



The Business Case for a Sustainable Supply Chain

DELL

Making Business Mutual

Case Study 1 | 12 May 2017

This is a descriptive case study, based on publicly available materials as well as on the information shared by the company described. It is not meant to provide critical analysis of the literature or information used to develop it



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Case Name

 Dell: The Business Case for a Sustainable Supply Chain



Dell is among the world's largest computer manufacturers and technology companies. It became a private company in 2013 through an acquisition by Silver Lake Partners, a private equity firm, and Michael Dell, the founder and CEO of Dell.

Dell offers a wide range of IT hardware and software products and services. Its clients include numerous governments, large enterprises, small businesses, and consumer markets. Dell also markets third-party software and hardware. It is known particularly for its direct sales and customisation model and for its innovative supply chain management.

Ecosystem Pain Point

E-waste is the world's fastest-growing waste stream, with a relatively low recycling rate overall (c. 15% globally). Rapid technology innovation and ever-shortening product lifespans are amongst the factors contributing to the growing amount of e-waste. The value of e-waste material is dominated by gold, copper, and plastic content. Particularly plastic is overabundant in landfills.

Responsible e-waste disposal is important from an environmental perspective, but it also makes good business sense; it opens an untapped potential to create a more efficient and sustainable product ecosystem and it reduces dependence on fossil fuels, which have fluctuating prices.

One of the solutions to that problem is to gather and use recycled plastic in products. While recyclers have made technical progress in the past few years, it is still not easy for companies to find sufficient supply of high-quality postconsumer recycled plastic that meets all the technical, economic, and aesthetic requirements of ICT product manufacturers.

Business Strategy

Dell has taken a full lifecycle approach to change its production, use, and disposal of plastic. For example, Dell's product design emphasizes the ease of repair and recyclability from the start. Dell also continually looks for ways to incorporate sustainable materials, such as recycled plastic into products and packaging. Dell's Global Takeback programme makes it easier for customers to dispose of old electronics. For products beyond repair or reuse, Dell offers free recycling for consumers and convenient, secure, and compliant solutions for larger customers.

Performance

The Dell Recycling programme has recovered 1.76 billion pounds of electronics since 2007. Since mid-2014, their closed-loop recycled plastic supply chain has used plastics recovered from recycled computers to create nearly 5,000 tonnes of new parts for more than 90 products across millions of units.

Through collaboration with TruCost, Dell has taken a multi-capital approach to quantify the natural capital benefits of the closed-loop model as well as explored the possibility of measuring the social impact associated with this approach. Financial and environmental savings were also identified in this collaborative work.

Prognosis

The next step for Dell is to scale the programme and to recycle a larger number of different materials through the programme. As Dell looks to the future, expanding collection capacity in developing countries represents a new frontier.

About the Company

Dell is one of the world's largest computer manufacturers and technology companies. Dell sells a wide range of IT hardware and software products and services for enterprise, government, small business, and consumer markets.

Dell is privately held, which has allowed the company to pursue a longer time horizon and commit to changing how Dell uses resources. The principle of efficiency is at the centre of the Dell business model and informs the company approach to resources, sourcing, and waste management.

It is known particularly for its innovative supply chain management.

Ecosystem Pain Point

In this case study, we will outline how Dell uses the concepts of circular economy to address the wider ecosystem pain points described in this section of the case study.

E-waste is the world's fastest-growing waste stream, with a relatively low recycling rate overall. Rapid technology innovation and ever-shortening product lifespans are amongst the factors contributing to the growing amount of e-waste.ⁱ

The amount of global e-waste reached 41.8 million tonnes in 2014, according to a United Nations University report and the total amount of global e-waste may hit 50 million tonnes in 2017, the report warns.ⁱⁱ

Responsible e-waste disposal is important from an environmental perspective, but it also makes good economic sense.ⁱⁱⁱ The material value of global e-waste is estimated to be 48 billion Euro in 2014.^{iv} This opens a lot of untapped potential to create a more sustainable, efficient product ecosystem.

