidance or reduction of waste production and its attendant harmfulness. The 6th Environment Action Programme (EAP) (2001–2010) has set the decoupling of waste generation from economic growth and a ‘significant overall reduction’ in the volumes of waste produced as its ultimate goal in this area. This is to be achieved “through waste prevention initiatives, better resource efficiency and a shift towards more sustainable consumption patterns”.
- 2 The *proximity principle* requires that waste should be disposed of in the nearest suitable installation from where it was generated and that the movement of waste should be minimised in order to protect the environment.

- 3 The *Producer Responsibility Principle* (PRP) aims to make producers responsible for the post-consumer waste management costs of their products and further implies that waste management concerns have to be fully taken into account from the product's design or conception phase.
- 4 Reflected in early EU waste directives and regulations, the *polluter pays principle* first implied that those who produce waste should bear the cost of its safe management and disposal, but has more recently evolved to hold an operator liable for environmental damage or *imminent threat* of such damage affecting land or water not privately owned, in the course of a number of occupational activities.
- 5 The *precautionary principle* is now described as a politically accepted risk management strategy in several fields that may justify measures aimed at a potential environmental or health hazard, even if this risk cannot be fully demonstrated or quantified or its effects determined because of the insufficiency or inconclusive nature of the scientific data.

Although apparently sound in theory, some historical evidence suggests that some of these principles might either not need a formal policy or are likely to create negative unintended consequences. For example, much of the evidence discussed in the essays of this special issue and in other sources suggests that market incentives and competition have always spontaneously promoted a more efficient use of resources over time.³ In this context, perhaps the best policy is not to create new directives and incentives on the prevention principle, but simply to remove price-distorting subsidies that artificially maintain firms that are less efficient than their competitors (De Moor, 1997) and regulatory barriers, including what is considered or not a 'waste'.⁴ Also problematic is the fact that the proximity principle completely ignores the overwhelming evidence that long-distance trade in residuals has historically insured that they would end up in the hands of the people most efficient at creating value out of them (Clapp, 1994; Zimring, this issue). Making producers responsible for the post-consumer waste management costs of their products also ignores the role traditionally played by intermediaries who might be more creative at finding better new uses for recovered materials. Finally, a case can be made that had our ancestors fully embraced the precautionary principle, many valuable innovations, including the development of by-products out of what had previously been waste, would have never occurred. In other words, much historical evidence suggests that new technologies offer not only potential problems, but also important benefits.

4 Conclusion

Although the contributors to this special PIE issue might not share all of the implications I have derived from their research, they remind us of Santayana's famous aphorism that those who forget the past are condemned to relive it. As an emerging perspective, industrial ecology has so far been dominated by scholars whose interests are often limited to the very recent past or the immediate future. It is the hope of this writer that the articles found in this issue will show the value of learning from past failures and accomplishments and that detailed historical research might not only result in better theoretical understanding and policymaking, but also in a greater appreciation of the ingenuity and efforts of past industrialists and their employees.

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Notes

- 1 In their survey of how historians of technology have dealt with the environment, Stine and Tarr (1998) concluded that, while it is difficult to write technological history without touching on some environmental element, it was not until the turn of the 1990s that practitioners of this subdiscipline began to pay sustained attention to this issue. Meisner Rosen and Sellers (1999) similarly observed the paucity of environmental considerations within the field of business history, while Stewart (1998) suggested that environmental historians had traditionally put more emphasis on industrial pollution than efforts to remedy it.
- 2 For more detail on the issue, see the various publications of the Commission of the European Communities (1989; 1996; 2000; 2001; 2003) on the topic.
- 3 Thus, in his classic *On the Economy of Machinery and Manufactures*, Babbage (1835, p.217) pointed out: “Amongst the causes which tend to the cheap production of any article, and which are connected with the employment of additional capital, may be mentioned, the care which is taken to prevent the absolute waste of any part of the raw material.”
- 4 According to the articles 13–17 of the 1996 EU waste management strategy, “The discussion on the distinction between waste and goods has been going on for almost twenty years now.” This issue is often crucial, as several regulatory dispositions in advanced economies often mandate the destruction of ‘waste’.