The circular economy takes the traditional, linear model of "take, make and dispose" — which moves products from design to factory to consumer to landfill — and bends it into a more efficient closed-loop ecosystem. When no longer wanted, used electronics can be taken back to be refurbished and resold on the secondary market. Products beyond repair, or no longer economical to repair, are recycled to allow for precious and scarce materials to be recovered. Recycled content can be incorporated into the designed and manufacturing of new products or sold out to the market for others to use.

Research shows that circa 30% of consumers have technology products lying around the house unused, and half of consumers are unsure of what to do with their old electronics.^v According to Dell, similar situations exist with businesses warehousing old equipment. Takeback options make it easy for customers of all sizes to dispose of their old electronic products in a responsible manner, ensuring they get reused or, if at end of life, properly recycled.

The value of the recycled e-waste materials is dominated by gold, copper and plastic content.¹ Plastics recycling is especially challenging and it is a major contributor to landfills.

Plastic is one of the most useful and important materials in modern society. It is popular in computers due to durability, ease of fabrication into complex shapes, and its electrical insulation qualities. However, the production of plastic uses an incredible amount of fossil fuels. Manufacturing of plastics from fuel is resource intensive, requires large amounts of energy and releases relatively high levels of CO2 emissions in the process. Recent research has shown that that our current use of plastics is not sustainable if we don't improve plastics recycling and reduce its usage.

One solution is to use secondary, recycled plastic as feed stock for new computers. With the fast pace of innovation and product upgrades in the ICT sector, using recycled content can reduce the environmental toll of manufacturing with virgin materials.

The circular economy and the development of secondary raw material markets are high on the European agenda. Nevertheless, it is still not easy to find sufficient supply of high-quality postconsumer recycled plastics that meets all the technical, economic, and aesthetic requirements of ICT products manufacturers.^{vi}

The tech giant Dell is making steps towards a more "circular" supply chain. Increased volatility in commodities and growing pressure on resources have alerted Dell to the necessity of rethinking materials and energy use.^{vii} In 2013, Dell committed to putting a total of 50 million pounds of recycled materials back into its products by 2020. The company reached this goal in the beginning of 2017 and is continuing to scale the efforts.

For Dell, sourcing postconsumer recycled plastics from the market and building a new, stable closed-loop supply chain for plastics from used electronics collected through takeback programmes are viable and affordable alternatives to using virgin materials.

**Business
Strategy**

Dell takes a whole ecosystem view of its product lifecycles, which is transforming the way products and services are designed. Dell's lifecycle approach aims to keep viable products and parts in circulation for longer, with global efforts to reuse, refurbish and resell products and parts to extend their lifetimes as much as possible and recycle them at end of life.

Product design emphasizes ease of repair and recyclability from the beginning. Dell also continually looks for ways to incorporate sustainable materials, such as recycled plastic and reclaimed carbon fiber into products and packaging.^{viii}

Jennifer Allison, director of supply chain sustainability at Dell:

"We're talking about systems — not just products, programs or initiatives. Looking at the whole system is when change begins to make a significant difference. Technology is a great tool for measuring and analyzing systems, understanding processes and identifying inefficiencies."^x

The World's Largest Electronics Takeback Programme

Dell has the world's largest electronics takeback program, which operates across 83 countries and territories. The program has recovered approximately 800,000 tonnes of electronics since 2008. For commercial customers, they offer a full-spectrum of logistics and disposal capabilities via the Asset Resale and Recycling Service. This includes data security, on-site shredding, recycling and full traceability reporting. Dell also makes it easy for individual consumers to recycle. They partner with freight companies to provide free mail-back recycling of Dell-branded equipment. In many countries, the program will pick up used equipment from a customer's home.



Another program designed to make recovery of obsolete electronics easier and more accessible is the Dell Reconnect Partnership with Goodwill, a not-for-profit organization committed to helping people become independent through education and training.

The Reconnect Program allows people to drop off any brand of used electronics to more than 2,000 Goodwill locations in the U.S. Dell Reconnect accepts any brand of computer equipment in any condition from consumers and recycles it for free.

The proceeds from donation are all returned to Goodwill and help to support Goodwill's important mission of putting people to work. Customers get a receipt for tax purposes, plus are helping to protect the environment and benefit the community at the same time.

The donated equipment has value—sometimes as a whole system, sometimes as parts, and sometimes as raw materials such as metals, plastics and glass.

If the equipment can be refurbished, Goodwill sells it. If not, the end-of-life product is sent to one of Dell's recycling partners, Wistron, for asset recovery in the U.S. Metals like tin, gold and tungsten are re-sold in the commodities market. Plastics are sorted and shipped to China, turned into pellets and mixed with virgin plastics for use in new Dell products, completing a closed loop.^x

Closed loop recycled plastic supply chain

Dell's 2020 Legacy of Good sustainability plan set the goal of 50 million pounds of post-consumer recycled-content plastics and other sustainable materials in [Dell] products by 2020.^{xi} They met this goal in early 2017.

In 2014, Dell launched its closed-loop recycled plastics supply chain to accelerate progress against their goal of using 50 million pounds of sustainable materials. Since then, they have used more than 10.5 million pounds of closed-loop plastics in new products. The programme is run in partnership with various supply chain partners.

The program entails collecting, recycling and using e-waste to make new Dell products.^{xii} It begins with plastics getting sorted out of the various takeback streams, further processed and then sent to a manufacturing partner in Asia. The plastics are then melted down and moulded into new parts and computer components (a closed-loop system).^{xiii} The whole process – from the time the equipment is received for recycling to the time the plastics are back in a customer's hands as part of a new product – takes less than 6 months.

Dell now offers over 90 products made with closed-loop recycled plastics such as flat panel monitors, desktops and all-in-one computers.

Louise Koch, Corporate Sustainability Lead in EMEA for Dell:

“Dell’s programme is driven by both an effort to improve efficiency – a principle that goes back to its founding ethos and business model – as well as a commitment to reducing environmental impact.”

For the business, the closed-loop system provides a more stable price than the use of virgin materials, which fluctuates with the cost of oil. It also reduces the company’s dependence on environmentally costly virgin materials and building a new, sustainable source of recycled plastics.

Furthermore, by reusing plastics already in circulation, Dell is cutting down on e-waste, reducing carbon emissions and helping drive a circular economy for IT. The closed-loop process has 11% lower carbon footprint when compared to virgin plastic.^{xiv}

The closed-loop plastics supply chain delivers products that are better for the environment, which is increasingly what Dell customers demand.^{xv}

Dell’s leadership in recovering and reusing plastic from used computers is important for transitioning the larger electronics industry toward circular economy. The use of closed-loop plastic may create a demand for plastic from used computers and increase the level of recycling of plastic from electronics. This in return generates new jobs and opportunities for those in the nascent industry.

Dell’s model of a closed-loop plastics supply chain is shown below:



“Moving from ‘business as usual’ to more sustainable life cycles can deliver significant benefits. This however requires a change throughout supply chains, product design and manufacturing, customer engagement, and post-use collection and recycling. In order to build a new supply chain and generate sufficient volumes of closed-loop plastics, Dell has had to work to create new systems,” explained Koch.

Transitioning from a "take-make-dispose" linear supply chain to a circular one is a challenging process. Dell has had to overcome a number of challenges in making the move. There are 4 main challenges that Dell have faced and continues to experience:

Technical Challenges

One of the biggest challenges that Dell faced with the closed-loop recycling was understanding what plastic can be incorporated back into new products. Dell worked with partners to test different approaches. For mechanical and aesthetic reasons, the blend of recycled-content with virgin plastics was needed.

Scott O'Connell, director of environmental affairs for Dell:

"When dealing with plastics, getting the properties equivalent or better to virgin materials isn't easy. But this is a challenge we've been able to overcome with engineering know-how."

Supply-side Challenges

Another challenge involves establishing a reliable closed-loop supply chain.

Scott O'Connell, director of environmental affairs for Dell:

"We had to make sure that we had sufficient volume of product coming in to be able to yield enough plastics to put into a mainstream Dell product."

Supply of products and plastic is coming from Dell's own sources which adds a greater degree of insight and security. However, for the closed-loop recycling to work and scale, Dell needs a security of supply, which can be difficult with fluctuating numbers of products collected through take-back. The situation is further complicated by shrinking form factors – meaning there is less plastic per item recycled as electronics become smaller. Hence Dell needs to continue to drive increasing participation in takeback programs while exploring other means of acquiring recycled-content materials.

Regulation and Geographical Challenges

There is the challenge of moving things around. Dell customers are all over the world, which means take-back happens all over the world. Materials need to be collected in sufficiently dense amounts to make shipping to a centralized processor worth the economic and environmental costs. This involves logistics, regulations, etc. In Europe, for example, closed-border regulation inhibits transportation of electronic waste and at the present makes it unfeasible for Dell to stand up a branch of their closed-loop supply chain there.

Demonstrating the benefits to customers

The final challenge for Dell is to demonstrate the benefits of closed-loop recycling to customers. Ultimately, these products look and perform exactly the same as those made from virgin materials. Dell must communicate the value proposition to customers well, highlighting the amount of recycled content in the final product, the closed-loop nature of the materials, and the benefits to the customers' own sustainability goals.

Performance **Global Takeback and Closed-Loop Recycling Programme**

Since 2008 Dell has taken back more than 1.76 billion pounds (nearly 800 million kg) of used electronics.

Since mid-2014, when Dell launched the closed-loop plastic recycling programme, it has created nearly 5,000 tonnes of plastics from recycled computer parts. Dell has saved more than USD \$1 million from this process, and the carbon footprint of the circular plastics is 11% smaller. Dell now use these plastics in about 90 products across millions of units globally.

Natural Capital Accounting

Together with TruCost, Dell has done an evaluation to understand the gains from moving away from virgin plastics. One of the most useful ways for companies to account for these risks is to quantify the environmental impacts generated by their activities—internal operations, upstream supply chain and downstream product use and disposal—and then convert those impacts into monetary values. The monetary value helps identify the value not captured in traditional financial markets and incorporate these into decision-making.

Dell quantified the greenhouse gas emissions savings derived from using closed-loop plastic and expanded it in the following ways:

- Measured the net benefit for environmental impacts of the closed-loop plastic, compared to traditional plastic.
- Valued the environmental net benefit in terms of natural capital—the stock of natural resources that makes human life possible and upon which businesses rely to produce goods and services.
- Scaled these benefits to larger applications, including utilizing closed-loop plastic across many of Dell's product lines.
- Prepared a framework for incorporating social and financial impacts into the net benefit valuation in the future.

“The results show that Dell's closed-loop plastic has a 44% (\$1.3 million annually) greater environmental benefit compared to virgin ABS plastic. Of critical importance to the net benefit of Dell's closed-loop plastic is increased recycling of computers—diverting them from disposal—to recover and recycle the used plastic. The closed-loop plastic's human health and ecotoxicity impacts are smaller because of the increased computer recycling and the resulting decrease in the emission of hazardous substances.”^{xvi}

“To expand the measurement of net benefits of closed-loop plastic recovery, production and use, social impact metrics can be incorporated into the valuation framework and analysis. Similar to measuring how business activities have environmental impacts, activities can be analyzed for how they use social and human capital by applying appropriate key performance indicators (KPIs). These social impact frameworks still are emerging and further refinement will help improve their application over time.”^{xvii}

Prognosis

- On a global scale, there is still a huge potential to scale up circular resource streams in the IT sector and beyond. Only 10% of the plastics produced today are recovered – and more than 50% end up in landfills.

- Dell has increased the use of recycled materials (both closed-loop and traditional postconsumer recycled plastics) in new products and Dell plans to continue to scale the programme.
- As Dell continues to scale the current programme, they will look to expand into reclaiming and reusing other materials. They have already had success with using reclaimed carbon fiber for products and are currently using recycled ocean plastics for packaging.
- Dell will also look at how ocean plastics or other solutions can be used with products.
- Dell will continue to measure using the same methodology, updating models for collection totals to follow form-factor trends. And it will report progress annually, building on this total toward a cumulative 2 billion pounds by 2020.^{xviii}
- Dell continues to lead conversations with governments and industry partners about recycling and circular loops on a global scale. Dell is open to innovative collaborations with even more customers, partners and governments in the coming years. Dell sees particular opportunities in creating partnerships in developing countries to strengthen this ecosystem:

As we look to the future, creating closed-loop recycling programs in developing countries represents a new frontier. Recycling products in the countries where they're recovered brings skilled jobs, creates industry and strengthens the local economy. Using our proven abilities to leverage partnerships and government relationships to create the infrastructure needed for new programs, we can continue driving a culture of recycling in communities around the world.^{xix}

Endnotes

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Definitions:

"E-waste is a term used to cover all items of electrical and electronic equipment (EEE) and its parts that have been discarded by its owner as waste without the intent of reuse" United Nations University, The Global E-waste Monitor 2014. <https://i.unu.edu/media/unu.edu/news/52624/UNU-1stGlobal-E-Waste-Monitor-2014-small.pdf>

Saïd Business School

Saïd Business School at the University of Oxford blends the best of new and old. We are a vibrant and innovative business school, yet deeply embedded in an 800-year-old university. We create programmes and ideas that have global impact. We educate people for successful business careers, and as a community seek to tackle world-scale problems. We deliver cutting-edge education programmes and ground-breaking research that transform individuals, organisations, business practice, and society. We seek to be a world-class business school community, embedded in a world-class university, tackling world-scale problems.

Mars Catalyst and the Economics of Mutuality programme

Mars' approach to business has been guided by Five Principles – Quality, Responsibility, Efficiency, Freedom and Mutuality for a long time. Together they inform and guide the actions of all Mars associates every day as they do their jobs and interface with the outside world.

The origins of the Mutuality principle go back to 1947 when Forest Mars Snr who led and grew the business through the 1920's to the 1960's, wrote a letter to all the then 500 associates of the company that said that the sole purpose of the company was to create a mutuality of benefits with all stakeholders that the company touched from suppliers to customers as well as governments and competitors and naturally associates and shareholders. This far-sighted thinking, that the company could only be successful if everyone around the company was being successful, has been a cornerstone of our business philosophy ever since.

Mars has therefore always been interested in how it can best live up to this principle and find new ways to drive mutuality with all stakeholders it touches. This led, a number of years ago, to Mars leadership tasking Mars' economic research unit, Catalyst, to start new work into unexplored territory for business to identify critical drivers of mutuality and to develop and test through business pilots new metrics and management practices that can help boost mutuality in business situations. This work has been called the Economics of Mutuality.

This work has established promising links between increasing social, human and natural capital (that can be measured with simple & stable metrics) and thereby increasing financial capital – demonstrating how a company can do both good and well at scale. A number of pilots have now been completed in the area of micro-distribution, the employees of Mars and in agricultural development that suggest that these relationships are true in different places and situations.

The Oxford Mars partnership

On the back of these promising findings, a multiyear partnership with Oxford University's Saïd Business School was established in 2014 to focus on the development of a business management theory for the Economics of Mutuality with corresponding teaching curriculum, new management practices, and case study research. The research programme has combined the pursuit of normative questions – what is mutuality and how should it be enacted? – with grounded, ethnographic research on current thinking and practices. This has led to the development of field experiments and case studies examining how large corporate actors conceive of and pursue responsible business practices, and how these relate to their financial and social performance.

The broader idea being to demonstrate that businesses based on mutuality, that look to ensure all stakeholders are successful, can be more successful than businesses that focus on just their shareholders.

The intent going forward is to continue to research this topic and create a broader platform where other companies and academic institutions can share their learnings and experiences to advance the collective understanding of how to drive mutuality in business.

Mutuality in Business

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